



Clinical Reasoning in Modern Orthopaedic Medicine

A practical diagnostic guide by using a standardized assessment form
2nd edition



Steven L.H. De Coninck, MSc PT

In collaboration with :

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Maurizio Leone, PT
Giuseppe Ridulfo, MD

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To my colleagues and patients who inspire me and make me think and re-think.

To my co-authors and respected team members.

To my wife who appreciates my passion, regardless of the sacrifices.

To my children who never would be born, without the passion for orthopaedic medicine...surprise...

To Dr. J. Cyriax for not only creating the stepstones...

About the authors

The authors are international lecturers of the European Teaching Group of Orthopaedic Medicine (Cyriax)

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Steven is working in De Haan (Belgium) as a private practitioner since 1989. In his practice he focuses exclusively on diagnosis and treatment of soft tissue lesions. He is the chairman of ETGOM; as an international lecturer in Modern Orthopaedic Medicine he taught continuing education courses in about 30 countries. He wrote different books, produced a series of films on orthopaedic medicine and prevention of back problems and created the new orthopaedic assessment forms. Inspiring therapists and facilitating examination and treatment procedures is his passion.

Jožica Zupančič



Jožica Zupančič was born in 1961 in Slovenia. She graduated as a PT in 1983, since then she has been working at a Health Care Center in Trebnje.

In 2002 she joined the ETGOM teaching team, mainly teaching courses in Slovenia, Croatia, Poland and other countries.

In 2005 she got the highest award for achievements in introducing a new method to Slovene physiotherapy.

In 2010 she was the co-producer of the ETGOM DVD's.

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Physiotherapist since 1983. Private practice in Sestri Levante (GE) Italy. He has a passion for Manual Therapy and Orthopaedic Medicine: McKenzie, Maitland and Cyriax courses in 1989-1995. Cyriax teacher since 2002.

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Extensive individual CV's can be consulted on www.cyriax.eu

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Introduction

A patient suffers from a shoulder or a lumbar problem: on consulting, hypothetically, 10 different therapists he might receive 7 different diagnoses?

Does this imply that we, therapists, “miss the ball”? Not necessarily... it merely implies we speak different diagnostic languages and we use a variety of tools to reach a diagnosis, tools which sometimes have poor validity.

As a consequence, certain “diagnoses” are merely the result of a momentary subjective intraindividual interpretation of the therapist. “Specificity” is often claimed for, but may not be confused with “wishful thinking”.

Perhaps we need to focus more on relevant questioning and testing ?

During the past 20 years I had the opportunity to teach courses in Modern Orthopaedic Medicine in about 30 countries, which is very inspiring. This gave me an interesting view on how therapists, globally, deal with soft tissue lesions.

It strikes me that some treatment strategies, still fail to have a solid diagnostic basis.

On the question “Why do you do this procedure and what exactly do you hope to achieve?” I receive most remarkable answers in a range varying from “I don’t know exactly” to something that can be defined as “artificial hypercomplication”, lacking quite some objectivity and validity.

Apparently often the focus merely lies on executing a series of treatment techniques, instead of establishing, if possible, a reliable diagnosis? On asking “How did you reach this diagnosis?”, the answers often lack any validity too, the nr. 1 answer mostly is: “because I felt it !”

Analyzing soft tissue lesions is mainly an issue of interpreting what is happening within the different anatomical structures. There is no need for an artificial hypercomplication of certain procedures, that perhaps can be illustrated “in vitro”, but often fail to prove any clinical relevance nor practical reliability when executed upon patients.

*Whatever the diagnosis might be, the main question for me still remains : “On the basis of which **relevant** elements from the history, inspection and functional examination do we come to a specific or a non-specific conclusion ?”*

This was for me the main stimulation to create the new “Orthopaedic Assessment Forms”, a standardized examination system.

It is the purpose of this publication to give you a very practical and detailed in-depth analysis of the clinical reasoning procedure, constantly bearing in mind an open vision mentality in combination with standardisation.

In fact this publication gives an overview of what could happen in the “random access memory” of our brains, while assessing a patient.

What is the relevance and diagnostic interpretation of the questions we ask to our patients and the tests we carry out? How do we interpret everything?

It is very important to emphasize the fact that one positive sign found in the examination, has no diagnostic value whatsoever; it is imperative to discover the different clusters of positive and negative signs that point in the direction of a certain lesion.

I also wish to motivate colleagues who are active in research fields, to implement this strategy in some study set ups.

This book can be accompanied by the ETGOM USB stick, containing about 7.36 GB film material illustrating, in a very practical way, all basic and accessory functional examination procedures described in the book, all deep transverse friction massage and manipulation techniques of the spine and the extremities, described in my previous publications.

We also provide blank orthopaedic assessment forms of each joint, ready to use in your clinical practice.

Every chapter is a well defined entity, although links between several joints are described. The practical aspect of all treatment procedures is not part of this book, but is described in detail in my previous publications.

I wish the reader a pleasant and successful discovery of objective clinical reasoning.

Steven De Coninck.

How to use the assessment forms

This book is in fact a continuation of my previous publications (*see reading list p157*).

A good understanding and knowledge of the basic examination and treatment procedures used within Modern Orthopaedic Medicine Cyriax is an advantage in appreciating and understanding the clinical reasoning strategy described in this book. I also make a link to e.g. some McKenzie clinical reasoning elements, since I strongly believe that the combination of certain concepts even enhances the overall efficiency.

Using a standardized protocol automatically facilitates documentation and communication among therapists.

This procedure doesn't have to be time consuming. In fact, as an experienced therapist, we need about max. 10-15 minutes to perform a basic shoulder evaluation.

The easiest way to work efficiently with the assessment form is for us to guide the procedure. On asking the patient "What can I do for you?", it is possible that the patient starts giving you a "speedy story" which often is incoherent and non-chronological, but nevertheless contains interesting information. During this story, trying to incorporate immediately the different data in the correct fields on the form, is far from easy; in fact it is stress !

When the patient reaches the end of his story, we keep in mind some interesting information, and from that point on we can take over and we can start with the history, step by step, following the different sections.

Make sure we ask neutral questions, don't put any words in the mouth of the patient. Formulate your questions as clear and as simple as possible. A simple, understandable question is often followed by a clear answer.

For practical reasons we only fill in the data which are positive in the examination process; sections/subsections which are negative are left blank (*cfr. case studies*).

When performing the functional examination, bear in mind the different variables which are valid for each test. Therefore, in section 4 of each assessment form, the variables which are not valid for a specific test are marked grey.

Also bear in mind the effect each test has on the symptoms of the patient: does anything change: worse, better, production of new symptoms, where?

So, first we collect all our puzzle pieces and then we can interpret the story of the patient and the cluster of positive/negative tests we found. Avoid jumping to conclusions too fast.

Only start a treatment strategy after reaching a (*preliminary*) diagnosis and take into account the expectation pattern we have for each lesion (*in that perspective I refer to my previous publications*). If the evolution does not accord with our expectation pattern, then re-assess and perhaps re-direct the strategy.

A symbiotic treatment approach is often suggested. In my humble opinion there are no "holy methods", through which everything can be analysed and treated.

Whatever we do, we must make sure that we are able to control, if possible in an objective way, the (*immediate*) effect of our treatment strategy.

Chapter I: The Shoulder

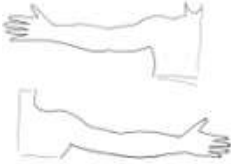
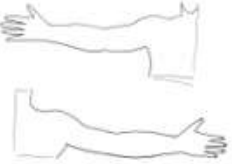
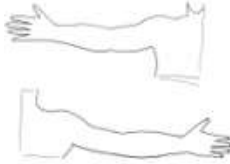
Section 1: General information		© Shoulder Assessment Form
Date:	Name:	
Address:		
Date of birth:	Sex: m – f	
Referral / diagnostic information:		

- Age

In general, age is not a determining differential diagnostic factor. Of course, arthrotic changes are more often in an elderly population.

A traumatic arthritis doesn't seem to occur under the age of 45 years (40 years if the patient already had a shoulder fracture), so, in that case, a trauma will more likely result into another type of lesion. Frequent shoulder lesions such as a supraspinatus tendinitis, -osis or a bursitis can occur at any adult age.

A steroid sensitive arthritis, with spontaneous onset, occurs mostly between the age of 45 - 60 years.

Section 2a: Specific history			
What is your main complaint: pain – paraesthesia – limitation of movement – hypermobility – weakness			
PAIN When did it start: How did it start: spontaneously overuse injury describe			
Can you lie on that side: sleeping position			
How can you influence the pain; what makes it worse or better:			
Evolution since the start: better-worse-unchanged			
Evolution	Start →	Evolution →	Now
Where do you feel the pain:			
Does the pain spread as far as the elbow beyond the elbow			
Pain quality: VAS score 0-10 constant-intermittent twinges-at rest during the day-at night during-after activity			
PARAESTHESIA Where: When: constant-intermittent at rest-during the day- at night-on activity (which)			
LIMITATION ROM (subj)			
HYPERMOBILITY (subj)			
WEAKNESS (subj)			

- What is your main complaint

Pain

Does the pain originate from a local lesion or is it referred from the cervical spine? Is it a C4-dermatome pain, possibly incriminating the acromioclavicular joint or the diaphragm, a C5-pain, pointing towards any shoulder structure or is it a multi-segmental pain referred from e.g. the dura mater, making us think of an internal derangement or discodural conflict?

Paraesthesia

Paraesthesia in relation to a shoulder problem are very rare. In case of paraesthesia we need to examine the cervical spine first and establish a possible link. Beware of multi-segmental paraesthesia in relation to spinal cord compression. Other diagnostic options are discussed in relation to wrist pathology.

Limitation of movement

Bear in mind that a tendinitis, -osis, *never* causes a limitation of passive movement. The active movement can be limited because of pain. Is there a real limitation of movement in the capsular pattern or in the non-capsular pattern? The functional examination will be conclusive.

Hypermobility

A patient who describes hypermobility problems, perhaps has an unstable shoulder and therefore further tests from the accessory examination are called for.

Weakness

Is it a real weakness due to e.g. a partial or a total tendinous rupture or a nervous problem (*mononeuritis or compression of a cervical nerve root*) or is it weakness because of too much pain on performing a specific test?

- Pain

When did it start

This is interesting information since several lesions do have a spontaneous evolution:

- an acute subdeltoid bursitis takes about 6 weeks to recover
- a traumatic arthritis needs up to 1 year
- a steroid sensitive arthritis needs up to two years

During this spontaneous evolution the clinical image can change and depending on those changes, the treatment strategy can be different. The treatment of a stage I arthritis is completely different from a stage III arthritis.

How did it start

A trauma mentioned in the history, in combination with a capsular pattern found in the functional examination, points in the direction of a traumatic arthritis.

Tendinitis is mostly the result of overuse (*RSI, repetitive strain injury*) or a trauma.

A chronic subdeltoid bursitis and a steroid sensitive arthritis mostly have a spontaneous onset: the patient mostly cannot describe any clear triggering factor (*"I don't know; I woke up with it"*).

If there was a trauma also beware of a fracture, a ligamentous rupture or a SLAP-lesion (*superior-labrum-antero-posterior-lesion*).

Can you lie on that side

In case of an arthritis, this is one of the questions we use to determine the stage of the arthritis (*see further*).

How can you influence the pain

We ask the patient which movements, positions or activities produce, worsen or abate his pain. This information should correlate with the data obtained after the functional examination. We also use this information as a reference point to interpret the evolution during treatment.

A “big” story should go together with a “big” clinical image, if not, this is an inherent unlikelihood possibly pointing in the direction of a partly psychogenic involvement.

Evolution since the start

Is it worse, better or unaltered since the beginning of the complaints? Mind specifically the presence of shortening pain (*centralisation = favourable*) or more radiation (= *unfavourable*). This will become obvious on the body chart.

Where do you feel the pain

The patient of course describes his actual symptoms, but it is also interesting to know where his complaints started. Remember that the lesion always lies in the neighbourhood of the first pain (*exception: lesions of nervous structures*), that’s why it is very interesting to inform about the localisation of the first symptoms.

Since the start, is there any centralization of symptoms or not?

Radiation that goes further than the elbow or not is a second element that helps us to determine the stage of an arthritis (*see further*).

How would you describe your pain quality

Describing the intensity of the pain is of course a subjective matter, therefore we use a VAS score. Normally severe pain always goes together with more radiation (*exception: bony structures, e.g. fracture*).

Is the pain constant or intermittent? Constant pain implies automatically the presence of pain at rest, so we make sure to ask the patient what he is feeling now, at this moment, during the history taking. If constant pain is present, the nature of the problem will most likely have an inflammatory component. Real constant pain implies a chemical factor (*inflammation*).

Soft tissue lesions mostly cause intermittent pain. Pain at night does not necessarily mean that a chemical factor is dominant: the patient can wake up because of mechanical reasons e.g. while turning in bed, he felt a twinge, waking him up.

Mostly patients describe complaints during activities; in some cases there could be some “after pain”. It is interesting to know how long the after pain lasts.

- *Paraesthesia*

As described above, rarely paraesthesia are related to a shoulder problem; mostly there is a cervical link or a link with a carpal tunnel syndrome. I refer to the specific chapters on those topics.

- *Subjective limitation of movement: hypermobility or weakness*

We ask the patient if he has a subjective feeling of hypermobility or weakness. In a previous section he already described which activities are problematic, but in this type of assessment we prefer to build in some double checks.

The information gained needs to be correlated with the information gathered from the functional examination.

Section 2b: General history	
Description of typical exertion during professional or leisure activities:	
Off work since:	Previous treatments when: what sort of treatment: results:
Are there any other joints affected which:	Medical imaging results:
Recurrences when: frequency: cause:	Medication which: Surgery:

- *Off work?*

If this is the case, then this should be in relation to the nature of his lesion.

- *Simultaneous problems in other joints*

Here we are looking for a link with a possible rheumatoid arthritis, perhaps in relation to systemous diseases.

- *Recurrences*

Is it the first time you have this problem? When did you have it before; how long did it take; was it OK since then, or did it become chronic; do you remember what triggered it?

- *Previous treatments*

This information is merely background information, since it is not always relevant. If the patient received treatment before for the same problem from another therapist, then he cannot always describe what exactly was done.

Keep in mind following: it is not because a certain procedure didn’t afford any relief e.g. 4 weeks ago, that it won’t now. Clinical images can vary in due time, so focus on the actual clinical presentation and then determine your treatment strategy.

- Medical imaging

Don't treat X-rays! Treat a patient who presents with a certain clinical image.

An arthrotic patient (*visible on X-ray*) can also have a bursitis or a tendinitis (*not visible on X-ray*). A calcification visible on X-ray is not necessarily responsible for the actual complaints. Be aware of false positives and false negatives.

The main advantage of medical imaging is to establish certain important differential diagnoses.

- Surgery

A patient who had a mastectomy for 3 years and now has a presumable shoulder problem deserves extra attention. Beware of any inherent unlikelyhoods that might appear. (*Soft tissue lesions are typical lesions: you always hear the same elements in the history and see the same patterns in the clinical presentation, typical for that particular lesion; when we are confronted with elements that do not correspond with our expectation pattern for a specific lesion, we call this inherent unlikelyhoods*).

Section 3: Inspection	
Special remarks:	Deformity: sternoclavicular joint – clavicle – acromioclavicular joint; left – right
Colour changes where:	Wasting where:
Swelling: local – diffuse where:	Position of the scapula: caudal/lateral – scapula alata left – right

Analyse the posture of the patient. Analyse the movement of the scapula during active movement.

Swelling is rather rare and can occur in the case of a subdeltoid bursitis.

Is there a deformity in the sternoclavicular joint, making us think of a Tietze syndrome or a subluxation? An acromioclavicular deformity could be related to a dyslocation or fracture.

Wasting is sometimes seen in case of a longstanding arthritis (*atrophy of deltoid*), after a rotator cuff rupture, or in case of a mononeuritis of the suprascapular nerve (*atrophy of supraspinatus and infraspinatus*) or the spinal accessory nerve (*atrophy of the trapezius*).

A caudal/lateral displacement of the scapula points in the direction of a mononeuritis of the spinal accessory nerve, with weakness of the trapezius (*accessory test, see further*). A scapula alata is due to a weakness of the serratus anterior (*accessory test, see further*), because of a mononeuritis of the long thoracic nerve.

Section 4: Basic functional examination				
Variables: pain (where and when), ROM (normal, limited, excessive<; in what degree), end-feel (normal, muscle spasm, harder) and weakness.				
Not painful / limited:	-	Painful / limited:	+	
Slightly painful / limited:	+/-	Very painful / limited:	++	
	Pain	ROM	End-feel	Weakness
Pre-test pain at rest				
A bilateral elevation				
P elevation				
Painful arc: up – down – forward arm in lateral rot. arm in medial rot.				
P glenohumeral abd.				
P lateral rotation				
P medial rotation PA + or –				
R abduction				
R adduction				
R lateral rotation				
R medial rotation				
R elbow flexion				
R elbow extension				
Remarks, what happens on repeated testing:				

- Pre-test pain at rest

Always inform about the presence of a pre-test pain: where is this pain and how is it going to be influenced by the tests. Does it get worse or better; is a new pain produced somewhere else or is there no change?

If there is no pain at rest, are we able to produce pain by performing tests and where is it produced?

- Active bilateral elevation

We interpret pain and range of motion. Where and when is it felt; also have a look at scapular motion during this movement.

- Passive elevation

We interpret pain, range of motion and endfeel (*elastic*). End range pain on passive elevation can also be a localizing sign in case of a tendinitis (*supraspinatus/infraspinatus tenoperiosteal aspect*). End range pain is also typical in case of a chronic subdeltoid bursitis, in combination with end range pain on passive rotations.

- Painful arc

We ask the patient to lift up the painful arm again, slowly, and we ask him to tell what he feels, when and where. A painful arc is a very important localizing sign and provides interesting diagnostic interpretations.

Mostly the tenoperiosteal part of the supraspinatus is squeezed. When the movement is performed with the shoulder in lateral rotation and palm of the hand facing upwards, we compress more the subscapularis; performed with the shoulder in medial rotation, infraspinatus is more compressed. On doing an anterior elevation combined with lateral rotation, the long head of biceps is more compressed. Anyhow, one single positive test is never conclusive; a cluster of positive tests has a more significant meaning.

If we cannot detect a painful arc in an active way, because the movement is too painful, we try to provoke a painful arc in a passive way: if positive, then this most likely points in the direction of a severe calcification (*in such a case a treatment with deep friction massage is not indicated; Extracorporeal ShockWave Therapy is more beneficial*).

- Passive glenohumeral abduction

Now we are only interested in the glenohumeral movement and we want to exclude the scapular rotation.

We block the lower angle of the scapula, thus blocking the normal 60° of scapular rotation. We interpret pain and range of movement.

- Passive rotations

We interpret pain, range of movement and endfeel (*elastic*). Make sure you reach the real end of the movement, because some pathologies (*e.g. subdeltoid bursitis, AC-joint sprain, instability*) only cause end range pain.

Another sign that might point in the direction of a chronic subdeltoid bursitis is the presence of a painful arc during medial rotation; so, on performing the test movement, stop at the first pain, interpret and try to proceed with the movement.

End range pain on passive rotations and passive elevation is typical for e.g. a chronic subdeltoid bursitis or an acromioclavicular lesion. In the latter case the pain will be felt in the C4-dermatome instead of the C5-dermatome and one accessory test (*passive horizontal adduction*) will be clearly positive.

End range pain on rotations and elevation is also seen in case of a sprain of coracoclavicular ligaments; in that case, scapular movements can also be painful.

In case of an acute subdeltoid bursitis the passive movements are quite painful and limited in a non-capsular pattern; especially passive abduction is very limited; there is certainly no painful arc.

- Resisted abduction

Variable pain

The main interpretation is a lesion of the supraspinatus. Compression of an inert structure (*mostly subdeltoid bursa*) is also possible. In the latter case, we can do some accessory tests (*see further*).

A real lesion of the deltoid is extremely rare.

Variable weakness

Weakness could be related to a complete or a partial rupture of the supraspinatus. Compression of the C5-nerve root or axillary nerve is also possible. A mononeuritis of the suprascapular nerve also causes weakness, as well as metastases in the acromion.

- Resisted adduction

Variable pain

We think of pectoralis maior, latissimus dorsi, teres maior and teres minor. How can we differentiate? Teres maior is also a medial rotator, teres minor is a lateral rotator, so those tests should be positive too. Pectoralis maior causes more anterior pain, as the others cause more posterior pain. All of them are rare lesions.

Variable weakness

The most common cause of weakness is pressure on the C7-nerve root by a C6 disc protrusion, causing motor deficit.

- Resisted lateral rotation

Variable pain

Firstly we think of infraspinatus, secondly of teres minor (*also pain on resisted adduction*). Compression of an inert structure (*e.g. subdeltoid bursa*) is also possible.

Variable weakness

Weakness could be related to a complete or a partial rupture. Compression of the C5-nerve root, by a disc or an osteophyte, is also possible. A mononeuritis of the suprascapular nerve also causes weakness on resisted lateral rotation and abduction.

- Resisted medial rotation

Variable pain

The first choice is subscapularis; the second choice is pectoralis maior, latissimus dorsi and teres maior (*also pain on resisted adduction*). A subscapularis lesion is, in relation to the three other structures, the most frequent one.

Variable weakness

We think of an, extremely rare, rupture of the subscapularis tendon.

- Resisted elbow flexion

Variable pain

We think of a biceps lesion in the bicipital groove or in the intracapsular extent; in the latter case a painful arc is present.

Variable weakness

Partial or total rupture is one possibility; compression of the C5 and/or C6 nerve root(s) is another.

- Resisted elbow extension

Variable pain

This is a test for triceps, but this lesion is very rare. If this test provokes pain in the C5-dermatome, then we think of compression of a C5-structure (*most likely the subdeltoid bursa*).

Variable weakness

The most common cause is pressure on the C7-nerve root or radial nerve compression.

Section 5: Accessory functional examination	
Not necessarily all tests have to be carried out; the variables we test are mentioned between brackets. We use the following quotation: test is positive = +; test is negative = -	
P horizontal adduction (pain)	Scapula adduction against resistance (weakness)
P lateral rotation from 90° abduction (pain)	Resisted forward movement from 90° abduction (pain)
P lateral rotation from 90° abduction (ROM)	Resisted backward movement from 90° abduction (pain)
Apprehension test for anterior instability (ROM)	Resisted horizontal adduction (pain)
Apprehension test for posterior instability (ROM)	Resisted antepulsion (pain)
Push against the wall with both arms (pain)	Resisted adduction with elbow 90° flexed (pain)
Push against the wall with both arms: scapula alata (weakness)	
Remark: is there any difference in response on resisted tests, from the basic examination, between the standing position and the lying position:	

Only when the basic examination didn't provide enough information to reach a useful diagnosis, then we have to perform one or more accessory tests.

- Passive horizontal adduction

This test will be clearly positive in the following three cases: lesion of the AC-joint, subcoracoid bursitis and a subscapularis tendinitis at the caudal aspect of the tenoperiosteal junction.

- Passive lateral rotation from 90° abduction

For what is concerned the variable ROM, we compare this test with the normal execution of the lateral rotation as carried out in the basic examination. We use it to differentiate between a subcoracoid bursitis and anterior capsular adhesions. In case of a bursitis we find an increased ROM, when carried out from 90° abduction, whereas in case of adhesions, there is no difference in ROM.

If there is a lesion of the coracoclavicular ligaments, this test is also painful, specifically at end range.

- Apprehension test

If the patient mentions instability complaints in the history we try to provoke this specific instability feeling by using those tests. Pain itself is not considered as being a positive answer; we really want to provoke the patient's instability feeling.

- Push against the wall with both arms

If this test is painful we think of a serratus anterior lesion; scapula alata is a sign of weakness of the serratus anterior: this could be related to a long thoracic mononeuritis.

- Scapula adduction against resistance

This test will be weak in case of weakness of the trapezius: this could be related to a spinal accessory mononeuritis.

- Resisted forward/backward movement from 90° abduction

Those tests are used to exclude the deltoid muscle as the culprit. A real deltoid lesion seems to be extremely rare. Pain in this area is mostly referred.

- Resisted horizontal adduction

We test the pectoralis maior.

- Resisted antepulsion

We test the coracobrachialis.

- Resisted adduction with elbow 90° flexed

This test is compared with the normal execution of the adduction as carried out in the basic examination: pain on performing the normal version and no pain during the version with the elbow flexed, points in the direction of a rare lesion of the origin of the biceps cranial of the glenoid fossa; in more severe cases further examination is necessary to exclude a SLAP lesion.

- Remark

If resisted tests hurt in the standing position and they hurt less or not in the lying position, then we don't think of a lesion of a contractile structure, but we think of a painful compression of an inert structure e.g. the subdeltoid bursa.

Section 6: Palpation	
Pain (slight – moderate – severe) where:	Sensory deficit where:

Palpation for pain/tenderness should always be the result of the outcome of the functional examination. We never start an examination procedure with palpation, since the information obtained in that way often is very unreliable. The clinical image shows us which structure or group of structures is responsible for the complaints and only in the absence of localizing signs we palpate in this specific structure for tenderness in order to localize the lesion.

Section 7: Conclusion - Diagnosis
Lesion: local – referred
Lesion of an inert structure; which one:
Lesion of a contractile structure; which one:
Localizing signs:
DIAGNOSIS:
Undecided

Take into account that a double lesion can be present: inert and/or contractile. Sometimes one doesn't discover the two lesions during the first visit of the patient. This is quite normal, since one lesion can be more dominant or acute than the second lesion. On examination the clinical image of the more severe lesion is obvious, the other one is less obvious. Therefore it is very useful to repeat the examination procedure several times during the treatment sessions; this will allow you to discover, at a later stage, the second lesion which was at the beginning less obvious, but became now more clear because of the improvement of the first lesion.

Differential diagnostic hints

Remember following localizing signs:

Painful arc →

- Supraspinatus, tp, superficial
- Infraspinatus, tp, superficial
- Subscapularis, tp, cranial aspect
- AC-joint, deep part
- Chronic subdeltoid bursitis
- Intracapsular lesion of the biceps

End range pain on passive elevation →

- Supraspinatus, tp, deep
- Infraspinatus, tp, deep
- AC-joint, superficial part

Passive horizontal adduction →

- Subscapularis, tp, caudal aspect

Capsular pattern:

Capsular pattern of the shoulder:

Limitation in three directions: lateral rotation > abduction > medial rotation.

In combination with a hard end-feel, think of arthrosis.

In combination with a muscle spasm end-feel, think of an active lesion, arthritis.

Remember three questions from the history to determine the stage of an arthritis:

- Do you have pain at rest?
- Is there any radiation of pain below the elbow?
- Can you lie on that side?

If three questions are in an unfavourable way, then the shoulder is very irritated, a stage III.

Three favourable answers point in the direction of less irritation, a stage I.

A stage II is a combination of favourable and unfavourable answers.

Resisted tests painful and/or weak?

Total rupture: resisted test weak and painless

Partial rupture: resisted test weak and painful

Mononeuritis: resisted test weak and painless

Section 8: Treatment procedure / analysis	
Date first treatment:	Date last treatment:
Treatment strategy:	
Evolution / treatment adaptation:	
Total number of treatment sessions:	
Results:	

For every lesion we have an expectation pattern; if this pattern is not fulfilled, then we need to react i.e. re-assess and, if necessary, change the treatment strategy. Therefore it is always interesting to repeat the examination procedure at different times during the treatment sessions.

Case study Shoulder

Section 1: General information	Shoulder Assessment Form
Date:	Name : Peters B.
Address:	
Date of birth: 24/10/1966	Sex: m – f Profession/hobby: account manager
Referral information / diagnostic information: chronic subdeltoid bursitis	

Section 2a: Specific history			
What is your main complaint: pain – paraesthesia – limitation of movement – hypermobility – weakness			
PAIN When did it start: about 5 weeks ago How did it start: spontaneously : “I don’t know; I woke up with it” overuse : perhaps it’s because I did some intense garden work; a lot of arm movements above the horizontal were involved injury describe			
Can you lie on that side: it’s sometimes difficult to lie on one side; sometimes I wake up because of pain sleeping position			
How can you influence the pain; what makes it worse or better: elevation movements are painful, as well as rotation movements (i.e. putting arm in the sleeve of my jacket, closing bra			
Evolution since the start: better- worse -unchanged			
Evolution	Start →	Evolution →	Now
Where do you feel the pain:			
Does the pain spread as far as the elbow beyond the elbow			
Pain quality: VAS score 0-10 constant- intermittent twinges -at rest during the day- at night during -after activity	4		7 Twinges on certain movements/ at night on turning +
PARAESTHESIA Where: When: constant-intermittent at rest-during the day- at night-on activity (which)			
LIMITATION ROM (subj)			Abduction/internal rotation
HYPERMOBILITY (subj)			
WEAKNESS (subj)			

Section 2b: General history	
Description of typical exertion during professional or leisure activities: office work; gardening, swimming	
Off work since: no	Previous treatments when: what sort of treatment: results:
Are there any other joints affected which: no	Medical imaging results: not available
Recurrences when: frequency: cause:	Medication which: NSAID Surgery:

Section 3: Inspection	
Special remarks:	Deformity: sternoclavicular joint – clavicle – acromioclavicular joint; left – right
Colour changes where:	Wasting where:
Swelling: local – diffuse where:	Position of the scapula: caudal/lateral – scapula alata left – right

Section 4: Basic functional examination				
<i>Variables:</i> pain (where and when), ROM (normal, limited, excessive; in what degree), end-feel (normal, muscle spasm, harder) and weakness.				
Not painful / limited: - Painful / limited: + Slightly painful / limited: +/- Very painful / limited: ++				
	Pain	ROM	End-feel	Weakness
Pre-test pain at rest	+/- prox. C5 dermat.			
A bilateral elevation	+	+		
P elevation	++		elastic	
Painful arc: up – down – forward arm in lateral rot. arm in medial rot.	+ More painful			
P glenohumeral abd.				
P lateral rotation	+ end range		elastic	
P medial rotation PA + or –	+ end range		elastic	
R abduction	+/-			
R adduction				
R lateral rotation	+/-			
R medial rotation				
R elbow flexion				
R elbow extension				
Remarks, what happens on repeated testing: Repeated resisted tests: not consistently positive				

Section 5: Accessory functional examination	
Not necessarily all tests have to be carried out; the variables we test are mentioned between brackets. We use the following quotation: test is positive = +; test is negative = -	
P horizontal adduction (pain)	Scapula adduction against resistance (weakness)
P lateral rotation from 90° abduction (pain)	Resisted forward movement from 90° abduction (pain)
P lateral rotation from 90° abduction (ROM)	Resisted backward movement from 90° abduction (pain)
Apprehension test for anterior instability (ROM)	Resisted horizontal adduction (pain)
Apprehension test for posterior instability (ROM)	Resisted antepulsion (pain)
Push against the wall with both arms (pain)	Resisted adduction with elbow 90° flexed (pain)
Push against the wall with both arms : scapula alata (weakness)	
Remark: is there any difference in response on resisted tests, from the basic examination, between the standing position and the lying position: Resisted tests in lying are clearly less positive than in standing!	

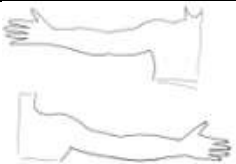
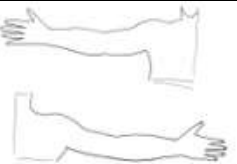
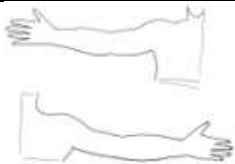
Section 6: Palpation	
Pain (slight – moderate – severe) where: a circular zone of 2cm in the subdeltoid part of the subdeltoid bursa	Sensory deficit where:

Section 7: Conclusion
Lesion: local – referred
Lesion of an inert structure; which one: subdeltoid bursa, subdeltoid part
Lesion of a contractile structure; which one:
Localizing signs:
DIAGNOSIS: chronic subdeltoid bursitis
Undecided

Chapter 2: The Elbow

Section 1: General information		© Elbow Assessment Form	
Date:		Name:	
Address:			
Date of birth:		Sex: m – f	
Referral / diagnostic information:			

Age mostly is not a determining diagnostic factor.
A tennis elbow occurs mainly between the age of 30 and 60 years. For what is concerned a type II tennis elbow (*extensor carpi radialis brevis, tenoperiosteal*) the spontaneous evolution takes about one to two years in absence of specific treatment.

Section 2a: Specific history			
What is your main complaint: pain – paraesthesia – limitation of movement – weakness			
PAIN When did it start: How did it start: spontaneously overuse injury describe			
How can you influence the pain, what makes it worse/better:			
Evolution since the start: better-worse-unchanged			
Evolution	Start →	Evolution →	Now
Where do you feel the pain:			
Pain quality: VAS 0-10 constant-intermittent twinges-at rest during the day-at night during-after activity			
PARAESTHESIA Where: When: constant-intermittent at rest-during the day- at night-on activity (which)			
LIMITATION ROM (subj)			
WEAKNESS (subj)			

- What is your main complaint

Pain

Does the pain originate from a local elbow lesion or is it referred from the cervical spine or the shoulder? This is easy to find out: if cervical or shoulder tests provoke the symptoms at the elbow region, then of course we look for a cervical or shoulder link.

Paraesthesia

Paraesthesia can be the result of a cervical lesion, a thoracic outlet, or a local lesion (*local compression of ulnar, radial or median nerve*).

Limitation of movement

Bear in mind that a tendinitis, -osis, never causes limitation of a passive movement. The active movement can be limited because of pain. Is there a limitation of movement in the capsular pattern or in the non-capsular pattern? The functional examination will be conclusive.

Weakness

Is it a real weakness due to e.g. a partial or a total muscular rupture or due to a nervous problem (*e.g. compression of the C5-, C6- or C7-nerve root or radial nerve*) or is it weakness because of too much pain on performing a specific test (*e.g. in case of a type II tennis elbow, resisted wrist extension could be quite painful and weak, because it hurts too much*)?

- Pain

When did it start

Is it an acute, subacute or chronic lesion?

Certain lesions may have a spontaneous evolution:

A tennis elbow type II takes about 1-2 years to recover, in the absence of treatment.

Of course, it is useless to wait for this spontaneous cure to happen, since, at every moment during this evolution we can start a treatment strategy; the treatment strategy of an acute lesion will be different from the strategy applied in chronic cases.

How did it start

A trauma in the history, in combination with a capsular pattern found in the functional examination, points in the direction of a traumatic arthritis. In that specific case, depending on the nature of the trauma, mind also the possibility of a fracture of the radial head or involvement of the brachialis (*risk for myositis ossificans: contraindication for friction massage*).

Tendinitis is mostly the result of overuse or a trauma.

A bursitis mostly has a spontaneous onset: the patient often cannot describe any triggering factor, unless in case of an olecranon bursitis; in that case there is clear “elbow friction factor” in the history.

How can you influence the pain

We ask the patient which movements, positions or activities produce, worsen or abate his pain. This information should correlate with the data obtained after the functional examination. A “big” story should go together with a “big” clinical image, if not, then this is an inherent unlikelihood perhaps pointing in the direction of a partly psychogenic involvement (*although, in case of elbow symptoms, this is very rare*).

We also use this information as a reference point to interpret the evolution during treatment.

Evolution since the start

Is it worse, better or unaltered since the beginning of the complaints? Mind specifically the presence of shortening pain (*centralizing*) or more radiation. This will become obvious on the body chart.

Where do you feel the pain

The patient of course describes his actual symptoms, but it is also interesting to know where his complaints started; is there any centralization of symptoms or not?

Remember that the lesion always lies in the neighbourhood of the localisation of the first pain (*exception: this rule does not apply to nervous structures*).

Remember that in case of a type II tennis elbow the pain can radiate to the fingers (*mostly II, III, IV*) and there can be a misleading tenderness at the lateral epicondyle: the lateral epicondyle which is more painful on palpation than the tendinous structure itself.

How would you describe your pain quality

Describing the intensity of the pain is of course a subjective matter, therefore we use a VAS score. Make a distinction between the actual score and the score at the beginning of the symptoms. Normally severe pain always goes together with more radiation (*exception: bony structures e.g. a fracture causes local pain*).

Is the pain constant or intermittent? Constant pain, of inflammatory origin, automatically implies the presence of pain at rest, so we make sure to ask the patient what he is feeling now, at this moment, during the history taking.

Soft tissue lesions mostly cause intermittent pain. Real constant pain is often related with a chemical factor (*inflammation*).

Pain at night does not necessarily mean a chemical factor is involved; the patient can wake up because of mechanical reasons: while turning in bed, he felt a twinge, waking him up.

Mostly patients describe complaints during activities; in some cases there could be some “after pain”; note the duration and intensity of this after pain.

Twinges are more typical for an internal derangement (*loose body*) blocking the joint in extension or flexion. Twinges could also occur in acute type II tennis elbow.

- ***Paraesthesia***

Paraesthesia may have a local cause (*local compression due to a postural or a structural reason*) or be the result of a thoracic outlet phenomenon; sometimes there is a cervical link. In the latter case the paraesthesia are very intermittent, day and night, sometimes at rest, perhaps related to some cervical movements. Also analyse the specific dermatome in which the paraesthesia are felt.

- ***Subjective limitation of movement: hypermobility or weakness***

This information needs to be correlated with the information gathered from the functional examination.

Section 2b: General history	
Description of typical exertion during professional or leisure activities:	
Off work since:	Previous treatments when: what sort of treatment: results:
Are there any other joints affected which:	Medical imaging results:
Recurrences when: frequency: cause:	Medication which: Surgery:

- ***Off work?***

If this is the case, then this should be in relation to the nature of the lesion. A tennis elbow type II can be quite invalidating (*e.g. cleaning job, constant computer work*).

- ***Simultaneous problems in other joints***

Here we look for a link with a possible rheumatoid arthritis, perhaps in relation to system diseases. In that case we also can palpate synovial thickening at the radial head.

- ***Recurrences***

Is it the first time you have this problem? When did you have it before; how long did it take; was it OK since then; do you remember what triggered it?

- ***Previous treatments***

This information is merely background information, since it is not always relevant. If the patient received treatment before from another therapist, then he cannot always describe what exactly was done.

It is not because a certain procedure didn't afford any relief e.g. 4 weeks ago, that it won't now. Clinical images can vary in due time, therefore it is useful to repeat the clinical examination procedure several times along the treatment process.

- Medical imaging

Don't treat X-rays! Treat a patient who presents with a certain clinical image. An arthrotic patient (*visible on X-ray*) can also have a bursitis, a loose body or a tendinitis (*not visible on X-ray*). The main advantage of medical imaging is to establish certain differential diagnoses.

Section 3: Inspection	
Colour changes where:	Wasting where:
Swelling: local – diffuse where:	Cubitus varus – valgus

- Swelling

Swelling rarely occurs at the elbow joint; it could happen in case of an olecranon bursitis.

- Cubitus varus/valgus

A cubitus valgus patient has a higher probability to suffer from a loose body problem. If mentions an internal derangement story, establish the nature of the loose body: is it bony or cartilaginous? If bony, surgery is indicated.

Section 4: Basic functional examination				
<i>Variables:</i> pain (where and when), ROM (normal, limited, excessive; in what degree), end-feel (normal, muscle spasm, harder, softer) and weakness.				
Not painful / limited: - Painful / limited: + Slightly painful / limited: +/- Very painful / limited: ++				
	Pain	ROM	End-feel	Weakness
Pre-test pain at rest				
P flexion				
P extension				
P pronation				
P supination				
R flexion				
R extension				
R pronation				
R supination				
R wrist extension				
R wrist flexion				
Remarks:				

- Pre-test pain at rest

Always inquire about the presence of a pre-test pain: where is this pain and how is it influenced by the tests. Does it get worse or better; is a new pain produced somewhere else? If there is no pain at rest, are we able to produce pain and where is it felt?

- Passive flexion

We interpret pain, range of motion and endfeel. The endfeel is extra-articular (*soft*).

- Passive extension

We interpret pain, range of motion and endfeel (*hard*).

After those two tests we interpret the pattern: did we see a capsular or a non-capsular pattern, with a normal or a pathological endfeel?

In case of a severe myositis ossificans of the brachialis, both movements can be limited too.

If a capsular pattern is discovered we think of arthrosis or different types of arthritis (*traumatic, rheumatoid*). In the non-capsular pattern we think of e.g. a sprain of the radio-ulnar joint, a loose body, or some bursitis.

- Passive pronation

We interpret pain, range of motion and endfeel (*elastic*). Pain on passive pronation could also be a localizing sign pointing in the direction of a biceps lesion at the radial tuberosity.

- Passive supination

We interpret pain, range of motion and endfeel (*elastic*). When the only positive finding in examination is end range pain on passive supination we think of a sprain of the upper radio-ulnar joint.

Pain on rotations, after a trauma, can be related to a radial head fracture; this will be in combination with a capsular pattern, with a muscle spasm end-feel.

- Resisted flexion

Variable pain

The main interpretation is a lesion of the biceps or the brachialis muscles, although these lesions are rare. If there is a brachialis lesion mind the possibility of a myositis ossificans (*if the X-ray is still negative after one month, no myositis ossificans will appear*). Myositis ossificans is a contraindication for friction massage techniques.

Variable weakness

Weakness could be related to a complete or a partial rupture of the biceps or the brachialis. Compression of the C5- or the C6-nerve root is more likely. Keep in mind that a complete rupture causes weakness on performing the resisted test, but no pain. The combination of pain and weakness makes us think of e.g. a partial rupture or fracture.

- Resisted extension

Variable pain

We think of the triceps, but this is a very rare lesion. If this test produces pain in the C5-dermatome instead of the C7-dermatome, then we think this is the result of a compression of an inert structure in the shoulder (*most likely a lesioned subdeltoid bursa*).

Variable weakness

The most common cause of weakness is pressure on the C7-nerve root, by a C6-disc (+ *weak wrist flexion*), or a local compression on the radial nerve (+ *weak wrist extension*).

This test will be weak and painful in case of an olecranon fracture.

- Resisted pronation

Variable pain

Theoretically we think of a lesion of the pronator teres; in practice however, a golfer elbow is more likely (+ *painful resisted wrist flexion*), since the pronator partly originates from the common flexor origin.

Variable weakness

Weakness could be related to a complete or a partial rupture. This is extremely rare.

- Resisted supination

Variable pain

We think of the supinator; an isolated supinator lesion is rare, but most likely this test is positive in case of a biceps lesion.

Variable weakness

Weakness could be related to a complete or a partial rupture. This is extremely rare.

- Resisted wrist flexion

Variable pain

We think of a lesion of the common flexor origin, a golfer's elbow: check two localisations by palpation, the tenoperiosteal part and the musculotendinous junction.

Variable weakness

The main thought is a compression on the C7-nerve root.

- Resisted wrist extension

Variable pain

We think of the wrist extensors: extensor carpi radialis longus, brevis; extensor carpi ulnaris, extensor digitorum communis, extensor indicis proprius and extensor digiti minimi. To differentiate we need the accessory examination (*see further*).

When this test is positive, we first think of a tennis elbow. In order to find out the specific type, we need to palpate for tenderness and compare four different localisations:

- Type 1: extensor carpi radialis longus, tenoperiosteal
- Type 2: extensor carpi radialis brevis, tenoperiosteal
- Type 3: extensor carpi radialis brevis, tendinous body
- Type 4: extensor carpi radialis brevis, muscle belly.

Variable weakness

The most common cause is compression on the C6-nerve root or the radial nerve.

Section 5: Accessory functional examination	
Not necessarily all tests have to be carried out; the variable we assess is pain. We use the following quotation: test is positive = +; test is negative = -	
Resisted wrist extension with simultaneous A finger flexion	R ulnar deviation
R radial deviation	
Remarks:	

- Resisted wrist extension + active finger flexion

In this way we only test the wrist extensors and exclude the finger extensors; from that point on we only have to differentiate between the radial and ulnar extensors, by doing a resisted radial deviation and a resisted ulnar deviation.

So, in case of a clear tennis elbow type II, the resisted extension, with fingers flexed, and the radial deviation against resistance will be positive. In less acute cases, it is possible that the radial deviation against resistance is negative.

Section 6: Palpation	
Pain (slight – moderate – severe) where:	Sensory deficit where:

Palpation for pain/tenderness should always be the result of the outcome of the functional examination. The clinical image shows us which structure/group of structures is responsible for the complaints and only in the absence of localizing signs we palpate for tenderness in that specific structure.

Keep in mind that in case of a biceps muscle belly lesion, generally the posterior fibres are affected. When palpating the four types of tennis elbow for tenderness always compare with the non affected side.

Section 7: Conclusion

Lesion: local – referred

Lesion of an inert structure; which one:
--

Lesion of a contractile structure; which one:

Localizing signs:

DIAGNOSIS:

Undecided

Take into account that a double lesion can be present: inert and/or contractile, or a double contractile lesion e.g. the combination of a type I and type II tennis elbow.

We can discover one localizing sign: pain on passive pronation in relation to a biceps lesion at the radial tuberosity.

Section 8: Treatment procedure / analysis

Date first treatment:

Date last treatment:

Treatment strategy:

Evolution / treatment adaptation:

Total number of treatment sessions:	
-------------------------------------	--

Results:

For every lesion we have an expectation pattern (*see previous publications*); if this pattern is not fulfilled, then we need to react i.e. re-assess and, if necessary, change the treatment strategy.

Case study Elbow

Section 1: General information

© Elbow Assessment Form

Date:

Name: **Pastrini G.**

Address:

Date of birth: 24/11/1966

Sex: m – f

Referral / diagnostic information: tennis elbow + arthrosis

Section 2a: Specific history

What is your main complaint: *pain – paraesthesia – (limitation of movement) – weakness*

	PAIN
--	------

When did it start: **about 8 days ago**

How did it start:

spontaneously

overuse

injury → he suffered an elbow fracture about 10 years ago

describe: redecorating his apartment, intense painting activities, patient has not the habit of doing this; after a couple of days started to get pain at the lateral aspect of the elbow, with radiation more distally; had to stop the painting activities because of too much pain

How can you influence the pain, what makes it worse/better: gripping activities (which involve wrist extension), pouring out coffee, shaking hands in a firm way, playing golf (patient is right handed; then he has more symptoms at the left elbow)

Evolution since the start: better-worse-unchanged

<i>Evolution</i>	<i>Start →</i>	<i>Evolution →</i>	<i>Now</i>
Where do you feel the pain:	 	 	 
Pain quality: VAS 0-10 constant- intermittent twinges -at rest during the day-at night during -after activity	4		8

PARAESTHESIA Where: When: constant-intermittent at rest-during the day- at night-on activity (which)			
LIMITATION ROM (subj)			since many years patient experiences slight limitation of extension and flexion, painless
WEAKNESS (subj)			Yes, it happened that patient drops things out of his hand, because of severe twinges

Section 2b: General history	
Description of typical exertion during professional or leisure activities: golf	
Off work since:	Previous treatments when: what sort of treatment: results:
Are there any other joints affected which:	Medical imaging results:
Recurrences when: frequency: cause:	Medication which: Surgery:

Section 3: Inspection	
Colour changes where:	Wasting where:
Swelling: local – diffuse where:	Cubitus varus – valgus

Section 4: Basic functional examination				
<i>Variables:</i> pain (where and when), ROM (normal, limited, excessive; in what degree), end-feel (normal, muscle spasm, harder, softer) and weakness.				
Not painful / limited: -		Painful / limited: +		
Slightly painful / limited: +/-		Very painful / limited: ++		
	Pain	ROM	End-feel	Weakness
Pre-test pain at rest				
P flexion		+	harder	
P extension		+/-	harder	
P pronation				
P supination				
R flexion				
R extension				
R pronation				
R supination				
R wrist extension	++			+
R wrist flexion				
Remarks: weakness on the resisted test, because of pain				

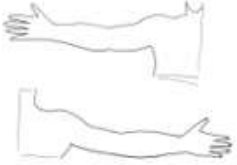
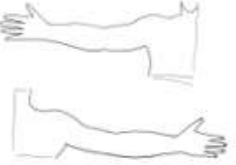
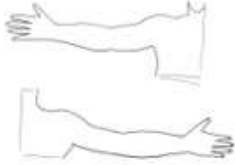
Section 5: Accessory functional examination	
Not necessarily all tests have to be carried out; the variable we assess is pain. We use the following quotation: test is positive = +; test is negative = -	
Resisted wrist extension with simultaneous A finger flexion ++	R ulnar deviation
R radial deviation +	
Remarks:	

Section 6 : Palpation	
Pain (slight – moderate – severe) where: tenoperiosteal aspect of the extensor carpi radialis brevis	Sensory deficit where:

Section 7: Conclusion
Lesion: local – referred
Lesion of an inert structure; which one: capsular pattern, because of the arthrosis (asymptomatic; this is not his actual problem)
Lesion of a contractile structure; which one: extensor carpi radialis brevis, tenoperiosteal aspect
Localizing signs:
DIAGNOSIS: acute tennis elbow type II
Undecided

Chapter 3: Wrist and Hand

Section 1: General information	© Wrist and Hand Assessment Form
Date: _____ Name: _____ Address: _____ Date of birth: _____ Sex: m – f Profession/hobby: _____ Referral / diagnostic information: _____	

Section 2a: Specific history			
<i>What is your main complaint: pain – paraesthesia – limitation of movement – weakness</i>			
PAIN When did it start: How did it start: spontaneously overuse injury describe			
How can you influence the pain, what makes it worse or better:			
Evolution since the start: better-worse-unchanged			
Evolution	Start →	Evolution →	Now
Where do you feel the pain:			
Hand: DIP, PIP, MCP-joints: where did the symptoms start?			
Pain quality: VAS 0-10 constant-intermittent twinges-at rest during the day-at night during-after activity			

PARAESTHESIA Where: palmar-dorsal ulnar-radial which fingers When: constant-intermittent at rest-during the day- at night-on activity (which)			
LIMITATION ROM (subj)			
WEAKNESS (subj)			

- What is your main complaint

Pain

Mostly the pain originates from a local lesion although referral from the cervical spine, the elbow or the shoulder is possible.

Paraesthesia

Paraesthesia could be related to a local lesion (*e.g. carpal tunnel syndrome*) or they are referred from the elbow (*e.g. compression of the ulnar nerve*), from the cervical spine (*e.g. compression on the C6-, C7- or C8-nerve root by a disc or an osteophyte*) or coming from a release phenomenon i.e. pressure on the lower part of the brachial plexus by a rib.

Limitation of movement

Bear in mind that a tendinitis, -osis, never causes limitation of a passive movement. The active movement can be limited because of pain. Is there a limitation of movement in the capsular pattern or in the non-capsular pattern? The functional examination will be conclusive.

Weakness

Is it a real weakness due to e.g. a partial or a total rupture or a nervous problem (*e.g. compression of a cervical nerve root or carpal tunnel syndrome*) or is it weakness because of too much pain on performing a specific test (*resisted wrist extension can be very painful and weak in case of an acute type II tennis elbow, see chapter 2*).

- Pain

When did it start

Bear in mind that a traumatic arthritis of the wrist only takes about 3 days to resolve spontaneously, so, clear pain and a capsular pattern still present after 3 days, including swelling, rather points in the direction of a fracture of one of the carpal bones (*scaphoid*).

How did it start

A trauma in the history in combination with a capsular pattern, with muscle spasm end feel, found in the functional examination points in the direction of a traumatic arthritis or a fracture.

Tendinitis is mostly the result of a repetitive strain injury or a trauma. A carpal tunnel syndrome often is also related with repetitive strain injuries.

How can you influence the pain

We ask the patient which movements, positions or activities produce, worsen or abate his pain. This information should correlate with the data obtained after the functional examination. We also use this information as a reference point to interpret the evolution during the treatment process. In case of a dorsal carpal subluxation extension is painfully limited. A rare palmar carpal subluxation will cause a slight limitation of flexion. A carpal tunnel syndrome patient will provoke pins and needles on specific wrist movements (*see accessory examination*).

Evolution since the start

Is it worse, better or unaltered since the beginning of the complaints?

Where do you feel the pain

The patient of course describes his actual symptoms, but it is also interesting to know where his complaints started.

Remember that the lesion always lies in the neighbourhood of the first pain (*exception: nervous structures*).

DIP-, PIP- or MCP-joints? Where did the complaints start? Typical for arthrosis is the start in the DIP-joints; rheumatoid arthritis rather starts in the PIP-joints.

How would you describe your pain quality

Describing the intensity of the pain is of course a subjective matter, therefore we use a VAS scale. In normal situations severe pain always goes together with more radiation (*exception: bony structures, e.g. fracture*). In case of wrist or hand lesions, it is logical that we don't expect much radiation of pain. Although carpal tunnel patients sometimes describe symptoms proximal from the carpal tunnel, radiating into the forearm.

Is the pain constant or intermittent? Constant pain implies automatically the presence of pain at rest, so we make sure to ask the patient what he is feeling now, at this moment, during the history taking.

Soft tissue lesions mostly cause intermittent pain. Real constant pain mostly implies a chemical factor (*inflammation*).

Pain at night does not necessarily mean that there is a chemical factor; the patient can wake up because of mechanical reasons: grasping the sheets while turning in bed, causing a twinge, waking him up.

Mostly patients describe complaints during activities; in more severe cases there could be some "after pain"; inform about the intensity and duration of it.

- Paraesthesia

In the case of paraesthesia due to compression of a cervical nerve root, those paraesthesia are very intermittent, can appear day and night, sometimes at rest, and are perhaps related to some cervical movements. Paraesthesia are mostly confined to the distal part of one dermatome.

Typical for thoracic outlet paraesthesia is the patient who wakes up, every night, at the same hour, due to paraesthesia, mostly in the distal aspect of the C8-dermatome. The "release phenomenon" is typical: during compression there are no symptoms; some time after the compression paraesthesia appear.

The carpal tunnel paraesthesia, mostly n. medianus, are related to wrist movements. Mind the possibility of a partial syndrome i.e. compression of part of the ulnar nerve in the tunnel of Guyon or a more distal compression of the median nerve (*i.e. stick palsy*).

- Subjective limitation of movement / weakness

This information needs to be correlated with the information gathered from the functional examination.

Section 2b: General history	
Description of typical exertion during professional or leisure activities:	
Off work since:	Previous treatments when: what sort of treatment: results:
Are there any other joints affected which:	Medical imaging results:
Recurrences when: frequency: cause:	Medication which: Surgery:

- Off work?

If this is the case, then this should be in relation to the nature of his lesion.

- Simultaneous problems in other joints

Here we look for a link with a possible rheumatoid arthritis, perhaps in relation to other systemous diseases.

- Recurrences

Is it the first time you have this problem? When did you have it before; how long did it take; was it OK since then; do you remember what triggered it?

- Previous treatments

This information is merely background information, since it is not always relevant.

- Medical imaging

Don't treat X-rays! Treat a patient who presents with a certain clinical image.

The main advantage of medical imaging is to establish certain differential diagnoses: e.g. a suspected dorsal carpal subluxation that doesn't react on manipulation within 5 treatment

sessions. In that case medical imaging is called for in order to make a differential diagnosis and look for other causes such as Kienböck disease, ununited fracture or severe local arthrosis.

Section 3: Inspection	
Wasting where:	Ganglion where:
Colour changes where:	Infections
Swelling: local – diffuse where: spontaneous – after injury	Trophic changes
Deformity: left – right – bilateral Posttraumatic Arthrosis Heberden's nodes where: Rheumatoid arthritis Ulnar deviation MCP-joint Spindle shaped swelling Swan neck Dupuytren Mallet finger Boutonnière Other	

Section 4: Basic functional examination				
Variables: pain (where and when), ROM (normal, limited, excessive; in what degree), end-feel (normal, muscle spasm, harder) and weakness.				
Not painful / limited: -		Painful / limited: +		
Slightly painful / limited: +/-		Very painful / limited: ++		
	Pain	ROM	End-feel	Weakness
Pre-test pain at rest				
P pronation				
P supination				
P flexion				
P extension				
P radial deviation				
P ulnar deviation				
R flexion				
R extension				
R radial deviation				
R ulnar deviation				
P CMC I				
R thumb extension				
R thumb flexion				
R thumb adduction				
R thumb abduction				
R finger tests spreading 2-3/3-4/4-5 pinching 2-3/3-4/4-5				
Remarks:				

- Pre-test pain at rest

Always inform about the presence of a pre-test pain: where is this pain and how is it influenced by the tests. Does it get worse or better; is a new pain produced somewhere else? If there is no pain at rest, are we able to produce pain and where is it produced?

- Passive pronation

We interpret the pain, range of motion and endfeel (*elastic*).

- Passive supination

We interpret pain, range of motion and endfeel (*elastic*). Pain on P supination can also be a localizing sign in case of a lesion of the extensor carpi ulnaris in the ulnar groove.

We can discover the capsular pattern of the lower radio-ulnar joint, which is pain on passive pronation and supination.

- Passive flexion

We interpret pain, range of motion and endfeel (*elastic*). It is not only a test for the dorsal ligaments but it also stretches the dorsal tendons. P flexion can also be slightly limited and painful because of a palmar carpal subluxation, which is quite rare.

- Passive extension

We interpret pain, range of motion and endfeel (*elastic*). The most common cause of a painful small limitation is a dorsal carpal subluxation. Mostly the capitate bone is subluxated.

We can also discover the capsular pattern of the wrist which is an equal limitation of passive flexion and extension.

In case of a periostitis at the distal aspect of the radius, P extension is also painful. This impingement lesion is a RSI, seen in gymnasts.

- Passive radial / ulnar deviation

We interpret pain and range of movement. The radial deviation is the main test for the ulnar collateral ligament (*at the same time we also put some stretch on the extensor carpi ulnaris*); we test the radial collateral ligament by using the ulnar deviation. A lesion of those ligaments is also rare.

- Resisted flexion

Variable pain

The following structures are tested: flexor carpi ulnaris, flexor carpi radialis, flexor digitorum communis (*superficialis/profundus*) and palmaris longus.

Variable weakness

The main interpretation is related to a cervical problem: pressure on the C7-nerve root by a disc, osteophyte, or a tumour?

- Resisted extension

Variable pain

The following structures are tested: extensor carpi radialis longus/brevis, extensor carpi ulnaris, extensor digitorum communis, extensor indicis proprius, extensor digiti minimi.

Variable weakness

The main interpretation is related to a cervical problem: pressure on the C6-nerve root. A local compression on the radial nerve is another possibility.

A C7-nerve root compression can still be possible. The radial nerve can also be compressed at the elbow or can be damaged in consequence of a fracture of the shaft of the humerus. Beware of a bilateral weakness.

- Resisted radial deviation

Variable pain

The following structures are tested: extensor carpi radialis longus/brevis and flexor carpi radialis.

- Resisted ulnar deviation

Variable pain

The following structures are tested: flexor carpi ulnaris and extensor carpi ulnaris.

Variable weakness

The main interpretation is related to a cervical problem: pressure on the C8-nerve root.

- Passive CMC-I test

This “backward movement during extension” of the thumb is the main test for the trapezio-first-metacarpal joint. In case of a traumatic arthritis/sprain, this test is clearly positive. Bear in mind that, when deep friction is used as a treatment option, we have to friction the anterior and the lateral aspect of the capsule. Of course, this joint can also be injected.

- Resisted thumb extension

Variable pain

We test the extensor pollicis longus and brevis muscles (*i.e. the tendons which are located in the dorsal tunnel 1 and/or tunnel 3*). In case of a De Quervain disease this test is certainly positive, as well as the resisted thumb abduction and some extra tests which put longitudinal strain on those structures.

Variable weakness

Apart from ruptures, the main interpretation is related to a cervical problem: pressure on the C8-nerve root.

- Resisted thumb flexion

Variable pain

We test the flexor pollicis longus. Remember that a lesion can occur at the carpal extent (*between flexor carpi radialis and palmaris longus*) or deeply under the thenar muscles. A trigger thumb is another possibility.

Variable weakness

A complete or partial rupture may be responsible.

- Resisted thumb adduction

Variable pain

We test the adductor pollicis. We expect to find the lesion at the carpal origin of the caput obliquum (*i.e. the part that extends from the carpal bones to the sesamoid bones*).

Variable weakness

The main interpretation is related to a cervical problem: pressure on the C8-nerve root.

- Resisted thumb abduction

Variable pain

We test the abductor pollicis longus (*i.e. one of the tendons located in the dorsal tunnel 1*). In case of a De Quervain disease, the resisted thumb extension will be positive too.

Variable weakness

Scarcely perceptible. We think of a cervical rib compression on nervous structures or of a carpal tunnel syndrome.

- Resisted finger tests : spreading and pinching

Those tests are used to detect a lesion of the interossei muscles; we differentiate the dorsal (→ *responsible for abduction*) and palmar interossei (→ *responsible for adduction*). If a dorsal interosseus is affected then we have to check two localizations by palpation: muscle belly and tendon.

Section 5: Accessory functional examination	
Not necessarily all tests have to be carried out; the variables are mentioned between brackets. We use the following quotation: test is positive = +; test is negative = -	
R wrist extension with A finger flexion (pain-weakness)	Trigger finger
R finger flexion (pain-weakness)	Trigger thumb
R finger extension (pain-weakness)	
CTS-test (provoke paraesthesia) Wrist in extension, pressure in CT: A finger flexion and extension Keep wrist one minute in flexion followed by sudden extension Tinnel sign,...	P finger tests (pain, ROM, if possible end-feel) Flexion: MCP-PIP-DIP Extension: MCP-PIP-DIP Radial deviation: MCP-PIP-DIP Ulnar deviation: MCP-PIP-DIP Rotation MCP

Only when the basic examination didn't provide enough information to reach a useful diagnosis, then we have to perform one or more accessory tests.

- Resisted wrist extension with active finger flexion

In this way we only test the wrist extensors and exclude the finger extensors (*see Chapter 2, Elbow*).

- Resisted finger flexion / extension

If the symptoms are felt more distally, we can test each finger flexor or extensor separately.

- Carpal tunnel syndrome tests

If the history points in that direction, then those tests can be carried out in order to provoke the typical pins and needles.

In case of a trigger finger, the swelling in the flexor tendon can be palpated and punctured. If necessary further passive tests for all finger joints may be performed.

Section 6: Palpation	
Pain (slight – moderate – severe) where:	Sensory deficit palmar – dorsal ulnar – radial fingers

Palpation for pain/tenderness should always be the result of the outcome of the functional examination. The clinical image shows us which structure/group of structures is responsible for the complaints and only in the absence of localizing signs we palpate for tenderness.

Sensory deficit can be the result of local compression of the radial, median or ulnar nerve (*at the wrist or elbow*); it can also be related to a cervical problem.

Section 7: Conclusion
Lesion: local – referred
Lesion of an inert structure; which one:
Lesion of a contractile structure; which one:
Localizing signs:
Carpal tunnel syndrome / Cervical root compression / Thoracic outlet syndrome
DIAGNOSIS:
Undecided

Take into account that a double lesion can be present: inert and/or contractile. Remember the following localizing sign: pain on passive supination in relation to a lesion of the extensor carpi ulnaris in the ulnar groove.

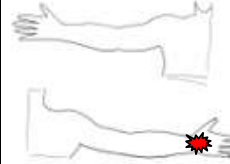
Section 8: Treatment procedure / analysis	
Date first treatment:	Date last treatment:
Treatment strategy:	
Evolution / treatment adaptation:	
Total number of treatment sessions:	
Results:	

Respect the expectation pattern we have for each treatment strategy: the reduction of a carpal subluxation should not take more than 3-4 sessions.

A sprain of a dorsal ligament should react in about 8-10 sessions. An interosseus lesion reacts well in about 4-6 treatment sessions.

Case study Wrist and Hand

Section 1: General information	© Wrist and Hand Assessment Form
Date: _____ Name: Vandeviere K.	
Address: _____	
Date of birth: 17/01/69	Sex: m – f Profession/hobby: cleaning industry
Referral / diagnostic information: carpal subluxation; chronic?	

Section 2a: Specific history			
<i>What is your main complaint:</i> pain – paraesthesia – limitation of movement – weakness			
PAIN When did it start: over one month ago How did it start: spontaneously overuse injury describe patient works as a cleaning lady for a company specialised in office cleaning; certain moment she developed pain at the dorsal aspect of the wrist			
How can you influence the pain, what makes it worse or better: extension seems to be painful and limited; putting body weight on the hand is clearly painful; different types of manual work are painful			
Evolution since the start : better-worse-unchanged			
Evolution	Start →	Evolution →	Now
Where do you feel the pain:			 Local pain, no radiation
Hand: DIP, PIP, MCP-joints: where did the symptoms start?			
Pain quality: VAS 0-10 constant- intermittent twinges -at rest during the day -at night during -after activity	4		4

PARAESTHESIA Where: palmar-dorsal ulnar-radial which fingers When: constant-intermittent at rest-during the day- at night-on activity (which)			
LIMITATION ROM (subj)			Subjective small limitation of extension
WEAKNESS (subj)			Subjective feeling of having less force on lifting weights in a certain way

Section 2b: General history	
Description of typical exertion during professional or leisure activities:	
Off work since: about 2 weeks now, because it interferes too much with the professional activities	Previous treatments when: what sort of treatment: results:
Are there any other joints affected which:	Medical imaging results:
Recurrences when: frequency: cause:	Medication which: Surgery:

Section 3: Inspection	
Wasting where:	Ganglion where:
Colour changes where:	Infections
Swelling: local – diffuse where: spontaneous – after injury	Trophic changes
Deformity: left – right – bilateral Posttraumatic Arthrosis Heberden's nodes where: Rheumatoid arthritis Ulnar deviation MCP Spindle shaped swelling Swan neck Dupuytren Mallet finger Boutonnière Other on performing wrist flexion we notice a little bump at the dorsal aspect of the wrist; capitate subluxation?	

Section 4: Basic functional examination				
<i>Variables:</i> pain (where and when), ROM (normal, limited, excessive; in what degree), end-feel (normal, muscle spasm, harder) and weakness.				
Not painful / limited: - Painful / limited: + Slightly painful / limited: +/- Very painful / limited: ++				
	Pain	ROM	End-feel	Weakness
Pre-test pain at rest				
P pronation				
P supination				
P flexion	+/- end range			
P extension	+	+/-		
P radial deviation				
P ulnar deviation				
R flexion				
R extension				
R radial deviation				
R ulnar deviation				
P CMC I				
R thumb extension				
R thumb flexion				
R thumb adduction				
R thumb abduction				
R finger tests spreading 2-3/3-4/4-5 pinching 2-3/3-4/4-5				
Remarks:				

Section 5: Accessory functional examination	
Not necessarily all tests have to be carried out; the variables are mentioned between brackets. We use the following quotation: test is positive = +; test is negative = -	
R wrist extension with A finger flexion (pain-weakness)	Trigger finger
R finger flexion (pain-weakness)	Trigger thumb
R finger extension (pain-weakness)	
CTS-test (provoke paraesthesia) Wrist in extension, pressure in CT: A finger flexion and extension Keep wrist one minute in flexion followed by sudden extension Tinnel sign,...	P finger tests (pain, ROM, if possible end-feel) Flexion: MCP-PIP-DIP Extension: MCP-PIP-DIP Radial deviation: MCP-PIP-DIP Ulnar deviation: MCP-PIP-DIP Rotation MCP

Section 6: Palpation	
Pain (slight – moderate – severe) where: palpation of the ligament between capitate and lunate is painful	Sensory deficit palmar – dorsal ulnar – radial fingers

Section 7: Conclusion
Lesion: local – referred
Lesion of an inert structure; which one: double lesion: dorsal ligament sprain + dorsal carpal subluxation
Lesion of a contractile structure; which one:
Localizing signs:
Carpal tunnel syndrome / Cervical root compression / Thoracic outlet syndrome
DIAGNOSIS: sprain of a dorsal ligament in combination with a dorsal carpal subluxation
Undecided

Chapter 4: The Hip

Section 1: General information	© Hip Assessment Form
Date:	Name:
Address:	
Date of birth:	Sex: m – f
Referral / diagnostic information:	

If a child limps because of pain, further examination is called for in order to exclude lesions such as Perthes, slipped epiphysis, coxa vara, congenital dislocation.

Section 2a: Specific history			
<i>What is your main complaint: pain – paraesthesia – limitation of movement – instability/giving way– weakness</i>			
PAIN When did it start: How did it start: spontaneously overuse injury describe			
How can you influence the pain, what makes it worse or better:			
Evolution since the start: better-worse-unchanged			
Evolution	Start →	Evolution →	Now
Where do you feel the pain:			
Pain quality: VAS 0-10 constant-intermittent twinges-at rest during the day-at night during-after activity Pain on coughing: where			

PARAESTHESIA Where: When: constant-intermittent at rest-during the day- at night-on activity (which)			
LIMITATION ROM (subj)			
INSTABILITY/GIVING WAY when how often			
WEAKNESS (subj)			

- What is your main complaint

Pain

Does the pain originate from a local lesion or is it referred from the lumbar spine (*internal derangement with pressure against dura or nerve root*)?

Paraesthesia

Paraesthesia in relation to a hip problem are very rare. Mostly we need to examine the lumbar spine (*specifically the L1-L2-L3 region; beware of the “forbidden area” (see Chapter 7: Lumbar Spine).*

Limitation of movement

Bear in mind that a tendinitis, -osis, never causes limitation of a passive movement. The active movement can be limited because of pain. Is there a limitation of movement in the capsular pattern or in the non-capsular pattern? The functional examination will be conclusive.

Instability / giving way

A subjective feeling of instability and giving way is typical for an internal derangement. The symptoms are always very intermittent.

Weakness

Is the weakness due to e.g. a partial or a total rupture, a fracture or a nervous problem (*e.g. compression of the L2- or L3-nerve root*)?

- Pain

When did it start

Does the lesion have a more chronic or acute character?

How did it start

A bursitis can have a spontaneous onset or can be the result of overuse. The latter mostly lies at the basis of most tendinous problems. An injury can be responsible for muscle and tendon lesions, fractures and arthritis. Beware of labral tears because of minor twisting and hyperextension injuries.

How can you influence the pain

We ask the patient which movements, positions or activities produce, worsen or abate his pain. This information should correlate with the data obtained from the functional examination. A “big” story should go together with a “big” clinical image, if not, then this is an inherent unlikelihood perhaps pointing in the direction of a partly psychogenic involvement.

We also use this information as a reference point to interpret the evolution during treatment. Beware of one specific case in which there is a relation between certain activities and the complaints, but not related to soft tissue lesions: we think of intermittent claudication problems.

Evolution since the start

Is it worse, better or unaltered since the beginning of the complaints? Mind specifically the presence of shortening or centralizing pain as opposed to peripheralisation. This will become obvious on the body chart.

Where do you feel the pain

The patient of course describes his actual symptoms, but it is also interesting to know where his complaints started; is there any centralization of symptoms or not?

Is there referred segmental or multi-segmental pain? Keep in mind that the lesion always lies in the neighbourhood of the first pain (*exception: lesion of nervous structures*).

How would you describe your pain quality

Describing the intensity of the pain is of course a subjective matter, therefore we use a VAS score. Normally severe pain always goes together with more radiation (*exception: bony structures, e.g. fracture*).

Is the pain constant or intermittent? Constant pain implies automatically the presence of pain at rest, so we make sure to ask the patient what he is feeling now, at this moment, during the history taking.

Soft tissue lesions mostly cause intermittent pain. Real constant pain mostly implies a chemical factor (*inflammation*).

Pain at night does not necessarily mean that there is a chemical factor; the patient can wake up because of mechanical reasons e.g. while turning in bed, he felt a twinge, waking him up.

Mostly patients describe complaints during activities; in more severe cases there could be some “after pain”, inform about the intensity and the duration.

Twinges are typical for an internal derangement.

If there is doubt between a local or lumbar origin of the symptoms, then one more question can be very helpful: what happens during coughing? Lumbar or cranial gluteal pain on coughing is a main dural symptom; in that case we think of a lumbar internal derangement.

- Paraesthesia

Rarely paraesthesia have a hip related cause; mostly there is a lumbar link. In that case the paraesthesia are very intermittent, could appear during the day and the night, sometimes at rest, perhaps related to some lumbar movements.

- Subjective limitation of movement; instability/giving way or weakness

This information needs to be correlated with the information gathered from the functional examination.

Section 2b: General history	
Description of typical exertion during professional or leisure activities:	
Off work since:	Previous treatments when: what sort of treatment: results:
Are there any other joints affected which:	Medical imaging results:
Recurrences when: frequency: cause:	Medication which: Surgery:

- Off work?

If this is the case, then this should be in relation to the nature of his lesion.

- Simultaneous problems in other joints

Here we look for a link with a possible rheumatoid arthritis, perhaps in relation to systemous diseases.

- Recurrences

Is it the first time you have this problem? When did you have it before; how long did it take; was it OK since then; do you remember what triggered it?

- Previous treatments

This information is merely background information, since it is not always relevant. If the patient received treatment before from another therapist, then he cannot always describe what exactly was done.

It is not because a certain procedure didn't afford any relief e.g. 4 weeks ago, that it won't now. Clinical images can vary in due time, therefore it is useful to repeat the examination procedure several times during a treatment process.

- Medical imaging

Don't treat X-rays! Treat a patient who presents with a certain clinical image.

An arthrotic patient (*visible on X-ray*) can also have a bursitis, a tendinitis or a loose body in an arthrotic joint (*not visible on X-ray*). The main advantage of medical imaging is to establish certain differential diagnoses.

Section 3: Inspection	
Gait: smooth – limping	Wasting where:
In standing: difference in length of legs flexion deviation: hip – lumbar spine deviation in medial rotation	Remarks:

A leg length difference is rarely related to the actual symptoms of the patient; I refer to Chapter 7: Lumbar Spine.

A flexion deviation of the lumbar spine is not related to a hip problem, but to a lumbar internal derangement.

A patient who walks, keeping the hip in medial rotation is a sign of psychogenic involvement (*if all other tests from the basic examination prove to be negative*).

Section 4: Basic functional examination				
<i>Variables:</i> pain (where and when), ROM (normal, limited, excessive; in what degree), end-feel (normal, muscle spasm, harder, softer) and weakness.				
Not painful / limited:	-	Painful / limited:	+	
Slightly painful / limited:	+/-	Very painful / limited:	++	
	Pain	ROM	End-feel	Weakness
Pre-test pain at rest				
P flexion				
P lateral rotation				
P medial rotation				
P adduction				
P abduction				
R flexion				
R extension				
R adduction				
R abduction				
P extension				
P bilateral medial rot.				
R medial rotation				
R lateral rotation				
R knee flexion				
R knee extension				
Remarks:				

- Pre-test pain at rest

Always inform about the presence of a pre-test pain: where is this pain and how is it influenced by the tests. Does it get worse or better; is a new pain produced somewhere else? If there is no pain at rest, are we able to produce pain and where is it produced?

- Passive flexion

We interpret pain, range of motion and endfeel (*soft/extra-articular*).

End range pain on passive flexion could impinge the proximal part of the rectus femoris. In case of a psoas bursitis, this test is also positive.

- Passive rotations

We interpret pain, range of motion and endfeel (*elastic*). Make sure to perform the tests in a delicate way, otherwise if performed too firmly then those tests also become SI-joints pain provocation tests (*see Chapter 7: Lumbar Spine*).

- Passive abduction and adduction

Adduction can be painful in case of a gluteal/trochanteric bursitis or in case of a lesion of the iliotibial tract. Abduction could be painful in case of an adductor tendinitis or a gluteal bursitis.

In an arthrotic hip medial rotation is the first movement to be restricted, followed by flexion. Both movements will have a harder end-feel. In arthritis, the end-feel changes and becomes a muscle spasm end-feel.

Typical for a gluteal/trochanteric bursitis is the variable clinical image: some passive movements may be painful at end-range and the image can vary slightly in time. It is not always a “fix” image meaning that some test might be painful at one moment and less painful at another moment. Palpation for tenderness will be positive.

- Resisted flexion

Variable pain

The most common interpretations are a lesion of the psoas, rectus femoris and a fracture of the trochanter minor. In the latter case there will also be weakness. The same applies for a fracture of the spina iliaca anterior superior: flexion and lateral rotation against resistance will be painful and weak.

A rare occasion in which resisted flexion is painful is an obturator hernia.

Variable weakness

Of course, a fracture (*trochanter minor, SIAS*) presents itself as the combination of pain and weakness. Pressure on the L2-L3-nerve root(s) can cause weakness, without pain, on testing; a tumour is also possible.

Force zero on resisted flexion, in the absence of other positive tests, points in the direction of a psychogenic disorder. There is an easy way to find a positive contradiction: the test is weak, carried out from the standard position (*see film; DVD or USB*), we then position the patient in prone lying, put our hand on the dorsal aspect of the knee and ask the patient “to push with his KNEE” in our hand. The patient does it...in fact doing a hip flexion against resistance. Thus we discovered an important contrast.

- Resisted extension

Variable pain

A gluteus lesion is quite rare, so we mainly think of compression of an inert structure: e.g. a gluteal bursitis.

Variable weakness

Fracture or severe pathology?

- Resisted adduction

Variable pain

The main interpretation is a lesion of the adductor muscles; check two localizations (*tenoperiosteal and musculotendinous junction*). Remember to palpate for tenderness bilaterally too; if palpation is not positive, but the test is, further examination to exclude a pubis fracture is called for.

Variable weakness

Pubis fracture?

- Resisted abduction

Variable pain

We mostly think of a compression of an inert structure: e.g. gluteal bursitis. A gluteus medius lesion is extremely rare; an iliotibial tract lesion is more frequent among runners.

Variable weakness

Fracture?

- Passive extension

We interpret pain, range of motion and endfeel (*elastic*).

In advanced arthrosis, extension will also be limited.

- Passive bilateral medial rotations

We interpret pain, range of motion and endfeel (*elastic*). This is the easiest way to detect an early arthrosis: we clearly find a slight limitation of movement combined with a harder endfeel.

After the passive tests we can interpret the pattern: capsular (*lateral rotation and adduction are free; medial rotation and abduction are more limited than flexion and flexion is more limited than extension: this is the capsular pattern as described by Cyriax; more recent research shows there are variations: the most common factors are the limited medial rotation and flexion; extension might be limited too*) or non-capsular?

- Resisted medial rotation

Variable pain

We expect this test to be negative; a lesion of a contractile structure is highly unlikely.

Variable weakness

Fracture?

- Resisted lateral rotation

Variable pain

We could think of a lesion of the sartorius muscle, but an isolated sartorius lesion is very rare. In combination with weakness we mainly think of a fracture of the SIAS.

Variable weakness

Fracture?

- Remarks

Remember that in case of a psoas or an adductor lesion we not only need a positive test but also pain on palpation, otherwise another lesion is suspected (*e.g. fracture*).

Section 5: Accessory functional examination	
Not necessarily all tests have to be carried out; the variables are mentioned between brackets. We use the following quotation: test is positive = +; test is negative = -	
Pulsations a. Femoralis left – right normal – weak – absent	Trunk side flexion in standing (pain) repeat with legs crossed (pain)
P adduction from 90° hip flexion (pain)	R hip flexion after Trendelenburg position (pain)
Sustained A hip extension in prone lying (claudicatio pain)	Sign of the buttock (ROM)

Checking the pulsations in the femoral artery and sustained active hip extension in prone lying could be interesting if the patient describes an intermittent claudication history. Further examination is necessary and will be conclusive.

Passive adduction from 90° hip flexion is the main positive test in case of a psoas bursitis.

The clinical image of a lesion of the iliotibial tract and the image of a gluteal/trochanteric bursitis can be very similar. Palpation for tenderness is not necessarily very helpful in order to differentiate. Side flexion in standing with the legs crossed puts extra strain on the iliotibial tract and thus could be more positive. A diagnostic deep friction could be helpful too (*see previous publications*).

If the patient has an obturator hernia, then the resisted flexion could be painful: repeating the test after some time in Trendelenburg position results in a negative answer.

The “Sign of the buttock” is a red flag: passive hip flexion is more limited than the Straight Leg Raise. A lumbar problem is excluded and we think of other lesions such as fracture, metastases or septic arthritis. Further examination is called for. I refer to Chapter 7: Lumbar Spine.

Section 6: Palpation	
Pain (slight – moderate – severe) where:	Sensory deficit where:

Palpation for pain/tenderness should always be the result of the outcome of the functional examination. The clinical image shows us which structure/group of structures is responsible for the complaints and only in the absence of localizing signs we palpate for tenderness.

Section 7: Conclusion
Lesion: local – referred
Lesion of an inert structure; which one:
Lesion of a contractile structure; which one:
Localizing signs:
DIAGNOSIS:
Undecided

Take into account that a double lesion can be present: inert and/or contractile.

Remember following localizing sign:

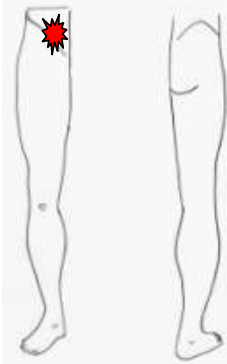
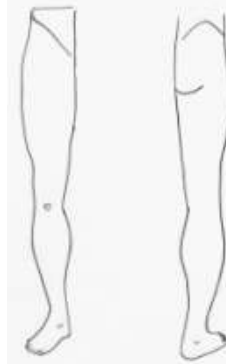
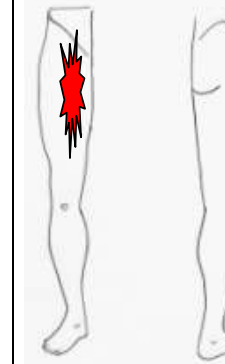
End range pain on passive flexion: the proximal aspect of the rectus femoris is pinched; if resisted hip flexion and knee extension prove to be positive, then we think of a rectus femoris lesion at its proximal extent.

Section 8: Treatment procedure / analysis	
Date first treatment:	Date last treatment:
Treatment strategy:	
Evolution / treatment adaptation:	
Total number of treatment session :	
Results:	

For every lesion we have an expectation pattern (*see previous publications*); if this pattern is not fulfilled, then we need to react i.e. re-assess and, if necessary, change the treatment strategy.

Case study Hip

Section 1: General information	© Hip Assessment Form
Date: Name: Malter R.	
Address:	
Date of birth: 13/03/1950	Sex: m – f
Referral / diagnostic information: psoas bursitis	

Section 2a: Specific history			
<i>What is your main complaint: pain – paraesthesia – limitation of movement – instability/giving way– weakness</i>			
PAIN When did it start: about 2 weeks ago How did it start: spontaneously overuse injury describe patient did a, for him, exceptionally long walk along the beach and the dunes			
How can you influence the pain, what makes it worse or better: walking for longer distance, walking on the stairs, working in the garden (with hips in flexed position)			
Evolution since the start : better- worse -unchanged			
Evolution	Start →	Evolution →	Now
Where do you feel the pain:			
Pain quality: VAS 0-10 constant- intermittent twinges-at rest during the day-at night during-after activity	4		7
Pain on coughing: where			Twinges on unexpected movements

PARAESTHESIA Where: When: constant-intermittent at rest-during the day- at night-on activity (which)			
LIMITATION ROM (subj)			
INSTABILITY/GIVING WAY when how often			
WEAKNESS (subj)			

Section 2b: General history	
Description of typical exertion during professional or leisure activities: <i>likes to do long walks along the beach, in the woods</i>	
Off work since:	Previous treatments when: what sort of treatment: results:
Are there any other joints affected which:	Medical imaging results:
Recurrences when: frequency: cause:	Medication which: Surgery:

Section 3: Inspection	
Gait: smooth – <i>limping after some time walking</i>	Wasting where:
In standing: difference in length of legs flexion deviation: hip – lumbar spine deviation in medial rotation	Remarks:

Section 4: Basic functional examination				
<i>Variables:</i> pain (where and when), ROM (normal, limited, excessive; in what degree), end-feel (normal, muscle spasm, harder, softer) and weakness.				
Not painful / limited:	-	Painful / limited:	+	
Slightly painful / limited:	+/-	Very painful / limited:	++	
	Pain	ROM	End-feel	Weakness
Pre-test pain at rest	<i>+/- just walked a bit</i>			
P flexion	++		<i>Spasm?</i>	
P lateral rotation	<i>(+/-)</i>			
P medial rotation	<i>(+/-)</i>			
P adduction	<i>(+/-)</i>			
P abduction				
R flexion	<i>+/-</i>			
R extension				
R adduction				
R abduction				
P extension	<i>+/-</i>			
P bilateral medial rot.				
R medial rotation				
R lateral rotation				
R knee flexion				
R knee extension				
Remarks: <i>(+/-) means that the test is positive on one occasion and on repetition negative; on repeating the test we see a variable answer</i>				

Section 5: Accessory functional examination	
Not necessarily all tests have to be carried out; the variables are mentioned between brackets. We use the following quotation: test is positive = +; test is negative = -	
Pulsations a. Femoralis left – right normal – weak – absent	Trunk side flexion in standing (pain) repeat with legs crossed (pain)
<i>P adduction from 90° hip flexion (pain) ++</i>	R hip flexion after Trendelenburg position (pain)
Sustained A hip extension in prone lying (claudicatio pain)	Sign of the buttock (ROM)

Section 6: Palpation	
Pain (slight – moderate – severe) where: <i>palpation of psoas bursa area quite painful, more in the proximal extent</i>	Sensory deficit where:

Section 7: Conclusion
Lesion: local – referred
Lesion of an inert structure; which one: psoas bursa
Lesion of a contractile structure; which one:
Localizing signs:
DIAGNOSIS: psoas bursitis
Undecided

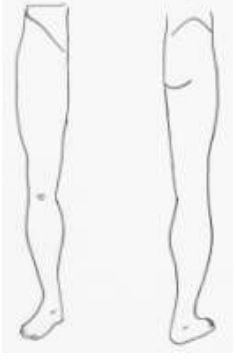
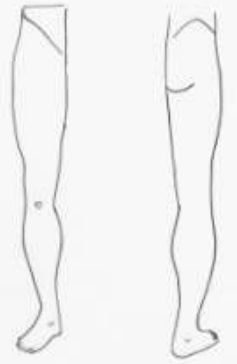
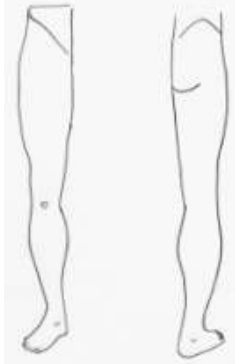
Chapter 5: The Knee

Section 1: General information	@ Knee Assessment Form
Date: _____ Name: _____ Address: _____ Date of birth: _____ Sex: m – f Referral / diagnostic information: _____	

- Age

Age can be an important differential diagnostic factor: the typical story of an internal derangement (*twinges, locking, giving way*) can have different interpretations at different ages:

- child: recurrent dislocation of the patella
- adolescent: loose body due to osteochondrosis dissecans
- adults: meniscal problem
- middle-aged: loose body in an arthrotic joint.

Section 2a: Specific history			
What is your main complaint: pain – paraesthesia – limitation of movement – instability/giving way/locking – weakness			
PAIN When did it start: How did it start: spontaneously overuse injury describe / position of the knee; which forces acted upon it			
Evolution: limitation of movement how fast did it appear swelling how fast / local-diffuse warmth			
How can you influence the pain, what makes it worse or better:			
Evolution since the start: better-worse-unchanged			
Evolution	Start →	Evolution →	Now
Where do you feel the pain:			
Is there any shifting pain?			
Pain quality: VAS 0-10 constant-intermittent twinges-at rest during the day-at night during-after activity			
PARAESTHESIA Where: When: constant-intermittent at rest-during the day- at night-on activity (which)			
LIMITATION ROM (subj)			
INSTABILITY/GIVING WAY/LOCKING Locking: flexion-extension how often spontaneous unlocking Giving way: how often Going up-downstairs: painful-insecure			
WEAKNESS (subj)			

- What is your main complaint

Pain

Does the pain originate from a local lesion or is it referred from the hip, lumbar spine or SI-joint? Of course, the history will be conclusive.

Paraesthesia

Paraesthesia in relation to a knee problem are very rare and are mostly the result of local compression). Mostly we focus on the examination of the lumbar spine first.

Limitation of movement

Bear in mind that a tendinitis, -osis, never causes limitation of a passive movement; an acute muscle belly lesion however (*e.g. quadriceps*) can cause limitation of passive movement, as well as a severe myositis ossificans. Is there a limitation of movement in the capsular pattern or in the non-capsular pattern? The functional examination will be conclusive.

Instability/giving way/locking

This type of feeling is typical for a patient suffering from an internal derangement (*meniscus, loose body*). In particular a subjective feeling of giving way on going downstairs is mentioned frequently.

Weakness

Is it a real weakness due to e.g. a partial or a total rupture or a nervous problem or is it weakness because of too much pain on performing a specific test (*e.g. resisted extension will be painful and weak in case of a patella fracture*)?

- Pain

When did it start

Are we confronted with an acute or a chronic lesion?

How did it start

A spontaneous onset of symptoms (*"I don't know how it started"*) is rather rare. Overuse is a common cause of tendon problems or bursitis. In case of a trauma it would be interesting to know what exactly happened, in which position was the knee during the trauma (*although it is not always possible for the patient to describe*); ligamentous and tendinous partial or total ruptures could be the result, as well as meniscal or cartilaginous damage.

Evolution

If there was a trauma, was this followed by immediate loss of function or did it take some time before the function was impaired?

- Immediate loss of function → severe meniscal lesion (*bucket handle*)?
- Gradual loss of function (*i.e. in about 1 ½ h after the initial trauma, limitation of movement appears*) → typical posttraumatic capsular reaction, which can mask the original clinical image. This point more in the direction of a ligamentous lesion.

Immediate swelling is the result of blood invasion, which should be aspirated. Gradual onset of swelling makes us think of synovial fluid and is also typical for the posttraumatic capsular reaction seen in combination with ligamentous and articular lesions. Swelling could also be related to a prepatellar bursitis.

Warmth means that the lesion is in an active stage.

How can you influence the pain

We ask the patient which movements, positions or activities produce, worsen or abate his pain. This information should correlate with the data obtained from the functional examination. We also use this information as a reference point to interpret the evolution during treatment.

Evolution since the start

Is it worse, better or unaltered since the beginning of the complaints?

Where do you feel the pain

The patient of course describes his actual symptoms, but it is also interesting to know where his complaints started.

Remember that a shifting pain always points in the direction of a shifting lesion i.e. an internal derangement (*loose body or meniscal problem*).

How would you describe your pain quality

Describing the intensity of the pain is of course a subjective matter, therefore we use a VAS scale. Normally severe pain always goes together with more radiation (*exception: bony structures, e.g. a fracture causing local pain*).

Is the pain constant or intermittent? Constant pain implies automatically the presence of pain at rest, so we make sure to ask the patient what he is feeling now, at this moment, during the history taking.

Soft tissue lesions mostly cause intermittent pain. Real constant pain implies a chemical factor (*inflammation*).

Pain at night does not necessarily mean that there is a major chemical factor; the patient can wake up because of mechanical reasons: while turning in bed, he felt a twinge, waking him up.

Mostly patients describe complaints during activities; in more severe cases there could be some “after pain”.

Twinges are typical for an internal derangement (*loose body or meniscus*).

- *Paraesthesia*

Rarely paraesthesia have a local cause; mostly there is a lumbar link. In that case the paraesthesia are very intermittent, day and night, sometimes at rest, perhaps related to some lumbar movements.

- *Subjective limitation of movement; weakness*

This information needs to be correlated with the information gathered from the functional examination.

- *Instability / giving way / locking*

Locking in flexion is more typical for a meniscal problem. In case of a bucket handle meniscal lesion there is no spontaneous or lasting unlocking.

A loose body tends to cause more a momentary locking in extension, followed by a spontaneous unlocking (*minor meniscal problems also unlock spontaneously*).

The frequency of locking is very intermittent, as for the feeling of giving way. An insecure/unstable feeling on going downstairs is typical for a loose body in an arthrotic joint.

If going up- and downstairs are both painful then this could also be related to a tendinous/muscular problem.

Section 2b: General history	
Description of typical exertion during professional or leisure activities:	
Off work since:	Previous treatments when: what sort of treatment: results:
Are there any other joints affected which:	Medical imaging results:
Recurrences when: frequency: cause:	Medication which: Surgery:

- *Off work?*

If this is the case, then this should be in relation to the nature of his lesion.

- *Simultaneous problems in other joints*

Here we look for a link with a possible rheumatoid arthritis, perhaps in relation to systemous diseases.

- *Recurrences*

Is it the first time you have this problem? When did you have it before; how long did it take; was it OK since then; do you remember what triggered it?

- *Previous treatments*

This information is merely background information, since it is not always relevant. If the patient received treatment before from another therapist, then he cannot always describe what exactly was done.

It is not because a certain procedure didn't afford any relief e.g. 4 weeks ago, that it won't now. Clinical images can vary in due time.

- Medical imaging

Don't treat X-rays! Treat a patient who presents with a certain clinical image.

An arthrotic patient (*visible on X-ray*) can also have a ligamentous or tendinous lesion (*not visible on X-ray*). A calcification visible on X-ray is not necessarily responsible for the actual complaints. A calcification in the proximal part of the medial collateral ligament, a Stieda Pellegrini, can be symptomatic and is not indicated for friction massage treatment.

The main advantage of medical imaging is to establish certain differential diagnoses.

Section 3: Inspection	
Gait: smooth – limping	Swelling: local – diffuse where:
Genu valgum – varum – recurvatum – left – right – bilateral	Wasting where:
Flexion deviation position of the knee	Remarks:

Limping could be associated with a number of lesions: an internal derangement, an arthritis or a tendinous/muscular problem.

A flexion deviation position of the knee is typical for a bucket handle meniscal problem.

Swelling could be the result of the posttraumatic capsular reaction or could be associated with a Baker's cyst or a bursitis.

Section 4: Basic functional examination				
Variables: pain (where and when), ROM (normal, limited, excessive; in what degree), end-feel (normal, muscle spasm, springy block, harder) and weakness.				
Not painful / limited:	-	Painful / limited:	+	
Slightly painful / limited:	+/-	Very painful / limited:	++	
	Pain	ROM	End-feel	Weakness
Pre-test pain at rest				
Palpation for warmth + or -				
P flexion				
P extension				
P lateral rotation				
P medial rotation				
P valgus				
P varus				
Lachman test				
Posterior drawer test				
R extension				
R flexion				
Palpation for warmth + or -				
Palpation for gross swelling + or -				
Palpation for small swelling + or -				
Palpation for synovial thickening + or -				
Remarks:				

- Pre-test pain at rest

Always inquire about the presence of a pre-test pain: where is this pain and how is it influenced by the tests. Does it get worse or better; is a new pain produced somewhere else? If there is no pain at rest, are we able to produce pain and where is it felt?

- Palpation for warmth

Is there any warmth before starting the examination?

- Passive flexion

We interpret pain, range of motion and endfeel (*soft/extra-articular*). In case of an acute quadriceps muscle belly lesion, flexion can be painfully limited.

- Passive extension

We interpret pain, range of motion and endfeel (*hard*). End range extension also puts strain on the medial collateral ligament.

After those tests we interpret the pattern: capsular pattern (*i.e. flexion more limited than extension*) or non-capsular pattern? A capsular pattern is related to a symptomatic arthrosis or arthritis. A bursitis, ligamentous lesion, meniscal lesion, loose body all present as a non-capsular pattern.

It is also possible to detect a painful arc during the passive movement from flexion to extension. This finding has three interpretations:

- An inflamed medial plica synovialis between the patella and the medial femoral condyle
- A bursitis between the iliotibial tract and the lateral epicondyle
- An iliotibial tract lesion

• Passive lateral and medial rotation

We interpret pain and range of movement. Make sure you reach the real end of the movement and then slightly provoke.

Lateral rotation is the main test for the medial coronary ligament; medial rotation tests the lateral coronary ligament.

A medial coronary ligament lesion is quite frequent in case of flexion-lateral rotation traumata.

• Passive valgus and varus

We interpret pain and range of movement. Make sure you reach the real end of the movement and then slightly provoke.

Valgus is the main test for the medial collateral ligament; varus tests the lateral collateral ligament. Those tests could also be false positive in case of an internal derangement.

Performing the valgus test from 30° of knee flexion is a good way to test laxity in relation to a rupture of the medial collateral ligament.

• Lachman test / posterior drawer test

We interpret pain and range of movement. Those are tests for the anterior and posterior cruciate ligaments. Testing mobility is the more important variable. Those tests could be painful in case of a partial rupture of a cruciate ligament.

• Resisted extension

Variable pain

The main interpretation is a lesion of the quadriceps. In case of severe patella-femoral arthrosis, this test could be positive too.

Variable weakness

Weakness could be related to a partial rupture or a fracture. Compression of the L3-nerve root is also possible. Remember that a fracture or partial rupture cause both pain and weakness on testing; compression on a nerve root, resulting in motor deficit, only causes weakness on testing.

• Resisted flexion

Variable pain

We think of the hamstrings first; further differentiation between the medial (*pes anserinus*) and the lateral rotators (*biceps*) is necessary. A popliteus lesion is also possible. In rare case we think of a lesion of the posterior cruciate ligament or a sprain of the upper tibiofibular ligament: in those cases the resisted flexion, carried out from the standard position, is painful and when performed from almost full extension, the test will be negative.

Variable weakness

Weakness could be related to a partial rupture. Compression of the S1-S2-nerve roots is also possible.

• Extra palpations

Warmth

No warmth before the examination, but 1-2 minutes of warmth after the examination sometimes happens in case of a loose body in an arthrotic joint.

Swelling

A large swelling is obvious; a small swelling can be palpated too, by using the fluctuation test.

Synovial thickening

We palpate at the height of the femoral condyles; this kind of swelling is typical for rheumatoid disorders.

Section 5: Accessory functional examination	
Not necessarily all tests have to be carried out; the variables are mentioned between brackets. We use the following quotation: test is positive = +; test is negative = -	
P bilateral lateral rotation in prone lying (ROM)	P varus from 30° flexion (ROM)
R lateral rotation (pain)	P valgus from 30° flexion (ROM)
R lateral rotation (weakness)	Posterior drawer test with foot in lateral rotation (ROM)
R medial rotation (pain)	Posterior drawer test with foot in medial rotation (ROM)
R medial rotation (weakness)	R flexion from almost full extension (pain)
Squatting with palpation of the patella (pain, crepitation)	
Accessory meniscal tests:	Remarks:
• From full flexion, with palpation in the joint line, exerting full P rotations (pain and palpable click) • From full flexion and lateral rotation, with palpation in the joint line, exert P extension (pain and palpable click) • From full flexion and medial/lateral rotation, with palpation in the joint line, exert P extension (pain and palpable click) • ...	

- Passive bilateral lateral rotation in prone lying

In case of a ligamentous rupture (*MCL*), we can look for hypermobility.

- Resisted lateral / medial rotation

On lateral rotation we test the biceps femoris; medial rotation is a test for the semitendinosus, semimembranosus and popliteus.

In case of a popliteus lesion check both the posterior and the lateral part by palpation for tenderness.

- Resisted flexion from almost full extension

The information from this test is compared with the information from the resisted flexion from the basic examination. In case of a lesion of the posterior cruciate ligament or a sprain of the upper tibiofibular ligament, the standard flexion test is positive, but the flexion performed from almost full extension becomes negative.

- Squatting

In case of patellofemoral arthrosis this test will be positive.

- Accessory meniscal tests

If the history points in the direction of a meniscal problem, those accessory tests can be performed. It is important to emphasize that all meniscal tests seem to have limited validity, so, one positive test is irrelevant. A cluster of elements from the history and clinical examination will be more conclusive.

- Passive varus / valgus from 30° flexion / drawer tests

In case of ligamentous rupture, there will be hypermobility.

Normally we expect full stability on the posterior drawer test performed in three versions: knee in neutral position, lateral rotation and medial rotation.

In case of a suspicion of instability further examination is called for.

Section 6: Palpation	
Pain (slight – moderate – severe) where:	Sensory deficit where:

Palpation for pain/tenderness should always be the result of the outcome of the functional examination. The clinical image shows us which structure/group of structures is responsible for the complaints.

Section 7: Conclusion
Lesion: local – referred
Lesion of an inert structure; which one:
Lesion of a contractile structure; which one:
DIAGNOSIS:
Undecided

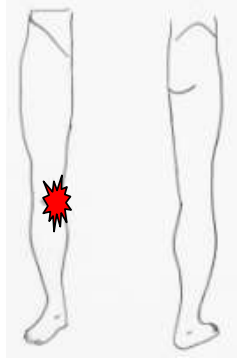
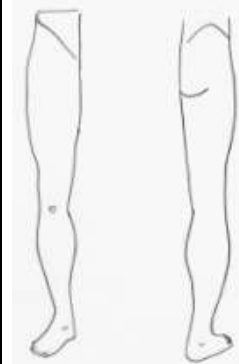
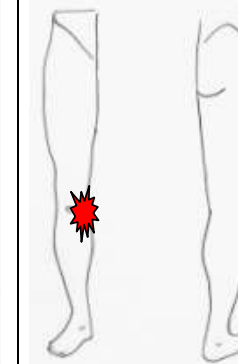
Take into account that a double lesion can be present: inert and/or contractile.

Section 8: Treatment procedure / analysis
Date first treatment: Date last treatment:
Treatment strategy:
Evolution / treatment adaptation:
Total number of treatment sessions:
Results:

For every lesion we have an expectation pattern (*see previous publications*); if this pattern of expectation is not fulfilled, then we need to react i.e. re-assess and, if necessary, change the treatment strategy.

Case study Knee

Section 1: General information		© Knee Assessment Form	
Date:	Name: Meisters C.		
Address:			
Date of birth: 17/07/78	Sex: m – f		
Referral, diagnostic information: ligamentous sprain medial collateral ligament, acute			

Section 2a: Specific history			
What is your main complaint: pain – paraesthesia – limitation of movement – instability/giving way/locking – weakness			
PAIN When did it start: 3 days ago How did it start: spontaneously overuse injury describe / position of the knee; which forces acted upon it: skiing accident; patient fell with knee in valgus, ski binding opened too late?			
Evolution: limitation of movement how fast did it appear approx 2 h later, after the accident, clear limitation of movement flexion - extension swelling how fast / local-diffuse approx 2 h later, after the accident, gross diffuse swelling warmth			
How can you influence the pain, what makes it worse or better: walking is still painful; patient is limping; scope of activities is very limited; had to walk with crutches			
Evolution since the start: better-worse- unchanged			
Evolution	Start →	Evolution →	Now
Where do you feel the pain:			
Is there any shifting pain? NO			
Pain quality: VAS 0-10 constant-intermittent twinges-at rest during the day-at night during-after activity	7 Constant		7 Intermittent; twinges on unexpected movements; pain at night (puts a cushion between the knees)

PARAESTHESIA Where: When: constant-intermittent at rest-during the day- at night-on activity (which)			
LIMITATION ROM (subj)			Flexion – extension
INSTABILITY/GIVING WAY/LOCKING Locking: flexion-extension how often spontaneous unlocking Giving way: how often Going up-downstairs: painful-insecure			
WEAKNESS (subj)			

Section 2b: General history	
Description of typical exertion during professional or leisure activities: patient works in a production department of a factory; performs a lot of sports: tennis, swimming, jogging	
Off work since: since the accident; impossible to work now	Previous treatments when: what sort of treatment: results:
Are there any other joints affected which:	Medical imaging results: non-conclusive
Recurrences when: frequency: cause:	Medication which: NSAID – pain killers Surgery:

Section 3: Inspection	
Gait: smooth – limping	Swelling: local – diffuse where: around the joint
Genu valgum – varum – recurvatum – left – right – bilateral	Wasting where:
Flexion deviation position of the knee Flexion AND extension are limited	Remarks:

Section 4: Basic functional examination				
<i>Variables:</i> pain (where and when), ROM (normal, limited, excessive; in what degree), end-feel (normal, muscle spasm, springy block, harder) and weakness.				
Not painful / limited: - Painful / limited: + Slightly painful / limited: +/- Very painful / limited: ++				
	Pain	ROM	End-feel	Weakness
Pre-test pain at rest	+/-			
Palpation for warmth + or -				
P flexion	++	++	Muscle spasm	
P extension	+	+	Muscle spasm	
P lateral rotation	+/-			
P medial rotation				
P valgus	++			
P varus				
Lachman test				
Posterior drawer test				
R extension				
R flexion				
Palpation for warmth + or -				
Palpation for gross swelling + or -				
Palpation for small swelling + or -				
Palpation for synovial thickening + or -				
Remarks:				

Section 5: Accessory functional examination	
Not necessarily all tests have to be carried out; the variables are mentioned between brackets. We use the following quotation: test is positive = +; test is negative = -	
P bilateral lateral rotation in prone lying (ROM)	P varus from 30° flexion (ROM)
R lateral rotation (pain)	P valgus from 30° flexion (ROM)
R lateral rotation (weakness)	Posterior drawer test with foot in lateral rotation (ROM)
R medial rotation (pain)	Posterior drawer test with foot in medial rotation (ROM)
R medial rotation (weakness)	R flexion from almost full extension (pain)
Squatting with palpation of the patella (pain, crepitation)	
Accessory meniscal tests: - From full flexion, with palpation in the joint line, exerting full P rotations (pain and palpable click) - From full flexion and lateral rotation, with palpation in the joint line, exert P extension (pain and palpable click) - From full flexion and medial/lateral rotation, with palpation in the joint line, exert P extension (pain and palpable click) ...	Remarks:

Section 6: Palpation	
Pain (slight – moderate – severe) where: MCL at the height of the joint line	Sensory deficit where:

Section 7: Conclusion
Lesion: local – referred
Lesion of an inert structure; which one: medial collateral ligament + posttraumatic capsular reaction (arthritis image)
Lesion of a contractile structure; which one:
DIAGNOSIS: acute sprain of the medial collateral ligament
Undecided

Chapter 6: The Foot and Ankle

Section 1: General information	© Foot and Ankle Assessment Form
Date: _____ Name: _____ Address: _____ Date of birth: _____ Sex: m – f Referral / diagnostic information: _____	

Section 2a: Specific history			
<i>What is your main complaint: pain – paraesthesia – limitation of movement – instability – weakness</i>			
PAIN When did it start: How did it start: spontaneously overuse injury describe			
How can you influence the pain, what makes it worse or better:			
Evolution since the start: better-worse-unchanged			
Evolution	Start →	Evolution →	Now
Where do you feel the pain:			
Pain quality: VAS 0-10 constant-intermittent twinges-at rest during the day-at night during-after activity Is there lasting morning stiffness			
Influence on pain by: type of shoes uneven surface			

PARAESTHESIA Where: When: constant-intermittent at rest-during the day- at night-on activity (which)			
LIMITATION ROM (subj)			
WEAKNESS (subj)			
INSTABILITY (subj)			

- What is your main complaint

Pain

Does the pain originate from a local lesion or is it referred from the knee, hip, lumbar spine or SI-joint?

Paraesthesia

Paraesthesia can be the result of local compression. Mostly we need to examine the lumbar spine.

Limitation of movement

Bear in mind that a tendinitis, -osis, never causes limitation of a passive movement. A muscle belly lesion can cause limitation of passive movement (*e.g. passive dorsiflexion is painfully limited in an acute tennis leg*). Is there a limitation of movement in the capsular pattern or in the non-capsular pattern? The functional examination will be conclusive.

Instability

A patient who describes intermittent instability problems could have an internal derangement (*loose body*) in the ankle or the subtalar joint. In those cases the functional examination will be negative.

Weakness

Is it a real weakness due to e.g. a partial or a total rupture or a nervous problem (*e.g. compression of a sacral nerve root*) or is it weakness because of too much pain on performing a specific test?

- Pain

When did it start

We determine whether the lesion is in an acute or a chronic stage.

How did it start

A spontaneous onset is more typical for a loose body or a bursitis.

Overuse, RSI, is mostly the cause of an achilles tendon problem.

In case of an injury beware of partial and total ruptures or a fracture. Also check the presence of a double lesion (*ligament and tendon; double ligamentous lesion*) in case of an inversion trauma. The examination will be conclusive.

How can you influence the pain

We ask the patient which movements, positions or activities produce, worsen or abate his pain. This information should correlate with the data obtained after the functional examination. We also use this information as a reference point to interpret the evolution during treatment.

Evolution since the start

Is it worse, better or unaltered since the beginning of the complaints?

Where do you feel the pain

The patient of course describes his actual symptoms, but it is also interesting to know where his complaints started; is there more radiation or not? Is there a shifting pain? Shifting pain is again typical for an internal derangement.

How would you describe your pain quality

Describing the intensity of the pain is of course a subjective matter, therefore we use a VAS score.

Is the pain constant or intermittent? Constant pain implies automatically the presence of pain at rest, so we make sure to ask the patient what he is feeling now, at this moment, during the history taking.

Soft tissue lesions mostly cause intermittent pain. Real constant pain implies a chemical factor (*inflammation*).

Pain at night does not necessarily mean that there is a chemical factor; the patient can wake up because of mechanical reasons: while turning in bed, he felt a twinge, waking him up.

Mostly patients describe complaints during activities; in more severe cases there could be some "after pain".

Irregular twinges are also typical for an internal derangement.

Lasting morning stiffness points in the direction of rheumatoid disorders.

Can the complaints be influenced by the type of shoes the patient uses (*high heels*)? Is there a difference between walking on an even or on an uneven surface (*e.g. beach*)?

- Paraesthesia

Rarely paraesthesia have a local cause (*unless there is a tarsal tunnel syndrome*); mostly there is a lumbar link. In that case the paraesthesia are very intermittent, can appear day and night, sometimes at rest, perhaps related to some lumbar movements.

- Subjective limitation of movement; instability or weakness

This information needs to be correlated with the information gathered from the functional examination.

Of course a rupture of the achilles tendon or gastrocnemius muscle belly is going to cause functional weakness.

Section 2b: General history	
Description of typical exertion during professional or leisure activities:	
Off work since:	Previous treatments when: what sort of treatment: results:
Are there any other joints affected which:	Medical imaging results:
Recurrences when: frequency: cause:	Medication which: Surgery:

- Off work?

If this is the case, then this should be in relation to the nature of his lesion.

- Simultaneous problems in other joints

Here we look for a link with a possible rheumatoid arthritis, perhaps in relation to system diseases.

- Recurrences

Is it the first time you have this problem? When did you have it before; how long did it take; was it OK since then; do you remember what triggered it?

- Previous treatments

This information is merely background information, since it is not always relevant. If the patient received treatment before from another therapist, then he cannot always describe what exactly was done.

It is not because a certain procedure didn't afford any relief e.g. 4 weeks ago, that it won't now. Clinical images can vary in due time.

- Medical imaging

Don't treat X-rays! Treat a patient who presents with a certain clinical image.

An arthrotic patient (*visible on X-ray*) can also have a ligamentous or a tendinous lesion (*not visible on X-ray*). The main advantage of medical imaging is to establish certain differential diagnoses: e.g. excluding a fracture in case of an inversion or an eversion trauma.

Section 3: Inspection	
Gait: smooth – limping	Wasting where: Colour changes where:
Swelling – oedema – varicose veins where:	
Deformity heel in varus – valgus / metatarsus inversus / pes planus – pes cavus	Abnormal wear of the shoes

Swelling and haematoma often occur after an inversion or eversion trauma; make sure you exclude a fracture.

A temporary deviated position of the heel in valgus can be related to a loose body in the subtalar joint (*mostly this is the only finding in the clinical examination*). A permanent valgus position of the heel points in the direction of arthrosis in the subtalar joint or rheumatoid arthritis.

A pes cavus could lead more easily to a plantar fasciitis.

Abnormal wear of the shoes learns us something about the gait pattern of the patient.

Section 4: Basic functional examination				
<i>Variables:</i> pain (where and when), ROM (normal, limited, excessive; in what degree), end-feel (normal, muscle spasm, harder) and weakness.				
Not painful / limited:	-	Painful / limited:	+	
Slightly painful / limited:	+/-	Very painful / limited:	++	
	Pain	ROM	End-feel	Weakness
Pre-test pain at rest				
Standing on one leg: rising on tiptoe				
P plantiflexion ankle				
P dorsiflexion ankle				
P mortice test	click: + or -			
P plflex-abd-pron				
P plflex-add-sup				
P subtalar varus				
P subtalar valgus				
P mid-tarsal plantiflexion				
P mid-tarsal dorsiflexion				
P mid-tarsal abduction				
P mid-tarsal adduction				
P mid-tarsal supination				
P mid-tarsal pronation				
R dorsiflexion				
R plantiflexion				
R inversion				
R eversion				
Remarks:				

- Pre-test pain at rest

Always inquire about the presence of a pre-test pain: where is this pain and how is it influenced by the tests. Does it get worse or better; is a new pain produced somewhere else? If there is no pain at rest, are we able to produce pain and where is it felt?

- Unilateral rising on tiptoe

Variable pain

We mainly think of a lesion of the gastrocnemius or the achilles tendon; in minor lesions it is possible that this test is negative, but after repeating it several times it becomes positive.

Variable weakness

Weakness is mostly related to a complete or a partial rupture. Compression of the S1-S2-nerve roots is also possible.

- Passive plantiflexion / dorsiflexion ankle

We interpret pain, range of motion and endfeel (*elastic*). We can detect the capsular or non-capsular pattern of the ankle joint (*capsular pattern of the ankle joint = equal limitation of dorsi- and plantiflexion*).

End range anterior pain on P plantiflexion could originate from a sprain of the anterior tibiotalar ligament.

End range posterior pain on P plantiflexion can be interpreted in several ways:

- could be a localizing sign in an achilles tendinitis, pointing to a tenoperiosteal lesion
- could be the result of a posterior periostitis (*i.e. dancer's heel: a periostitis at the posterior distal aspect of the tibia*)
- a retrocalcaneal bursitis
- endrange slight pain and slight limitation could come from a periostitis of the trigonum bone (*i.e. a complementary bone on the posterior aspect of talus, which is only present in 10% of the population*).

End range anterior pain on P dorsiflexion could be related to an anterior periostitis (*i.e. soccer's ankle; a periostitis at the distal anterior aspect of the tibia and the collum tali*).

A snapping ankle can also be discovered: there is a disruption of the retinacula over the posterior fibular groove, resulting in a "luxation" of the peroneal tendons. In dorsiflexion move anteriorly over the fibular head and in plantiflexion they move back into their normal position.

- Passive mortice test

It is the purpose to test the integrity of the tibiofibular connections: pain alone is not considered a positive answer (*could come from the calcaneofibular ligament*). There should be a combination of pain, hypermobility and a click. In the history a trauma was mentioned.

- Passive plantiflexion-abduction-pronation

We interpret pain and range of movement. This is the main test for the deltoid ligament; no differentiation can be made between the anterior, posterior, middle and deeper portion of the ligament.

When this test causes lateral instead of medial pain, we think of a painful impingement of the posterior talofibular ligament.

- Passive plantiflexion-adduction-supination

We interpret pain and range of movement. This is the main test for the lateral ligaments, particularly the anterior talofibular ligament and the calcaneocuboid ligament, and to a lesser degree, the calcaneofibular ligament. Of course there is also extra tension on the peroneal tendons.

In case of an inversion trauma, this test is surely positive.

- Passive subtalar varus / valgus

We interpret pain, range of motion and endfeel (*elastic*). We can detect the capsular pattern (*i.e. limitation of varus, with eventually fixation in valgus*) or the non-capsular pattern of the subtalar joint.

Subtalar varus is also the main test for the calcaneofibular ligament.

When, in case of an inversion trauma, passive valgus causes quite some pain laterally, then we can suspect a malleolus fracture and further examination is called for.

- Passive midtarsal tests

Interpret pain and the pattern: capsular (*i.e. abduction and lateral rotation/supination normal, the four other movements are limited*) or non-capsular pattern of the midtarsal joints.

Lateral rotation/supination is the main test for the calcaneocuboid ligament.

A lateral periostitis or jumper's ankle is a periostitis at the superolateral aspect of the anterior calcaneus border, against the inferior anterior aspect of the fibula. A passive dorsiflexion movement combined with eversion will provoke the symptoms, as well as standing with the heel in valgus.

- Resisted dorsiflexion

Variable pain

We mainly think of tibialis anterior.

Variable weakness

The most common cause of weakness is pressure on the L4-nerve root or an acute symptomatic anterior compartment syndrome, resulting in a dropfoot.

- Resisted plantiflexion

Variable pain

We think of the achilles tendon or the gastrocnemius/soleus. Perhaps repeated test movements are necessary in order to provoke symptoms on testing.

Variable weakness

Weakness could be related to a complete or a partial rupture. Compression of the S1-S2-nerve roots is also possible.

A tennis leg (*acute muscle belly lesion of the gastrocnemius*) is a frequent lesion. From the differential diagnostic point of view we have to consider different options:

- A rupture of the plantaris tendon: in that case the resisted test will be negative and there won't be any antalgic position in plantiflexion
- A rupture of the achilles tendon: we find weakness, but no passive limitation of movement
- A deep venous thrombosis: no pain during contraction, no passive limitation, but diffuse swelling and diffuse tenderness on palpation; the problem arises after a period of immobilisation
- A ruptured Baker's cyste: we find diffuse swelling in the calf; the patient has rheumatoid arthritis
- Posterior compartment syndrome: the patient describes pain and swelling some hours after exertion; walking is painful; passive dorsiflexion limited and painful; rubor and calor
- Intermittent claudicatio: the typical history points in that direction i.e. pain after some time of exertion forcing the patient to stop the activity for some minutes, after which the pain disappears. The patient restarts his activity (*e.g. walking*), after some time symptoms arise again...

- Resisted inversion

Variable pain

We mainly think of the tibialis posterior. Check two localizations for tenderness by palpation (*proximally and distally from the medial malleolus*); perhaps also check if the heel is not in a valgus deviated position, because this could put more strain on the contractile structure and calls for adjustment.

Variable weakness

We think of a rupture.

- Resisted eversion

Variable pain

We think of the peroneal tendons (*longus and brevis*). Check three localizations for tenderness by palpation (*proximal to, behind and distal to the lateral malleolus*).

In case of an inversion trauma beware of a double lesion: tendinous and ligamentous lesion or a double ligamentous lesion.

When, in case of an inversion trauma, resisted eversion is painful and weak a fracture of the base of meta V is likely; further examination is called for.

Variable weakness

Rupture is one possibility; compression of the L5-S1- nerve roots is another.

Section 5: Accessory functional examination	
Not necessarily all tests have to be carried out; the variables are mentioned between brackets. We use the following quotation: test is positive = +; test is negative = -	
Mid- and forefoot: P flexion and extension each joint separately (pain, ROM)	Toes: R flexion and extension each joint separately (pain, weakness)
Ankle: drawer test (ROM)	Combined P dorsiflexion + eversion (pain)

If the symptoms are felt more distally in the foot, then some accessory tests are carried out. The ankle drawer test can also be used in cases of instability; increased posterior movement of the fibula points in the direction of a rupture or laxity of the anterior talofibular ligament. The combined passive dorsiflexion and eversion is the main test for a lateral periostitis (*jumper's ankle*).

Section 6: Palpation	
Pain (slight – moderate – severe) where:	Sensory deficit where: plantar-dorsal / medial-lateral / complete

Palpation for pain/tenderness should always be the result of the outcome of the functional examination. The clinical image shows us which structure/group of structures is responsible for the complaints and only in the absence of localizing signs we palpate for tenderness.

Section 7: Conclusion
Lesion: local – referred
Lesion of an inert structure; which one:
Lesion of a contractile structure; which one:
Localizing signs:
DIAGNOSIS:
Undecided

Remember the following localizing sign:

End range passive plantiflexion → tenoperiosteal part of the achilles tendon is squeezed in.

Section 8: Treatment procedure / analysis	
Date first treatment:	Date last treatment:
Treatment strategy:	
Evolution / treatment adaptation:	
Total number of treatment sessions:	
Results:	

If there is a double lesion (*ligamentous and tendinous*) it is necessary to adapt the treatment strategy. Active mobilisation/exercises for an acute tendinous problem should be avoided during the first week. Regarding detailed treatment strategy, I refer to my previous publications.

Case study Foot and Ankle

Section 1: General information	© Foot and Ankle Assessment Form
Date: _____ Name: Demaegd D. Address: _____ Date of birth: 18/08/1965 Sex: m – f Referral / diagnostic information: acute sprain lateral ligaments	

Section 2a: Specific history			
What is your main complaint: pain – paraesthesia – limitation of movement – instability – (weakness)			
PAIN When did it start: 5 days ago How did it start: spontaneously overuse injury describe inversion trauma during mini-football game			
How can you influence the pain, what makes it worse or better: walking is painful, running not possible, every other movement with the foot is painful (supination, planti- and dorsiflexion)			
Evolution since the start: better-worse- unchanged			
Evolution	Start →	Evolution →	Now
Where do you feel the pain:			
Pain quality: VAS 0-10 constant -intermittent twinges-at rest during the day-at night during -after activity Is there lasting morning stiffness	8		6 Twinges on slight movements
Influence on pain by: type of shoes uneven surface			

PARAESTHESIA Where: When: constant-intermittent at rest-during the day- at night-on activity (which)			
LIMITATION ROM (subj)			Flexion - extension
WEAKNESS (subj)			Weightbearing is difficult/painful
INSTABILITY (subj)			

Section 2b: General history	
Description of typical exertion during professional or leisure activities: postman; likes to play football in a veteran team	
Off work since: the accident	Previous treatments when: after the accident what sort of treatment: 4 days of immobilisation results: less swelling?
Are there any other joints affected which:	Medical imaging results: fracture negative
Recurrences when: frequency: cause:	Medication which: NSAID – pain killers Surgery:

Section 3: Inspection	
Gait: smooth – limping Swelling – oedema – varicose veins where: mainly lateral aspect foot	Wasting where: Colour changes where: haematoma lateral and medial foot
Deformity heel in varus – valgus / metatarsus inversus / pes planus – pes cavus	Abnormal wear of the shoes

Section 4: Basic functional examination				
Variables: pain (where and when), ROM (normal, limited, excessive; in what degree), end-feel (normal, muscle spasm, harder) and weakness.				
Not painful / limited: -		Painful / limited: +		
Slightly painful / limited: +/-		Very painful / limited: ++		
	Pain	ROM	End-feel	Weakness
Pre-test pain at rest	+/-			
Standing on one leg: rising on tiptoe	Not possible			
P plantiflexion ankle	++	+	Muscle spasm	
P dorsiflexion ankle	+/-			
P mortice test	click: + or -			
P plflex-abd-pron				
P plflex-add-sup	++	++		
P subtalar varus	++	++		
P subtalar valgus				
P mid-tarsal plantiflexion				
P mid-tarsal dorsiflexion				
P mid-tarsal abduction				
P mid-tarsal adduction				
P mid-tarsal supination				
P mid-tarsal pronation				
R dorsiflexion				
R plantiflexion				
R inversion				
R eversion	+/-			
Remarks: repeated resisted eversion causes more pain				

Section 5: Accessory functional examination	
Not necessarily all tests have to be carried out; the variables are mentioned between brackets. We use the following quotation: test is positive = +; test is negative = -	
Mid- and forefoot: P flexion and extension each joint separately (pain, ROM)	Toes: R flexion and extension each joint separately (pain, weakness)
Ankle: drawer test (ROM)	Combined P dorsiflexion + eversion (pain)

Section 6: Palpation	
Pain (slight – moderate – severe) where: lig talofib ant; lig calcaneo fibulare; peroneus brevis	Sensory deficit where: plantar-dorsal / medial-lateral / complete

Chapter 7: The Lumbar Spine

Section 7: Conclusion
Lesion: local – referred
Lesion of an inert structure ; which one: mainly anterior talofibular ligament and calcaneofibular ligament
Lesion of a contractile structure ; which one: minor lesion peroneus brevis
Localizing signs:
DIAGNOSIS: acute double ligamentous sprain + minor tendinitis
Undecided

Section 1: General information		@ Lumbar spine Assessment Form
Date:	Name:	
Address:		
Date of birth:	Sex: m – f	
Referral / diagnostic information:		

- Age

Young patients suffering from an internal derangement could have a more nuclear and/or annular type of disc bulging; certain manipulation and/or traction techniques could be interesting treatment options *(it is imperative to respect specific indications and contraindications; therefore I refer to my previous publications)*.

Elderly patients have less chance to suffer from a softer nuclear internal derangement, therefore, continuous traction is not the treatment option of choice anymore, manipulation will be a more efficient option.

Symptomatic spinal canal stenosis, as well as lateral recessus stenosis or a mushroom phenomenon are seen mostly in an elderly population. This also applies for symptomatic facet joint lesions.

Section 2a: Specific history			
What is your main complaint: pain – paraesthesia – limitation of movement – weakness			
PAIN When did it start: How did it start: spontaneously overuse - injury describe sudden – slow onset suddenly, slowly worse slowly, suddenly worse			
How can you influence the pain, what makes it better or worse:			
Evolution since the start: better-worse-unchanged			
Evolution	Start →	Evolution →	Now
Where do you feel the pain: lumbar region low – high – central left – right – bilateral gluteal region bilateral – alternating left – right cranial – caudal lower limb left – right where exactly with or without lumbar pain distal border of the symptoms			
Pain quality: VAS 0-10 constant-intermittent during activity - at rest			
Worse with: lying – sitting – standing – on the move – bending In the morning As the day progresses At evening – at night Better with: lying – sitting – standing – on the move – bending In the morning As the day progresses At evening – at night			
Pain on coughing/sneezing: where:			

PARAESTHESIA Where: With or without pain: When: constant-intermittent at rest-during the day- at night-on activity (which)			
LIMITATION ROM (subj)			
WEAKNESS (subj)			

- What is your main complaint

Pain

Is it segmental or multi-segmental pain? Multi-segmental pain mainly points in the direction of dural involvement i.e. an internal derangement with pressure against dura mater. Segmental pain can be related to a nerve root problem, a hip or an SI-lesion.

Paraesthesia

Segmental paraesthesia can be related to a nerve root problem; locate the distal border of the symptoms in order to determine the specific dermatome. Multi-segmental paraesthesia are a symptom of spinal cord compression; in the presence of other red flags, further examination is called for.

Limitation of movement

We have to interpret the pattern found on functional examination: a full or a partial articular pattern? The full articular pattern consists of an equal limitation of extension and side flexions, while flexion is the best movement. A full articular pattern is typical for an arthrotic spine. An internal derangement always presents itself as a partial articular pattern. A partial articular pattern is any other combination which does not correspond with the full articular pattern.

Weakness

Is there weakness because of pain (*e.g. root tests in an acute lumbago can be weak because of too much back pain; the patient is afraid to move too much*) or is it real weakness due to considerable pressure on a nerve root. In that case also remember the spontaneous evolution that exists in case of a monoradicular deficit; also consider biradicular symptoms (*see further*).

- Pain

When did it start

An acute phase of back pain is obvious and is mostly due to an internal derangement. In chronic cases however, an underlying dysfunction syndrome can be present. The functional examination will be conclusive.

In case of root pain (*in patients younger than 60 y.*), caused by an internal derangement, it is very important to know when the root pain started, and the backpain ceased. From that moment on the spontaneous evolution starts which takes about 8-12 months: once over the middle of this period the protrusion/internal derangement becomes irreducible and manipulation/traction becomes useless.

How did it start

A spontaneous “I don’t know how” onset is rather rare. Mostly the patient is able to relate a certain activity to the start of his symptoms (*I refer to a number of typical histories, described in my previous publications*).

If symptoms are triggered by a trauma beware of the possibility of a muscle lesion or a fracture: always perform the accessory examination.

Repetitive activities, from e.g. a sustained flexion posture, could be an example of overuse.

Did the symptoms start suddenly or slowly? Or is it rather a combination of both? A sudden onset points more in the direction of an internal derangement that will react well on manipulation (*i.e. a “harder” protrusion*); a slower or gradual onset makes us think of an internal derangement that benefits more from a continuous traction treatment (*i.e. a softer protrusion*).

How can you influence the pain

It is interesting to know which activities, positions and movements have an influence on the patient’s symptoms. We would like to know what makes the patient worse and what makes him better; because we can use this information in the treatment and prophylactic strategy. This information also has to be correlated with the findings of the functional examination. A “big” story goes together with a “big” image.

Evolution since the start

The main issue is the presence or not of centralizing pain: centralisation always is a favourable evolution; peripheralisation, on the contrary, always is unfavourable.

Where do you feel the pain

Segmental or multi-segmental?

The high lumbar area is considered as the “forbidden area” as other pathology is more frequent than internal derangement.

Alternating gluteal pain could also be typical for an active SI-phase in an ankylosing spondylitis patient.

If the patient describes leg pain: where exactly; which dermatome? Or is it multi-segmental pain, most likely coming from the dura instead of the nerve root?

An SI-problem or a hip problem both can refer pain in the lower limb. An SI-joint mostly refers pain in the S1-S2-dermatome; a hip joint refers pain in the L3-dermatome.

Remember that a unilateral structure only can cause unilateral pain, thus an SI-joint or a facet joint cannot refer pain in the centre of the back; they only cause pure unilateral pain, neither do they cause a shifting pain.

The patient of course describes his actual symptoms, but we would also like to know where it started in order to interpret the evolution. Centralisation or peripheralisation? Notice the presence of a shifting pain, pointing automatically in the direction of an internal derangement. An expanding pain however is a red flag and makes us think of severe pathology. Further examination is called for.

A symptomatic spinal stenosis mostly is going to cause bilateral symptoms, whereas a lateral recess stenosis cause unilateral symptoms confined to one dermatome.

Finally, knowing the distal border of the symptoms is going to be helpful to determine the specific dermatome(s) in which the symptoms are felt.

How would you describe your pain quality

Real constant pain implies there is a chemical or inflammatory factor and thus should always be accompanied by pain at rest, although an acute internal derangement also can cause constant pain. Again we use a VAS scale to objectivate the pain intensity.

The vast majority of our patients describe an intermittent pain.

Keep in mind that a “big” story should go together with a “big” clinical image.

The pain is better/worse with...

Perhaps the patient has pain during sitting: is there a difference between sitting on a hard chair or sitting in a soft couch (*sitting slouched*)? Or, if there is no pain on sitting, perhaps the curve reversal movement (*i.e. transition from a kyphotic to a lordotic position*) is painful. A symptomatic positive curve reversal is typical for internal derangements.

Some symptomatic SI-patients prefer to sit with one half of the gluteal area on the chair and the other half outside the chair. SI-patients never describe a problematic curve reversal.

Pain at night suggests an inflammatory factor, but mostly patients wake up because of a mechanical factor (*e.g. turning from one side to another*).

Patients with an internal derangement can feel better or worse in the morning, sometimes depending on the size and position of the protrusion. Generally, being on the move is beneficial.

Patients who describe symptoms in which they maintain certain positions for a longer time, might have a postural syndrome or even a dysfunction syndrome. The functional examination is going to be conclusive.

Is there any pain on coughing/sneezing

If yes, where?

→ pain in the lumbar region: this is a clear dural sign in relation with an internal derangement

→ pain in caudal gluteal aspect: perhaps a symptomatic SI arthritis

→ pain in the leg: we think of a primary posterolateral protrusion or a neuroma.

- Paraesthesia

Multi-segmental paraesthesia are a symptom of spinal cord compression. Monosegmental paraesthesia are mostly the result of nerve root compression. Paraesthesia, without previous or simultaneous pain, rather point in the direction of a compression of a nerve trunk: in that case the disc cannot be responsible for the symptoms and we have to look for the lesion along the more distal part of the nerve.

Paraesthesia caused by disc compression of a nerve root have a very irregular intermittent pattern.

- Limitation range of motion / weakness

This is subjective information that has to be correlated with the findings in the functional examination. We are only interested in real weakness as the result of too much pressure on one or more nerve roots or on the spinal cord.

Section 2b: General history	
Description of typical exertion during professional or leisure activities:	
Off work since:	Previous treatments when: what sort of treatment: results:
Are there any other joints affected which:	Medical imaging results:
Mattress: soft – hard – age	Incontinence problem since the beginning of the complaints:
Recurrences when: frequency: cause: how are you feeling between attacks:	Medication which: Surgery:
General state of health: good – moderate – bad	Sudden unexplained loss of weight:

The information concerning professional and leisure activities is going to be helpful for the incorporation of the prophylactic and the self treatment measures.

When the patient is off work, he should be stimulated to perform a series of self treatment exercises. Of course, patient compliance is a problem we all are confronted with.

Simultaneous problems in other joints could be linked to a rheumatoid disorder or other system diseases.

A well maintained mattress, which is older than 10 years, had its best time and should be replaced.

Information about recurrences and previous treatments could be useful, but always keep an “open vision” spirit towards the present situation. If the patient already suffered several attacks of low back pain, and in-between the attacks he was never fully pain-free, then we might suspect a dysfunction syndrome. A dysfunction syndrome may coexist with an internal derangement.

If a patient received manipulation 4 weeks ago, that doesn’t imply that manipulation is not going to be the treatment of choice today: first of all, not all types of manipulation have the same effect and furthermore clinical images vary in time. So, always check and analyze the actual image and then decide which therapeutic strategy to follow.

Medical imaging? Far too many X-rays, scan’s, MRI’s are taken without having any relevance at all. There are so many false negative and false positive images. Medical imaging is only one part of “the truth” and certainly does not represent the total truth. Medical imaging is useful and necessary when the patient describes red flags or other inherent unlikelyhoods.

An incontinence problem, since the start of the back problem, is in fact a motor deficit of the S4-nerve root and therefore considered as an important red flag. A poor general health in combination with an involuntary weight loss is also an important red flag pointing in the direction of severe pathology. A list of red flags is summarized in Section 7.

The use of anticoagulant medication is an absolute bar to manipulation.

Longstanding use of corticosteroids could cause osteoporosis; some kinds of manipulations will be contraindicated.

Section 3: Inspection	
How is the patient sitting during history taking:	Wasting where:
Particularities during undressing:	Horizontal / oblique position of the pelvis
Equal weight-bearing on both feet:	Angular kyphosis – shelf felt on palpation
Deviation: in flexion: trunk – hip lateral: left – right with or without pain	Remarks:

As described in my previous books, inspection starts the moment the patient enters in our clinic: how does he walk, sit (*slouched or not?*), how is his curve reversal movement, how does he undress,...

Patients suffering from a large internal derangement (*acute lumbago with a lateral deviation or severe sciatica with a lateral deviation*) sometimes are not able to distribute their body weight equally over the both legs.

A flexion deviation coming from the hip and not from the lumbar spine probably is related to a hip problem and not to a lumbar derangement. A relevant lateral deviation (*i.e. a deviation without clear rotation component*) mostly goes together with pain; the patient can deviate away from or towards the painful side. Sometimes, some time after an acute phase, patients show an asymptomatic lateral deviation. In that case the patient can be treated with a selection of anti-deviation techniques.

We can also detect a “painful arc deviation”: we stand behind the patient, he has no lateral deviation, he performs a flexion movement and somewhere mid range we notice the patient deviates slightly and comes back to the neutral position to proceed with the movement. This is a clear dural sign, pointing in the direction of an internal derangement.

If we stand lateral to the patient while checking the test movement, then we won’t discover this particular sign.

It sometimes happens a patient has a deviation in standing which disappears in lying, or no deviation in standing, which appears in flexion position, or even the reverse.

The interpretation of a hyper- or hypolordosis is very subjective and has very limited clinical value, since there are such big variations in lordotic angles in an asymptomatic population. An exceptional hyperlordosis could cause a rare pathology: “kissing spines”, this is a periost irritation at the tips of the spinous processes.

Wasting could occur in case of longstanding sciatica with motor deficit (*e.g. wasting of the calf muscles in a severe S1- or S2-sciatica*).

A pelvic tilt is, because of big intra- and inter-individual differences in asymptomatic populations and because of the lack of reliable manual tests to determine its presence, generally irrelevant and not related to the patient’s actual symptoms.

The patient is standing and we palpate along the spinous processes; an angular kyphosis could be the result of severe local degeneration or of a fracture. A shelf is associated with a spondylolisthesis, which is only symptomatic if its specific history is also present i.e. pain (*back- or leg pain*) on walking and standing, which disappears fast on sitting and lying.

Section 4: Basic functional examination				
Variables: pain (where and when), ROM (normal, limited; in what degree), end-feel (normal, muscle spasm, hard) and weakness.				
Not painful / limited: - Painful / limited: + Slightly painful / limited: +/- Very painful / limited: ++				
	Pain	ROM	End-feel	Weakness
Pre-test pain at rest				
A extension				
A side flexion left				
A side flexion right				
A flexion neck flexion + or – where				
Standing on tip toe: l – r				
SI distraction test with or without lumbar support				
SLR: l – r neck flexion + or – where				
P hip flexion: l – r				
P hip lateral rot.: l – r				
P hip medial rot.: l – r				
R hip flexion: l – r				
R dorsiflexion foot: l – r				
R ext. big toe: l – r				
R eversion foot: l – r				
Sensory deficit: l – r where Knee jerk: l – r normal – weak – absent Babinski + or –; l – r Ankle jerk: l – r normal – weak – absent				
R knee flexion: l – r				
R knee extension: l – r				
P knee flexion: l – r				
Gluteal contraction				wasting: + or -
Palpation angular kyphosis and shelf :				
Extension pressure on spinous processes: pain – end-feel				
Remarks:				
Outcome of repeated test movements:				

There is no point in performing many tests if there is no valid reason for doing so. Let's not forget that quite some tests, frequently used to diagnose vertebral dysfunctions, have no validity at all or just have a very poor validity. The best example are e.g. sacro-iliac mobility tests, which don't seem to have any intra-tester and inter-tester validity whatsoever, as described in several publications.

On performing tests, we should ask ourselves: "What exactly do we test; which are the variables?" and "Do we really test what we think we are testing?" The answer to those questions is sometimes disappointing.

So, what's the point of performing a series of tests which don't have reliability? Furthermore, the more tests we perform, the more difficult the interpretation becomes.

"Artificial hyper-complication" is not helpful, although this is a tendency frequently seen in actual orthopaedic manual therapy.

Instead, we look for bony, articular, dural and nerve root signs (*mobility and conduction*). Also make sure to identify the specific variables for each test.

- Pre-test pain at rest

What does the patient feel now; where is he feeling it? This information is going to be regarded as our base line reference information. Do our tests have an influence on this pain: does it get worse or better, or are symptoms produced, where? Or is there no change?

On performing tests we don't ask the patient: "Does it hurt?", because this could be very misleading. Instead we always ask: "Does anything change?" on performing a test movement.

- Active extension

We interpret pain and range of movement.

What happens to the pain and where is it felt?

If a patient has back pain at rest and extension hurts, do not automatically assume the patient has more back pain; he might produce leg pain during the extension movement; in other words, we see a peripherilisation. By the way, this is one of the unfavourable articular signs for reduction of an internal derangement by manipulation.

- Active side flexions

We interpret pain and range of movement.

Also pay attention to a possible peripherilisation on testing.

- Active flexion

We interpret pain and range of movement.

If a patient states that a certain point the movement is painful, ask him where it hurts and then motivate the patient to continue the movement, although it is painful; don't stop too early! Only in this way we will be able to detect a painful arc on flexion.

A painful arc on flexion is a perfect dural sign, pointing in the direction of a small and easy reducible internal derangement and excluding with certainty any facet joint or SI-joint involvement.

When standing behind the patient we could also detect a midway momentary lateral deviation (i.e. "a painful arc deviation") also pointing in the direction of a small internal derangement.

If we don't stand behind the patient during the test movement, we will never discover this. At the end of the flexion, we interpret any possible pain, then we ask for an accessory neck flexion and interpret again: this could cause more or even less (*back*) pain. In those cases, again this is a clear dural sign excluding the facet- or SI-joints as a possible source of the complaints. Of course it is also possible that an accessory neck flexion has no influence on the actual symptoms.

At this point in the examination we can detect a partial or a full articular pattern. A full articular pattern in a young patient is considered as a red flag; we could think of a symptomatic ankylosing spondylitis or a relation with other system diseases. Remember that an internal derangement always presents itself as a partial articular pattern.

- Standing on tip toe

This is a motor test for the S1-S2 nerve roots; we are only interested in clear weakness. Pain on this test is not relevant.

- SI distraction test

Remember that an SI-joint only can cause unilateral symptoms neither can it cause a shifting pain, so, central pain provoked on this test is totally irrelevant. If a unilateral gluteal pain is provoked then the SI-joint might be involved and we repeat the test, more intensively, this time with a lumbar support in order to optimize the lumbar lordosis. If, in this adapted test version, more pain is produced, then we think of SI-joint involvement and the SI-joint test appendix is called for (*see further*).

- Straight leg raise (SLR)

We interpret pain and range of motion.

Let's not forget that the SLR is not only a nerve root test (*L4 L5 S1 S2*), but it is also a dural test!

SLR is negative in case of L1-, L2-, L3-, S3- or S4-nerve root compression (*for L3 see: Passive knee flexion*).

We can provoke or worsen back and/or leg pain.

Remember always to start testing at the good side first, in order not to confuse a (*false*) positive answer with some uncomfortable strain on the hamstrings. On performing the passive movement, stop whenever the patients says it hurts, ask where it hurts and then try to continue the movement; only in this way we can detect a painful arc, which is a very favourable sign for reduction of an internal derangement.

Once we reached the end of the SLR, always assess the effect of an extra neck flexion: this could produce, worsen or even abate symptoms; again this is a clear dural or radicular sign pointing in the direction of an internal derangement, excluding SI-joint or facet-joint involvement.

A crossed SLR is also possible i.e. the right SLR causes back and/or leg pain on the left side, this only occurs in case of a certain disco-dural or disco-radicular conflict.

In case of severe posterocentral internal derangements, e.g. an acute lumbago, the SLR will be painful and limited bilaterally.

In case of small internal derangements the SLR could be:

- Negative
- Show a painful arc on movement
- End range painful

In case of bigger internal derangements the SLR could be:

- Painful and limited
- Painful and limited + motor deficit
- Negative due to an ischaemic root atrophy

In case of a nerve root dysfunction syndrome we could find:

- An adherent nerve root

- Passive hip flexion / passive hip rotations

The hip is an L3-structure and thus can be an alternative cause of buttock or leg pain. We interpret pain, range of motion and end-feel (*elastic*).

In order to detect a "sign of the buttock"- red flag it is imperative to compare the range of motion of the hip flexion with the range of motion of the straight leg raise. If passive hip flexion is more limited than the SLR, then this is a red flag. Further examination is called for in order to exclude SI-joint septic arthritis, fracture or tumour.

For the rotations we interpret pain, range of motion and end-feel (*elastic*); perform the tests without force, otherwise they also become SI-joint pain provocation tests.

Provocation of slight lumbar pain on passive hip rotations is mostly irrelevant.

- Resisted hip flexion

We interpret pain and weakness, although weakness is the most important variable.

We test the motor conduction of the L2- and L3-nerve roots.

- Resisted dorsiflexion foot

We interpret pain and weakness, although weakness is the most important variable.

We test the motor conduction of the L4- and L5-nerve roots.

- Resisted extension big toe

We interpret pain and weakness, although weakness is the most important variable.

We test the motor conduction of the L4-nerve root.

- Resisted eversion foot

We interpret pain and weakness, although weakness is the most important variable.

We test the motor conduction of the L5- and S1-nerve roots.

A sensory deficit is searched for in the most distal part of the dermatomes.

A knee jerk is related to the L3-nerve root; an ankle jerk is related to the (L5)-S1-S2-nerve roots. Once this jerk is lost, it doesn't recuperate in 50% of the cases. So, an absent or weak ankle jerk does not necessarily mean there is an actual problem with those nerve roots. This is only the case if other S1-S2-tests are positive too. A cluster of positive tests is what we are looking for.

Mind that one disc can compress two nerve roots simultaneously, so biradicular symptoms L4-L5 or L5-S1 are acceptable; however, the combination L3-L4 is suspicious, since for anatomical reasons it is more difficult for the L3 disc to compress those two nerve roots.

A positive Babinski, in the presence of multi-segmental paraesthesia, means there is a compression of the spinal cord, thus offering an absolute bar to manipulation or any other active treatment. Further examination is called for.

- Resisted knee flexion

We interpret pain and weakness, although weakness is the most important variable. We are testing the S1-S2-nerve roots.

- Resisted knee extension

We interpret pain and weakness, although weakness is the most important variable. We are testing the L3-nerve root.

- Passive knee flexion

This is the "Lasègue" of the L3-root: via the femoral nerve, the L3-root can be stretched; it also puts strain on the dura mater. The patient can thus experience back or anterior leg pain.

- Gluteal contraction

We ask the patient to contract his gluteals and we palpate for a possible wasting (*i.e. motor deficit S1-S2-nerve roots*).

- Palpation for bony and ligamentous irregularity

We palpate along the spinous processes and specifically look for an angular kyphosis or a shelf.

- Extension pressure on spinous processes

Two variables draw our attention: can we provoke more pain in the higher lumbar area or in the lower lumbar area? Let's not forget that the high lumbar area is considered as being the "forbidden area" (*see higher*).

Is the end feel elastic or not? We expect an elastic end feel in younger patients and a harder end feel in an elderly population. If we find a hard end feel in young patient, perhaps there might be a link with early arthrosis or an ankylosing spondylitis.

- Remarks

In some cases it is interesting to interpret the effect of repeated movements on the symptoms. Does it get worse or not during the repeated movements; is the patient worse, better or is there no change after completing the repeated movement? This information will be necessary to differentiate between e.g. a dysfunction syndrome and an internal derangement. Typical for a dysfunction syndrome is the fact that end range pain is provoked on certain movements and on repeating the test, the patient still describes the same end range pain; it doesn't get better or worse. After completing the repeated tests there is no change either. In case of an internal derangement we are always going to be able find a certain test direction which has an influence on the symptoms: it gets either better or worse.

In more difficult cases a derangement can coexist with a dysfunction syndrome: this is a situation we don't identify as from the first treatment session; we discover this on repeated testing during a treatment phase.

If the symptoms seem to improve by using repeated movements in a certain direction, then we are going to use that for the benefit of the patient and incorporate this movement(s) in the self treatment exercise strategy of the patient.

Section 5: Accessory functional examination	
Not necessarily all tests have to be carried out; the variables are mentioned between brackets.	
We use the following quotation: test is positive = +; test is negative = -	
R trunk side flexion in standing: l - r (pain)	R trunk side flexion in standing: l - r (weakness)
Prone lying: active – passive – resisted extension (pain)	

In case of a fractured transverse process, the homolateral side flexion in standing, against resistance, will be painful.

We perform three versions of extension in prone lying mainly to differentiate between an internal derangement and a muscle lesion. In case of a real muscle lesion, the resisted and active version will be clearly positive, whereas the passive version is completely negative. A real lumbar muscle lesion is very rare.

SI-appendix	
The variable we assess is pain: can we provoke unilateral gluteal pain?	
Pain provocation tests: anterior ligaments: Distraction test via pressure on ASIS Forced hip lateral rotation Patrick's test Resisted hip adduction Pain provocation tests: posterior ligaments Pressure on anterolateral aspect crista iliaca Forced hip medial rotation Axial pressure on the knee (from 90° hip flexion-add.) Resisted hip abduction	Pain provocation tests: anterior and posterior ligaments Prone-lying Extension pressure on sacrum Yeoman's test Supine-lying Gaenslen's test Conclusion:

If a cluster of elements from the history and the basic functional examination point in the direction of an SI-joint problem, then we have to perform some extra tests. Keep in mind that, according to numerous studies (*I refer to the ETGOM courses on that subject*), *mobility tests* for the SI-joint have no value or validity at all. The good news is that a cluster of *pain provocation tests* can be reliable, although they are unspecific. Once we have a cluster of 5 positive SI-joint pain provocation tests, we have a good diagnostic validity. Stand alone positive tests don't seem to have any value at all. A real SI-joint problem, which can be detected in an objective way, is rare and mostly occurs in an ankylosing spondylitis population i.e. a symptomatic SI-joint arthritis. A kind of hyper-mobility problem in the SI-joint, i.e. a situation in which there is too much tension on healthy tissue (*in fact a postural syndrome*), is seen in pregnant women or post partum.

Section 6: Palpation	
Pain (slight – moderate – severe) where:	Sensory deficit where:

- Pain

As explained in my previous publications and during the ETGOM courses, diagnostic specificity in the lumbar spine, by using palpation techniques for tenderness and mobility, is rather “wishful thinking”. Many people claim to feel things which simply cannot be felt. The diagnostic value of palpation in the lumbar spine is extremely limited.

While exerting the extension pressure on spinous processes we are only interested in the fact whether we can provoke more pain in the higher or lower lumbar region. Remember that high lumbar pain, in combination with other inherent unlikelyhoods, is a red flag.

We also interpret the end feel: is it rather elastic or hard? Normally we expect it to be elastic, but e.g. in an ankylosing spondylitis patient the end-feel is rather harder. In an arthrotic patient the end feel is harder too.

- Sensory deficit

Sensory deficit is mostly felt in the distal part of the dermatome and is often related to a compression of a nerve root or a compression in the more distal part of the nerve.

Section 7: Conclusion	
Mechanical disorders	Non-mechanical disorders
Disco-dural conflict: big derangement – small derangement annular – nuclear – mixed: reducible – irreducible – selfreducing Disco-radicular conflict (lateral derangement) : primary – secondary sciatica annular – nuclear – mixed – root: reducible – irreducible Postural – dysfunction syndrome SI-joint irritation Visceral cause Symptomatic structural deformity Other / undecided	Red flags: Pain in the “forbidden area” Constantly increasing pain Expanding pain Constant pain, not influenced by positions or movements Chronology other than spontaneous cure Bilateral sciatica Combination of gross articular signs, absence of dural signs Gross limitation of both side flexions Side flexion away from the painful side is the only painful and limited movement Discrepancy between pain and neurological deficit (d >> p) Deficit of more than two nerve roots L1- or L2-deficit A positive sign of the buttock S4 symptoms and signs

The first thing we need to establish is whether the problem has a mechanical or a non-mechanical origin.

If it is non-mechanical then we discover several inherent unlikelyhoods in the history and the functional examination. In order not to forget the most important “red flags”, they are summarized in the assessment form. In such cases medical imaging will also be indicated to establish a differential diagnosis.

In case of a mechanical problem we have to establish its nature and we have to decide whether we can do something about it or not and how we are going to do it.

If there is a disco-dural conflict we need to know whether it is a large or a small protrusion; is it more annular (*manipulation is probably going to be the treatment of choice*) or nuclear (*mechanical continuous traction could be more beneficial*) or mixed? What are our chances to reduce it?

If there is a disco-radicular conflict we ask ourselves the same questions as above, but we need to take into account the mechanism of spontaneous evolution that exists in case of a monoradicular root pain: *i.e. the spontaneous evolution, during which symptoms resolve automatically, takes about 8-12 months; in the second half of the spontaneous evolution, the protrusion is not reducible anymore. Cave: this is only valid as long as the patient is not much older than 60 years and he only has leg pain, without back pain.*

A postural and a dysfunction syndrome deserve their own proper treatment strategy. Remember the key factors:

- Postural syndrome: any situation in which too much tension exists on healthy tissue, resulting in intermittent pain and a negative functional examination.
- Dysfunction syndrome: any situation in which normal loading on abnormal tissue causes symptoms; we expect end range pain on certain movements which is unaltered on repeating the same movement.

We only think of a symptomatic SI-joint lesion if at least 5 tests from our SI-appendix are positive (*see above*) and of course we will also need a history that points in this direction and that excludes other lesions such as internal derangements.

What is a symptomatic structural deformity? Well, we think e.g. of an osteophyte compressing a nerve root or the spinal cord or we think of a spinal or a lateral recessus stenosis. Bear in mind that medical imaging alone is not conclusive, the specific history of those lesions needs to be present too:

- In case of spinal stenosis the patient is going to describe multi-segmental, bilateral intermittent claudication symptoms in the back and the legs. Typical for those patients is the fact that they feel much better in flexion; extension immediately worsens their symptoms.
- In case of a lateral recessus stenosis we hear the typical story of an elderly patient suffering from a sciatica in walking and standing, which disappears in sitting and lying. They also like flexion and dislike extension.

Unfortunately, it can happen that the presented image is unclear for us. In that case, re-test on several occasions; when it remains unclear we might think of e.g. a visceral link. Further examination is called for.

Let's not forget that chronic patients might suffer from central sensitisation in which a modification on brain and spinal cord level occurs, resulting in "wrong" pain signals, although the original peripheral problem is not present anymore.

Section 8: Treatment procedure / analysis	
Date first treatment:	Date last treatment:
Treatment strategy:	
Evolution / treatment adaptation:	
Total number of treatment sessions:	
Results:	

In clinic settings, it happens far too often that the history, the inspection and the functional examination are "forgotten" and that the patient ends up pretty fast on the treatment table and "a cocktail of something" (*a series of mobilisations and/or manipulations*) is performed for some time. The problem however is, if the patient improves or worsens, we don't know why; what was the triggering factor? Was it mobilisation/manipulation nr.2 or nr.6?

Within the modern orthopaedic medicine strategy we like to propose a logical and controllable manipulation strategy in which we also try to avoid as much as possible placebo effects. I refer to my previous publications on that subject.

First we decide about the treatment strategy we are going to use; we perform it and then we interpret what is happening, we re-assess after e.g. each manipulation and not after a "set of manoeuvres". Respect the specific expectation pattern we have while performing our treatment strategy. If our expectations are not fulfilled, re-assess and perhaps we will have to modify our strategy.

Whether you use manipulation techniques or mechanical traction techniques always respect the specific indications and contraindications, described in my previous publications!

Case study Lumbar Spine

Section 1: General information

© Lumbar spine Assessment Form

Date: _____ Name: Veriest V.

Address:

Date of birth: 18/11/67 Sex: m – f

Referral / diagnostic information: lumbar disc bulging? Acute lumbago

Section 2a: Specific history

What is your main complaint: **pain** – paraesthesia – **limitation of movement** – weakness

PAIN

When did it start: yesterday morning

How did it start:

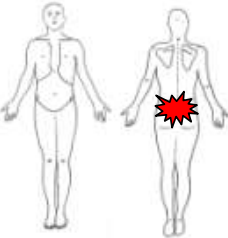
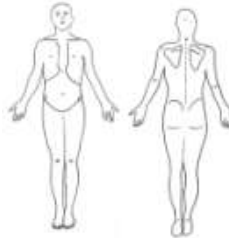
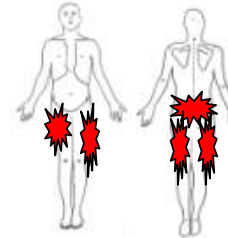
spontaneously
overuse - injury

describe the patient felt a sudden twinge low lumbar central on putting on her stockings, immediately followed by quite some lumbar pain and a feeling of being blocked

sudden – slow onset
suddenly, slowly worse
slowly, suddenly worse

How can you influence the pain, what makes it better or worse: **lying down is the best; all the rest is painful; flexion and extension are a “disaster”, but extension is worse**

Evolution since the start: better-worse-unchanged

<i>Evolution</i>	<i>Start →</i>	<i>Evolution →</i>	<i>Now</i>
Where do you feel the pain: lumbar region low – high – central left – right – bilateral gluteal region bilateral – alternating left – right cranial – caudal lower limb left – right where exactly with or without lumbar pain back pain is worse; radiation of pain into the leg is not constant distal border of the symptoms			

Pain quality: VAS 0-10 constant-intermittent during activity - at rest	6		8
Worse with: lying – sitting – standing – on the move – bending In the morning As the day progresses At evening – at night Better with: lying – sitting – standing – on the move – bending In the morning As the day progresses At evening – at night			Sitting slouched is +++ Curve reversal is +++ Getting out of bed in the morning is also very painful Feel better on the move, but not for too long time
Pain on coughing/sneezing: where:			Very painful, in the lumbar area
PARAESTHESIA Where: With or without pain: When: constant-intermittent at rest-during the day- at night-on activity (which)			Slight intermittent pins and needles feeling anterolateral aspect of both legs, nor further than the knee
LIMITATION ROM (subj)			“everything”
WEAKNESS (subj)			

Section 2b: General history

Description of typical exertion during professional or leisure activities: **has an administrative job; works as a civil servant.**
Triathlon is her passion

Off work since: the start of the complaints	Previous treatments when: what sort of treatment: results:
Are there any other joints affected which:	Medical imaging results: not available
Mattress: soft – hard – age > 10 years; time to change	Incontinence problem since the beginning of the complaints:
Recurrences when: frequency: cause: how are you feeling between attacks:	Medication which: NSAID and muscle relaxants Surgery:
General state of health: good – moderate – bad	Sudden unexplained loss of weight:

Section 3: Inspection	
How is the patient sitting during history taking: Doesn't like to sit; sits upright; curve reversal quite problematic	Wasting where:
Particularities during undressing: also problematic	Horizontal / oblique position of the pelvis
Equal weightbearing on both feet:	Angular kyphosis – shelf felt on palpation
Deviation: in flexion: trunk – hip lateral: left – right with or without pain	Remarks:

Section 4: Basic functional examination				
Variables: pain (where and when), ROM (normal, limited; in what degree), end-feel (normal, muscle spasm, hard) and weakness.				
Not painful / limited: - Painful / limited: + Slightly painful / limited: +/- Very painful / limited: ++				
	Pain	ROM	End-feel	Weakness
Pre-test pain at rest	+			
A extension	++	++		
A side flexion left	+	+		
A side flexion right	+	+		
A flexion neck flexion + or – where	++	+		
Standing on tip toe: l – r				
SI distraction test with or without lumbar support				
SLR: l - r neck flexion + or – where	++	-40° left -30° right		
P hip flexion: l - r				
P hip lateral rot.: l - r				
P hip medial rot.: l - r				
R hip flexion: l - r				
R dorsiflexion foot: l - r				
R ext. big toe: l - r				
R eversion foot: l - r				
Sensory deficit: l – r Knee jerk: l – r where normal – weak – absent				
Babinski + or -; l – r Ankle jerk: l – r normal – weak – absent				
R knee flexion: l- r				
R knee extension: l- r				
P knee flexion: l – r				
Gluteal contraction				wasting: + or -
Palpation angular kyphosis and shelf :				
Extension pressure on spinous processes: pain – end-feel L4 L5 very painful				
Remarks:				
Outcome of repeated test movements: no need for repeated testing, the image is obvious				

Section 5: Accessory functional examination	
Not necessarily all tests have to be carried out; the variables are mentioned between brackets. We use the following quotation: test is positive = +; test is negative = -	
R trunk side flexion in standing: l - r (pain)	R trunk side flexion in standing: l - r (weakness)
Prone lying: active – passive – resisted extension (pain)	

SI-appendix	
<i>The variable we assess is pain: can we provoke unilateral gluteal pain?</i>	
<i>Pain provocation tests: anterior ligaments:</i> Distraction test via pressure on ASIS Forced hip lateral rotation Patrick's test Resisted hip adduction <i>Pain provocation tests: posterior ligaments</i> Pressure on anterolateral aspect crista iliaca Forced hip medial rotation Axial pressure on the knee (from 90° hip flexion-add.) Resisted hip abduction	<i>Pain provocation tests: anterior and posterior ligaments</i> Prone-lying Extension pressure on sacrum Yeoman's test Supine-lying Gaenslen's test Conclusion:

Section 6: Palpation	
Pain (slight – moderate – severe) where: L4 L5	Sensory deficit where:

Section 7: Conclusion	
<i>Mechanical disorders</i>	<i>Non-mechanical disorders</i>
<i>Disco-dural conflict: big derangement</i> – small derangement annular – nuclear – mixed : reducible – irreducible – selfreducing <i>Disco-radicular conflict</i> (lateral derangement): primary – secondary sciatica annular – nuclear – mixed – root: reducible – irreducible <i>Postural – dysfunction syndrome</i> <i>SI-joint irritation</i> <i>Visceral cause</i> <i>Symptomatic structural deformity</i> <i>Other / undecided</i>	<i>Red flags:</i> Pain in the “forbidden area” Constantly increasing pain Expanding pain Constant pain, not influenced by positions or movements Chronology other than spontaneous cure Bilateral sciatica Combination of gross articular signs, absence of dural signs Gross limitation of both side flexions Side flexion away from the painful side is the only painful and limited movement Discrepancy between pain and neurological deficit (d >> p) Deficit of more than two nerve roots L1- or L2-deficit A positive sign of the buttock S4 symptoms and signs

Chapter 8: The Thoracic Spine

Section 1: General information		© Thoracic spine Assessment Form	
Date:		Name:	
Address:			
Date of birth:		Sex: m – f	
Referral / diagnostic information:			

- Age

If a patient has osteoporosis remember that extension manipulation techniques are contraindicated.

Section 2a: Specific history			
What is your main complaint: pain – paraesthesia – limitation of movement			
PAIN When did it start: How did it start: spontaneously overuse - injury describe			
How can you influence the pain, what makes it worse or better:			
Evolution since the start: better-worse-unchanged			
Evolution	Start →	Evolution →	Now
Where do you feel the pain: Back central-left-right-bilateral high-mid-low-thoracic Anterior thorax central-left-right-bilateral sternal-parasternal Abdomen central-left-right-bilateral			
Pain quality: VAS 0-10 constant – intermittent during activity - at rest during the day - at night			
Worse with: lying – sitting – standing – on the move – bending in the morning as the day progresses at evening – at night Better with: lying – sitting – standing – on the move – bending in the morning as the day progresses at evening – at night			
Pain on coughing/sneezing/taking a deep breath: where:			
PARAESTHESIA Where: With or without pain: When: constant-intermittent at rest-during the day- at night-on activity (which)			
LIMITATION ROM (subj)			

- What is your main complaint

Pain

Is it segmental or multi-segmental pain? Multi-segmental pain points in the direction of dural involvement. Segmental pain can be related to a rib joint, a muscular problem or pressure on a nerve root, which is more rare.

Paraesthesia

Segmental paraesthesia are generally related to a nerve root problem or to a thoracic outlet phenomenon; multi-segmental paraesthesia are a symptom of spinal cord compression and this is of course a contraindication for any kind of active treatment, even in the absence of a positive Babinski jerk.

Limitation of movement

We have to interpret the pattern found on functional examination: a full (*equal limitation of the rotations and flexion is the best movement*) or a partial articular pattern. An internal derangement always goes together with a partial articular pattern. A full articular pattern is typical for an arthrotic spine. A muscular pattern can be found too.

- Pain

When did it start

It might be an acute, a sub-acute or a chronic lesion. Interesting to know is that, in case of root pain by disc compression, there is no spontaneous evolution as it occurs in the cervical and the lumbar spine; so, regardless of the fact how long the root pain is already present, treatment will be useful.

How did it start

In case of an internal derangement the symptoms can start suddenly (*mostly on performing a flexion-rotation movement*) or more gradually (*longer periods of time in flexion position*). If there was an injury beware of the possibility of a muscle lesion or a fracture: performing the accessory examination will be necessary.

How can you influence the pain

It is interesting to know which activities, positions and movements have an influence on the patient's symptoms. What makes it worse and/or better? This information is correlated with the findings of the functional examination. A “big” story goes together with a “big” image. Also use this information for prophylactic purposes.

Are there any dural symptoms such as backpain on taking a deep breath?

Also bear in mind that the clinical image of an internal derangement can be extremely variable, this in contrast to the internal derangement images found in the lumbar and cervical spine.

Evolution since the start

The main issue is the presence of centralizing pain: this is a favourable evolution; peripheralisation is rather unfavourable.

Where do you feel the pain

Segmental or multi-segmental?

Mostly patients suffering from an internal derangement have pain in the mid-thoracic area (*central, uni- or bilateral*).

Sometimes a patient has simultaneously anterior and posterior pain: the dural tests sometimes influence the anterior pain (*sternal, parasternal*) and the articular tests influence the posterior pain.

Unilateral paravertebral pain could originate from a costovertebral problem; in that case we have to compare the “springing test” with the central extension pressure in order to differentiate (*see functional examination*).

Deep abdominal pain could also originate from a muscle lesion. Also bear in mind that visceral lesions are more frequent in this area.

The patient of course describes his actual symptoms, but we would also like to know where they started in order to interpret the evolution. Notice the presence of a shifting pain, pointing automatically in the direction of an internal derangement.

An expanding pain however is another red flag making us think of severe pathology.

How would you describe your pain quality

Again we use a VAS scale.

Real constant pain implies the involvement of a chemical factor and should always be accompanied by pain at rest.

The vast majority of our patients describe an intermittent pain.

The pain is better/worse with...

In case of an internal derangement, most patients suffer from loading and rotation activities.

They can feel better or worse in the morning, depending on the size and position of the internal derangement. Generally being on the move is more beneficial.

Pain at night suggests an inflammatory factor, but mostly patients wake up because of a mechanical factor (*e.g. turning from one side to another*).

Is there pain on coughing/sneezing/taking a deep breath

Coughing and sneezing could be painful in case of a disc lesion, a muscle lesion, a rib lesion or a visceral lesion.

Pain on taking a deep breath is considered being the main dural symptom, pointing in the direction of an internal derangement. Notice that the pain can be felt anteriorly and/or posteriorly.

- *Paraesthesia*

Multi-segmental paraesthesia are a symptom of spinal cord compression. Paraesthesia are mostly the result of a nerve root or a nerve trunk compression.

- *Limitation range of motion*

This is subjective information that has to be correlated with the findings obtained from the functional examination.

Section 2b: General history	
Description of typical exertion during professional or leisure activities:	
Off work since:	Previous treatments when: what sort of treatment: results:
Are there any other joints affected which:	Medical imaging results:
Bed system: soft – hard - ... Sleeping posture :	Medication which: Surgery :
Recurrences when: frequency: cause: how are you feeling between attacks:	General state of health: good – moderate – bad Sudden unexplained loss of weight:

The information concerning professional and leisure activities is going to be helpful for prophylactic and self treatment measures.

When the patient is off work, this should be in relation to the type of work and his clinical image.

Simultaneous problems in other joints could be linked to rheumatoid arthritis or other system diseases.

A mattress which is older than 10 years had its best time and should be replaced.

Information about recurrences and previous treatments could be useful, but always keep an “open vision” mind towards the actual situation.

Medical imaging? Be sure not to treat an X-ray, but focus on the clinical image of the patients. Only in the presence of red flags or other inherent unlikelihoods medical imaging is useful and necessary.

The use of anticoagulant medication is an absolute bar to manipulation. The osteoporotic patient may not be manipulated either.

A poor general health in combination with an involuntary weight loss is also an important red flag pointing in the direction of serious pathology.

Section 3: Inspection	
Kyphosis – Scheuermann – angular kyphosis	Wasting: where
Scoliosis	Position of the scapulae:

If the patient has a severe kyphosis, there could be a false positive scapula alata. A Scheuermann’s disease is no contraindication for manipulation, but recurrences of internal derangement can be more frequent due to the shape of the spine.

An angular kyphosis that appeared after trauma deserves further attention (*medical imaging*).

A minor scoliosis is mostly irrelevant to the clinical image.

Section 4: Basic functional examination			
Variables: pain (where and when), ROM (normal, limited; in what degree), end-feel (normal, muscle spasm, hard).			
Not painful / limited: -		Painful / limited: +	
Slightly painful / limited: +/-		Very painful / limited: ++	
	Pain	ROM	End-feel
Pre-test pain at rest			
Taking a deep breath			
Neck flexion			
Bilateral shoulder elevation			
Bilateral shoulder protraction			
Bilateral shoulder retraction			
A trunk flexion			
A trunk extension			
A trunk side flexion: l – r			
A trunk rotation: l – r			
R trunk rotation: l – r			
P trunk rotation left neck flexion + or -			
P trunk rotation right neck flexion + or -			
Plantar reflex: + or -			
Palpation for ligamentous or bony irregularity:			
Extension pressure on spinous processes: pain – end-feel			
Remarks:			

- Pre-test pain at rest

What does the patient feel now; where is he feeling it? This information is going to be regarded as our base line reference information. Do our tests have an influence on this pain (*worse, better, unchanged*) or are new symptoms produced, where?

- Taking a deep breath / neck flexion / shoulder elevation, protraction and retraction

We interpret pain. Those tests are typical dural tests.

Pain on neck flexion can have a cervical, thoracic or lumbar origin. If e.g. further thoracic tests influence the pain, then we established a thoracic link.

Pain on taking a deep breath can be felt anteriorly and/or posteriorly.

From the three shoulder movements, the retraction is most frequently positive in case of an internal derangement, causing some pain in the interscapular, midthoracic area.

- Active trunk flexion / extension / side flexions / rotations

We interpret pain and range of movement. Now we can discover a full or a partial articular pattern.

The main reason, however, for performing those tests is to discover a particular partial articular pattern (*side flexion away from the pain is the only painful and limited movement*), which is considered a red flag throughout the whole spine.

- Resisted trunk rotations

We interpret pain. In case of an abdominal muscle lesion one or both tests can be positive. If a resisted rotation hurts more than the passive rotations, we thus found a muscular pattern.

- Passive trunk rotation

We interpret pain, range of movement and endfeel (*elastic*). At the end of the rotation we inform about a possible pain and then ask for an accessory neck flexion and interpret again (*neck flexion in the sagittal plane, without any rotation!*). When this accessory neck flexion causes more or less pain, then this is a clear dural sign, pointing in the direction of an internal derangement, excluding e.g. costovertebral joints as a possible culprit for the actual symptoms.

- Plantar reflex (Babinski)

The presence of multi-segmental paraesthesia or a positive Babinski is an absolute contraindication for manipulation.

Extension pressure on the spinous processes is needed to establish the presumable level from which the symptoms arise (*in case of an internal derangement or costotransversal problem*); keep in mind, we always need two positive answers to determine a level. Manipulation, if indicated, is then focused on this level.

The end feel is normally elastic; in case of an ankylosing spondylitis or severe arthrosis it will be harder.

- Remarks

In many cases it is interesting to interpret the effect of repeated movements on the symptoms. This will be necessary to differentiate between e.g. a dysfunction syndrome and an internal derangement.

If the symptoms seem to improve by using one or more specific repeated movements, then we know we can continue using those movements in this specific direction in the patient's advantage.

Section 5: Accessory functional examination	
Not necessarily all tests have to be carried out; the variables we assess are: pain and weakness. We use the following quotation: test is positive = +; test is negative = -	
R scapulae tests: left – right upward/downward/forward/backward (pain) press with both arms against a wall (pain, weakness)	Stretching T1-root (pain)
Trunk tests: R side flexion in standing, left – right (pain, weakness) R flexion in sitting (pain, weakness) A-P-R extension in prone-lying (pain)	Distant rib pressure (pain) Springing test rib (<i>compare with extension pressure on spinous processes</i>): more – less – negative (pain)

- Resisted scapulae tests

Upward → test for the trapezius
Downward → subclavius muscle
Forward → pectoralis major
Backward → rhomboid muscles

- Trunk tests

Resisted side flexion in standing → muscle lesion or fracture of a transverse process.
Resisted flexion in sitting → abdominal muscle lesion.
Active, passive and resisted extension in prone lying → differentiation between an internal derangement and a muscle lesion or fracture: in case of a real muscle lesion the active and resisted version are going to be painful while the passive version is negative.

- Rib tests

Distant rib pressure → if anterior thoracic pain, presumably originating from a rib lesion, is worsened by a distant pressure on that rib, then most likely this rib is going to be the culprit.
Springing test → a patient has unilateral paravertebral pain and there is doubt about its origin: spinal or costovertebral? If the springing test causes more pain than the central extension pressure, we think of a costovertebral lesion.

Section 6: Palpation	
Extension pressure on spinous processes: pain (slight – moderate – severe) where:	Sensory deficit where:
Rib or intercostal muscle: difference	

As pointed out before, we need to perform an extension pressure on the spinous processes in order to get an idea about the affected level.
If anterior thoracic pain originates from an intercostal muscle lesion, then this palpation will be positive too and even more painful in comparison to the palpation of the rib itself.
A sensory deficit in the thoracic area is very rare: if there is a deficit, then at least two nerve roots need to be affected, which is suspect.

Section 7: Conclusion	
Mechanical disorders	Non-mechanical disorders
Disco-dural conflict	Red flags: Expanding pain Constant pain, independent from positions or activities Increasing post-OP thoracic pain First symptoms/signs in patients > 50 years Gross limitation of both side flexions, rotations and extension Side flexion away from the painful side is the only painful and limited movement Sign of spinal cord compression Lesion of different nerve roots Bilateral thoracic sensory deficit Muscle spasm
Disco-radicular conflict	
Spinal cord compression	
Postural – dysfunction syndrome	
Muscle lesion	
Symptomatic structural deformity	
Other / undecided	

The first thing we need to know is whether the problem is related to a mechanical or a non-mechanical disorder.

If it is non-mechanical then several inherent unlikelihoods are present in the history and the functional examination. In order not to forget the most important “red flags”, they are summarized in the assessment form. In that case medical imaging will also be helpful to establish a differential diagnosis.

In the case of a mechanical problem we have to establish its nature and we ask ourselves whether active treatment is useful or not?

Unlike in the cervical and the lumbar spine, a thoracic internal derangement is nearly always reducible by manipulation (*unless there is spinal cord compression*).

A disco-radicular conflict is rather rare, but, in contrast to the lumbar and cervical spine, there is no spontaneous resolution of root pain, so treatment can be started at any moment.

Spinal cord compression is an absolute contraindication for active treatment.

A postural and a dysfunction syndrome deserve their own proper treatment. Perhaps an internal derangement can go together with an underlying dysfunction syndrome; this can only be discovered after some examination/treatment sessions.

A muscle lesion only occurs after a trauma or an overuse and reacts very well on deep friction.

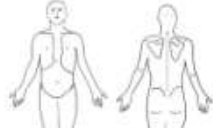
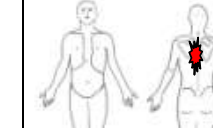
A symptomatic structural deformity: e.g. an osteophyte, compressing a nerve root or the spinal cord; a spinal or a lateral recessus stenosis; osteoporotic fractures. Bear in mind that medical imaging alone is not necessarily conclusive, the specific history and clinical image of those specific pathologies has an important diagnostic value too.

Section 8: Treatment procedure / analysis	
Date first treatment:	Date last treatment:
Treatment strategy:	
Evolution / treatment adaptation:	
Total number of treatment sessions:	
Results:	

If there is an internal derangement and manipulation is not contraindicated, then probably it is more efficient and safe to perform techniques under traction.
Before starting a treatment session, decide about the treatment strategy you will use; perform it and then interpret what is happening, re-assess. Respect the specific expectation pattern we have for each strategy. If our expectations are not fulfilled, re-assess and perhaps modify the therapeutic strategy.

Case study Thoracic Spine

Section 1: General information		© Thoracic spine Assessment Form	
Date:	Name: Severs K.		
Address:			
Date of birth:	Sex: m – f		
Referral / diagnostic information: thoracic internal derangement			

Section 2a: Specific history			
What is your main complaint: pain – paraesthesia – limitation of movement			
PAIN When did it start: some weeks ago How did it start: spontaneously overuse - injury describe patient works in a hospital kitchen; carries a lot quite some heavy weight kettles etc., works a lot from slight flexion positions, for a longer period; a certain moment it started during a more heavy “service”			
How can you influence the pain, what makes it worse or better: rotation to the left is painful and limited; longer time in flexed positions are also painful; patient has the impression he has a lung problem, since taking a deep breath is painful parasternal left			
Evolution since the start: better-worse-unchanged			
Evolution	Start →	Evolution →	Now
Where do you feel the pain: Back central-left-right-bilateral high-,mid-,low-thoracic Anterior thorax central-left-right-bilateral sternal-parasternal Abdomen central-left-right-bilateral	 → only on taking a deeper breath		
Pain quality: VAS 0-10 constant – intermittent during activity - at rest during the day - at night	6		6
Worse with: lying – sitting – standing – on the move – bending in the morning as the day progresses at evening – at night Better with: lying – sitting – standing – on the move – bending in the morning as the day progresses at evening – at night			

Pain on coughing/sneezing/ taking a deep breath: where:			Parasternal left
PARAESTHESIA Where: With or without pain: When: constant-intermittent at rest-during the day- at night-on activity (which)			
LIMITATION ROM (subj)			Left rotation in standing slightly limited

Section 2b: General history	
Description of typical exertion during professional or leisure activities:	
Off work since:	Previous treatments when: what sort of treatment: results:
Are there any other joints affected which:	Medical imaging results:
Bed system: soft – hard - ... Sleeping posture:	Medication which: sometimes some pain killers Surgery :
Recurrences when: frequency: cause: how are you feeling between attacks:	General state of health : good – moderate – bad Sudden unexplained loss of weight:

Section 3: Inspection	
Kyphosis – Scheuermann – angular kyphosis	Wasting: where
Scoliosis	Position of the scapulae:

Section 4: Basic functional examination			
<i>Variables:</i> pain (where and when), ROM (normal, limited; in what degree), end-feel (normal, muscle spasm, hard).			
Not painful / limited: -		Painful / limited: +	
Slightly painful / limited: +/-		Very painful / limited: ++	
	Pain	ROM	End-feel
Pre-test pain at rest			
Taking a deep breath	+ parasternal left		
Neck flexion	+/- mid thoracic central		
Bilateral shoulder elevation			
Bilateral shoulder protraction			
Bilateral shoulder retraction	+/- mid thoracic central		
A trunk flexion			
A trunk extension			
A trunk side flexion: l – r			
A trunk rotation: l – r	+	+	
R trunk rotation: l – r			
P trunk rotation left neck flexion + or -	+	+/-	
P trunk rotation right neck flexion + or -			
Plantar reflex: + or -			
Palpation for ligamentous or bony irregularity:			
Extension pressure on spinous processes: pain – end-feel level T7-T8			
Remarks:			

Section 5: Accessory functional examination	
Not necessarily all tests have to be carried out; the variables we assess are: pain and weakness. We use the following quotation: test is positive = +; test is negative = -	
R scapulae tests: left – right upward/downward/forward/backward (pain) press with both arms against a wall (pain, weakness)	Stretching T1-root (pain)
Trunk tests: R side flexion in standing, left – right (pain, weakness) R flexion in sitting (pain, weakness) A-P-R extension in prone-lying (pain)	Distant rib pressure (pain) Springing test rib (<i>compare with extension pressure on spinous processes</i>): more – less – negative (pain)

Section 6: Palpation	
Extension pressure on spinous processes: pain (slight – moderate – severe) where: T7 T8	Sensory deficit where:
Rib or intercostal muscle: difference	

Section 7: Conclusion	
Mechanical disorders	Non-mechanical disorders
<i>Disco-dural conflict</i>	<i>Red flags:</i>
<i>Disco-radicular conflict</i>	Expanding pain
	Constant pain, independent from positions or activities
	Increasing post-OP thoracic pain
	First symptoms/signs in patients > 50 years
<i>Spinal cord compression</i>	Gross limitation of both side flexions, rotations and extension
	Side flexion away from the painful side is the only painful and limited movement
<i>Postural – dysfunction syndrome</i>	Sign of spinal cord compression
	Lesion of different nerve roots
	Bilateral thoracic sensory deficit
<i>Muscle lesion</i>	Muscle spasm
<i>Symptomatic structural deformity</i>	
<i>Other / undecided</i>	

Chapter 9: The Cervical Spine

Section 1: General information	© Cervical spine Assessment Form
Date:	Name:
Address:	
Date of birth:	Sex: m – f
Referral / Diagnostic information:	

- Age

A lateral disc protrusion compressing a nerve root is rather rare in the cervical spine. In 90% of the cases the C7-nerve root is going to be compressed by the C6-disc. A C5-nerve root is more often compressed by an osteophyte, which is seen in an elderly population. Based on empirical data, compression of a nerve root caused by a disc protrusion doesn't seem to occur under the age of 35 years. If a e.g. 25 year old patient describes clear arm pain, then we have to consider the presence of a neuroma (*only if the other typical characteristics of a neuroma are present: pain evolution from distal to proximal, coughing produces arm pain, arm pain lasting over 6 months, bilateral arm pain*).

Elderly patients might suffer from high cervical arthrosis resulting in C1-C2 referred headaches.

Section 2a: Specific history			
<i>What is your main complaint: pain – vertigo - paraesthesia – limitation of movement – weakness</i>			
PAIN When did it start: How did it start: spontaneously overuse - injury describe			
How can you influence the pain, what makes it worse or better:			
Evolution since the start: better-worse-unchanged			
Evolution	Start →	Evolution →	Now
Where do you feel the pain: headache where – irregular only in the morning migraine neck-shoulder pain only cervical cervical + scapular l – r – bilateral arm pain where – with or without previous neck-shoulder pain			
Pain quality: VAS 0-10 constant – intermittent during activity - at rest at night			
Pain on coughing/sneezing: where:			
PARAESTHESIA Where: With or without pain: When: constant-intermittent at rest-during the day- at night-on activity (which)			
VERTIGO When Constant – postural			
LIMITATION ROM (subj)			
WEAKNESS (subj)			

- What is your main complaint

Pain

Is it segmental or multi-segmental pain? Multi-segmental pain points in the direction of dural involvement / internal derangement. Segmental pain is mostly related to e.g. a nerve root problem, a facet joint or a muscle problem or a high cervical capsulo-ligamentous lesion.

Vertigo

The most important issue is to find out whether the vertigo has a vestibular or a cervicogenic origin. If there is a cervicogenic link, then all kinds of manipulation are contraindicated.

Paraesthesia

Segmental paraesthesia are generally related to a nerve root problem; multi-segmental paraesthesia are a symptom of spinal cord compression (*by a disc, osteophyte, tumour, ...?*). A link with a symptomatic carpal tunnel syndrome, a thoracic outlet syndrome or another local compression of a nerve trunk must be considered too. In those cases, the history and clinical image of each lesion is quite different.

Limitation of movement

In the functional examination we have to interpret the pattern: a full or a partial articular pattern. An internal derangement always presents itself as a partial articular pattern. A full articular pattern (*i.e. equal limitation on articular movements and flexion is the best movement*) is typical for an arthrotic spine (*e.g. ankylosing spondylitis*).

Weakness

Is there weakness because of pain (*e.g. root tests in an acute torticollis can be weak because of too much neck pain; the patient is afraid to move too much or to use too much force*) or is it a real weakness due to pressure on a nerve root? In case of a monoradicular deficit, keep in mind that a spontaneous evolution exists: in about an average time frame of 6 months, muscle force returns to normal. A biradicular deficit however is a possible red flag, specifically when it is a biradicular deficit above C5. As from C5-C6 biradicular compression by a disc becomes anatomically possible, but nevertheless is very rare.

- Pain

When did it start

In case of neck or neck-shoulder pain this information is less important; of course, in chronic cases an underlying dysfunction syndrome can be present.

In case of root pain, it is very important to know when the root pain started, and the neck-shoulder pain ceased. From the moment the pain shifts from the neck-shoulder region into the arm, the spontaneous evolution starts, which takes about 3-4 months: once over half of this period the protrusion becomes irreducible (*it is too far lateral*) and manipulation/traction become useless.

How did it start

Unlike in the lumbar spine, cervical patients mostly don't exactly know what triggered their symptoms: mostly "they woke up with it" and it got slowly worse or they mention that e.g. they worked too long in a flexed position.

If there was an injury beware of the possibility of a muscle, a ligamentous lesion or a fracture: always perform all passive and resisted tests from the basic examination in order to reach a clear differential diagnosis.

How can you influence the pain

It is interesting to know which activities, positions and movements have an influence on the patient's symptoms; what makes it better, what makes it worse? This information is correlated with the findings of the functional examination. A "big" story should go together with a "big" image.

Also use this information for prophylactic purposes.

Evolution since the start

The main issue is the presence of centralizing pain: this is a favourable evolution; peripheralisation is rather unfavourable. Whatever we do as a therapist, whatever the patient does, if it results in centralisation, continue with it.

Where do you feel the pain

Segmental or multi-segmental?

Does the pain have a local origin or not? If local, we can think of the upper cervical capsuloligamentous structures, the nerve roots or the facet joints as possible sources.

If there is pain in the upper limb: where exactly, in which dermatome is the pain felt? Keep in mind that referred pain from the dura does not extend to the lower arm.

A facet joint problem mostly causes unilateral paravertebral pain; radiation is possible, though it stays monosegmental.

Most patients suffering from an internal derangement describe the combination of a cervical and a scapular pain component. Also be aware of multi-segmental tenderness, found on palpation: a painful spot in the suprascapular area is not automatically an active trigger point or indicative for a local lesion. If the painful spot shifts during a treatment session, it is not an active trigger point, thus its diagnostic value is nihil.

Headache can have both a segmental or a multi-segmental origin.

The patient of course describes his actual symptoms, but we would also like to know where they started in order to interpret the evolution. Notice the presence of a shifting pain, pointing automatically in the direction of an internal derangement.

An expanding pain however is another red flag and makes us think of severe pathology.

Finally, knowing the distal border of the symptoms is going to be helpful to determine the specific dermatome in which the symptoms are felt.

How would you describe your pain quality

Again we work with a VAS scale.

Real constant pain mostly implies there is a chemical factor and should always be accompanied by pain at rest; in case of a very acute internal derangement, the patient can also describe constant pain.

The vast majority of our patients describe an intermittent pain.

Keep in mind that a "big" story always should go together with a "big" clinical image. Pain at night mostly is related to a poor sleeping posture; also check the cushion of the patient.

Pain on coughing/sneezing

More scapular or neck pain on coughing or sneezing is considered as a dural symptom. Anyway this symptom is not so often present as it is in the lumbar spine. Pain provoked in the arm could be the result of a primary posterolateral protrusion or a neuroma and is considered a yellow flag.

• Paraesthesia

Multi-segmental paraesthesia are a symptom of spinal cord compression. Segmental paraesthesia are mostly the result of a nerve root compression (*disc, osteophyte*). The presence of paraesthesia, without previous or simultaneous pain, rather points in the direction of compression of a nerve trunk: in that case the disc cannot be responsible for the symptoms and the pressure occurs more distally along the nerve trunk (*e.g. thoracic outlet phenomenon, carpal tunnel syndrome*).

Paraesthesia caused by disc compression of a nerve root have a very irregular intermittent pattern and can occur during the day as well as during the night; cervical functional testing could have an influence on the symptoms.

• Vertigo

Vertigo: is the origin cervical or vestibular? Further specialised examination is indicated. A range of vertebro-basilar-insufficiency functional tests do exist, but all of them unfortunately have only limited value.

If the patient needs a manipulative treatment and he has postural vertigo, then, for safety reasons, we only use longitudinal traction techniques.

• Limitation range of motion / weakness

This is subjective information that has to be correlated with the findings obtained from the functional examination. We are only interested in real weakness as the result of too much pressure on one or more nerve roots or spinal cord pressure.

Weakness can also occur in case of fractures

Section 2b: General history	
Description of typical exertion during professional or leisure activities:	
Off work since:	Previous treatments when: what sort of treatment: results:
Are there any other joints affected which:	Medical imaging results:
Pillow system: cervical support – no support Sleeping posture:	Medication which: Surgery:
Recurrences when: how long: cause: how are you feeling between attacks:	General state of health: good – moderate – bad Sudden unexplained loss of weight:

The information concerning professional and leisure activities is going to be helpful for prophylactic and self treatment measures.

Simultaneous problems in other joints could be linked to rheumatoid arthritis or other system diseases; in that case, any kind of manipulation will be absolutely contraindicated.

Ask for the specific sleeping posture of the patient; perhaps, if needed, we could offer a test cushion with a good cervical support to the patient.

Information about recurrences and previous treatments could be useful, but always keep an “open vision” spirit towards the actual situation.

Medical imaging? Be sure not to treat an X-ray, but focus on the clinical image of the patients. Far too many X-rays, scan's, MRI's are taken without any relevance at all. The results of medical imaging are only one part of “the truth” and certainly do not represent the total truth. Spinal problems mostly are a continuum, therefore the history is so important.

Only in the presence of red flags or other inherent unlikelihoods medical imaging is more indicated and useful.

The use of anticoagulant medication is an absolute bar to any kind of manipulation.

A poor general health in combination with an involuntary weight loss is also an important red flag pointing in the direction of severe pathology.

Section 3: Inspection	
Deviation: flexion side flexion (left – right) / with or without rotation (left – right)	Wasting: where
Position of the scapulae	Remarks:

A side flexion deviation with rotational component is considered irrelevant in relation to an internal derangement, but could be related to a spasm of the sternocleidomastoideus muscle because of e.g. a glandular fever. An internal derangement only causes a side flexion deviation or a flexion deviation. An extension deviation of course is very suspicious, making us think of meningitis.

Is there a scapula alata or some other scapular malpositioning? A scapula alata is the result of a weak serratus anterior. I refer for more differential diagnostic interpretation to Chapter 1.

Wasting could be the result of a root compression, a rupture or a mononeuritis.

Section 4: Basic functional examination					
Variables: pain (where and when), ROM (normal, limited; in what degree), end-feel (normal, muscle spasm, hard), weakness and vertigo.					
Not painful / limited:	-	Painful / limited:	+		
Slightly painful / limited:	+/-	Very painful / limited:	++		
* = these tests are only carried out in case of post-traumatic complaints					
	Pain	ROM	End-feel	Vertigo	Weakness
Pre-test pain at rest					
A flexion					
A extension					
A side flexion: l – r					
A rotation: l – r					
P flexion*					
P extension					
P side flexion*: l – r					
P rotation: l – r					
R flexion*					
R extension*					
R side flexion*: l – r					
R rotation: l – r					
Scapulae: A bilateral elev.					
Scapulae: R bilateral elev.					
A bilateral arm elevation					
R shoulder abduction: l – r					
R shoulder lat. rot.: l – r					
R elbow flexion: l – r					
R elbow extension: l – r					
R wrist flexion: l – r					
R wrist extension: l – r					
R thumb extension: l – r					
R adduction finger V: l – r					
Sensory deficit: where	Jerks: normal – weak – absent biceps – brachioradialis – triceps				
Plantar reflex: + or –					
Effect of repeated movement testing:					

- Pre-test pain at rest

What does the patient feel now; where is he feeling it? This information is going to be regarded as our base line reference information. Do our tests have an influence on this pain: does it get worse or better or doesn't it change? Or are new symptoms produced, where?

- Active flexion / extension / side flexions / rotations

What happens to the symptoms and where are they felt? We also interpret the range of motion.

If a patient has neck pain at rest and extension hurts, do not automatically assume the patient has more neck pain; it might occur he produces arm pain instead during the extension movement. This is one of the unfavourable articular signs for reducing an internal derangement by manipulation.

After those tests we can interpret the pattern: did we see a full articular pattern (*i.e. an equal limitation of extension, rotations, side flexions and flexion is the best movement*) pointing in the direction of an arthrosis or arthritis or did we see a partial articular pattern? An internal derangement always presents itself as a partial articular pattern.

- Passive flexion / extension / side flexions / rotations

We interpret pain, range of movement and end feel.

The end-feel of the rotations and extension is elastic. A muscle spasm end feel is also a contraindication for manipulative treatment. Also interpret the provocation of postural vertigo on those tests: if one of those tests produces postural vertigo, then repeat the test several times and if the vertigo gets worse, manipulation is absolutely contraindicated; if the vertigo slowly abates on repeating the test(s), then longitudinal manipulation techniques under traction can be performed, if indicated.

- Resisted flexion / extension / side flexions / rotations

We interpret pain and weakness. If a resisted test hurts more than the active and the passive tests we interpret this as a muscular pattern *i.e.* a disc lesion becomes highly improbable: a muscle lesion (*e.g. occipital muscle*) or a fracture are much more likely.

When the patient mentions a trauma in the history those resisted tests always have to be performed.

Rotations against resistance are also a C1-test. If this would be weak, medical imaging is imperative.

- Active / resisted scapula elevation

Limitation only on the active movement is very rare and could be related to a contracture of the costocoracoid fascia. Pain during the active movement can have multiple causes: a thoracic internal derangement, a subclavius muscle lesion, an acromioclavicular lesion,...

The resisted version is also a motor test for the C2-C3-C4-nerve roots.

- Active bilateral arm elevation

Perhaps we find a painful arc or a limitation of movement, pointing in the direction of several shoulder lesions. For further interpretation I refer to Chapter 1.

- Resisted shoulder abduction

We interpret pain and weakness. This is mainly a motor test for the C5-nerve root. Alternative causes of pain are described in Chapter 1.

- Resisted shoulder lateral rotation

We interpret pain and weakness. This is mainly a motor test for the C5-nerve root. Alternative causes of pain are described in Chapter 1.

- Resisted elbow flexion

We interpret pain and weakness. This is mainly a motor test for the C5-C6-nerve roots. Alternative causes of pain are described in Chapter 1.

- Resisted elbow extension

We interpret pain and weakness. This is mainly a motor test for the C7-nerve root. Alternative causes of pain are described in Chapter 1.

- Resisted wrist flexion

We interpret pain and weakness. This is mainly a motor test for the C7-nerve root. Alternative causes of pain are described in Chapter 2.

- Resisted wrist extension

We interpret pain and weakness. This is mainly a motor test for the C6-nerve root. Alternative causes of pain are described in Chapter 2.

- Resisted thumb extension

We interpret pain and weakness. This is mainly a motor test for the C8-nerve root. Alternative causes of pain are described in Chapter 3.

- Resisted adduction finger V

We interpret pain and weakness. This is mainly a motor test for the T1-nerve root. Remember that a T1 weakness is probably not related to a disc protrusion and therefore medical imaging is called for in order to exclude some red flags. Alternative causes of pain are described in Chapter 3.

We look for a sensory deficit and define the dermatome; in that perspective, knowing the distal border of the symptoms will be helpful.

A biceps jerk is related to the C5-C6-nerve roots; a brachioradialis jerk is related to the C5-nerve root and the triceps jerk relates to the C7-nerve root.

A positive Babinski means there is compression of the spinal cord, thus offering an absolute bar to manipulation or any other active treatment. Further examination is called for.

- Remarks

In many cases it is interesting to interpret the effect of repeated movements on the symptoms. Do repeated movements make it worse or better? What is the result after *e.g.* 20 repetitions: is the patient feeling better or not? This will be necessary to differentiate between *e.g.* a dysfunction syndrome or an internal derangement. Let's not forget that a dysfunction and derangement can coexist; this is a situation which is not going to be discovered during the first visit of the patient. We discover this during a control examination, some treatment sessions later.

If the symptoms seem to improve by using one or more repeated movements in a certain direction, then we know we can continue using those movements in this specific direction; we can incorporate this in our treatment plan.

It is possible that resisted arm movements hurt in case of an acute torticollis; of course those are false positive answers (*a similar situation occurs on doing some passive hip movements and root tests in an acute lumbago*): it hurts because the patient has too much neckpain and is afraid to give maximal resistance during the test movement.

Section 5 : Accessory functional examination	
Not necessarily all tests have to be carried out	
Postural vertigo test : de Kleyn and Nieuwenhuysse : supine lying, head outside the treatment table, in hyperextension and full rotation ; eyes fix a point during 30'' : vertigo – nystagmus	C8-root : wrist : R ulnar abduction weak thumb : R adduction weak

Besides the passive rotations and extension from the basic examination, we can also use another vertigo test.

In case of a, rare, C8-nerve root compression, other tests will be weak too.

Section 6 : Palpation	
Pain (slight – moderate – severe) where :	Sensory deficit where :

In case of an internal derangement, palpation for pain is not very useful (*there could be multi-segmentally referred tenderness, which has no diagnostic value at all; see higher*); Determining, by palpation, the exact level of the internal derangement is merely “wishful thinking”.

Palpation for local tenderness is interesting in case of a facet joint or a muscular problem.

Sensory deficit mostly is felt in the most distal part of the dermatome.

Section 7 : Conclusion	
Mechanical disorders	Non-mechanical disorders
Disco-dural conflict : reducible - irreducible	Red flags :
Disco-radicular conflict : reducible - irreducible	Expanding pain
	Bilateral root pain
	Patient < 35 years with root pain
	Arm pain > 6 months
	A full articular pattern
Spinal cord compression : reducible – irreducible	Muscle spasm on P movements
	R neck movements are painful and weak
	Side flexion away from the painful side is the only painful and limited movement
Postural – dysfunction syndrome	Limitation of scapula elevation
Facet joint : arthrosis – rheumatoid arthritis	Horner’s syndrome
	Too much weakness
Capsulo-ligamentous problem	Paresis of more than two nerve roots
	Bilateral paresis
Muscle lesion	Weakness without root pain
Symptomatic structural deformity	
Other / undecided	

The first thing we need to know is whether the symptoms have a mechanical or a non-mechanical source.

If it is non-mechanical then several inherent unlikelihoods are present in the history and the functional examination. In order not to forget the most important “red flags”, they are summarized in the assessment form. In that case medical imaging will also be helpful to establish a differential diagnosis.

In case of a mechanical problem we have to establish its nature: can we do something about it or not?

If there is a disco-dural conflict we need to know whether it is reducible or not. What are the chances to reduce it, also depending on the size and the localization of the protrusion.

If there is a disco-radicular conflict we ask ourselves the same questions as above, but we need to take into account the mechanism of spontaneous evolution that exists in the case of monoradicular root pain: the spontaneous evolution takes about 3-4 months; once the patient has more than 2 months of arm pain (*without scapular or neck pain*), the protrusion is not reducible anymore.

In that perspective I refer to my previous publications on examination and treatment of soft tissue lesions.

Compression on the spinal cord by a disc protrusion can be reducible or not: if the patient only describes multi-segmental paraesthesia, without a positive Babinski, then the chances for reduction are still open, by using longitudinal traction techniques. A positive Babinski is an absolute contraindication for each type of manipulation.

A postural and a dysfunction syndrome deserve their own proper treatment strategy. Remember that a dysfunction syndrome causes end range pain on certain movements, which does not change on repeated testing; normal tension on abnormal tissue is causing problems. In case of a postural syndrome, the patient describes symptoms only after some time of loading, but the functional examination is negative. Just changing the “loaded” position is enough to make the symptoms disappear; in that case too much tension on normal tissue is responsible for the complaints.

A symptomatic facet joint arthrosis/arthrititis can be treated by e.g. deep friction massage; in case of a rheumatoid arthritis an intra-articular injection is useful.

If a facet joint problem occurs, mostly the facet joints at C2-C3 level and at C3-C4 level, are affected.

A capsuloligamentous problem is an example of a dysfunction syndrome and can be treated by using some stretch techniques (*can occur e.g. after a trauma or at older age*).

A muscle lesion (*occipital muscles*) also only occurs after trauma: this can be treated easily by deep friction massage.

A symptomatic structural deformity: e.g. an osteophyte, compressing a nerve root or the spinal cord; a spinal or a lateral recessus stenosis. Bear in mind that medical imaging alone is not necessarily conclusive, the specific history/clinical image needs to be present too.

Unfortunately, it can happen that the presented image is at first unclear for us and that we have to refer for further examination. Also take into account the possibility of central sensitisation, which is an important pain mechanism seen in some chronic patients.

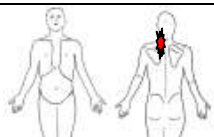
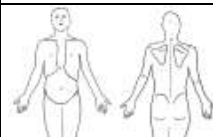
Section 8 : Treatment procedure / analysis	
Date first treatment :	Date last treatment :
Treatment strategy :	
Evolution / treatment adaptation :	
Total number of treatment sessions :	
Results :	

Before starting a treatment session, decide about the treatment strategy you will use; perform it and then interpret what is happening, re-assess at several occasions. Respect the specific expectation pattern we have for each lesion. If our expectations are not fulfilled, re-assess and perhaps modify your strategy. In that perspective I refer again to my previous publications on examination and treatment procedures.

Whether you use manipulation, traction, stretch techniques or any other technique always respect the specific indications and contraindications!

Case study Cervical Spine

Section 1 : General information	@ Cervical spine Assessment Form
Date :	Name : Wenger B.
Address :	
Date of birth : 13/08/1970	Sex : m – f
Diagnostic data : acute torticollis	

Section 2a : Specific history			
What is your main complaint : pain – vertigo - paraesthesia – limitation of movement – weakness			
PAIN When did it start : yesterday morning How did it start : spontaneously overuse - injury describe on waking up I felt a sore neck, unilateral left, into the scapular area ; later that day it got worse			
How can you influence the pain, what makes it worse or better : all movements to the left are very limited and painful ; lying down is also very painful, once the patient lies down, it's better ; flexion also painful			
Evolution since the start : better-worse-unchanged			
Evolution	Start →	Evolution →	Now
Where do you feel the pain : headache where – irregular only in the morning migraine neck-shoulder pain only cervical cervical + scapular l – r – bilateral arm pain where – with or without previous neck-shoulder pain			
Pain quality : VAS 0-10 constant – intermittent during activity - at rest at night	6		8 ➔ Because of posture
Pain on coughing/sneezing : where :			Painful in scapular area

PARAESTHESIA Where : With or without pain : When : constant-intermittent at rest-during the day- at night-on activity (which)			
VERTIGO When Constant – postural			
LIMITATION ROM (subj)			All movements to the left
WEAKNESS (subj)			

Section 2b : General history	
Description of typical exertion during professional or leisure activities : architekt ; likes to visit musea etc. ; no sport	
Off work since : yesterday afternoon	Previous treatments when : what sort of treatment : results :
Are there any other joints affected which :	Medical imaging results :
Pillow system : cervical support – no support Sleeping posture : side-prone lying	Medication which : just painkillers Surgery :
Recurrences when : how long : cause : how are you feeling between attacks :	General state of health : good – moderate – bad Sudden unexplained loss of weight :

Section 3 : Inspection	
Deviation : flexion side flexion (left – right) / with or without rotation (left – right)	Wasting : where
Position of the scapulae	Remarks :

Section 4 : Basic functional examination					
Variables : pain (where and when), ROM (normal, limited ; in what degree), end-feel (normal, muscle spasm, hard) weakness and vertigo.					
Not painful / limited : -		Painful / limited : +			
Slightly painful / limited : +/-		Very painful / limited : ++			
* = these tests are only carried out in case of post-traumatic complaints					
	Pain	ROM	End-feel	Vertigo	Weakness
Pre-test pain at rest	+/-				
A flexion	+	++			
A extension	++	++			
A side flexion : l – r	Left ++ right +	Left ++ right +/-			
A rotation : l – r	Left ++ right +	Left ++ right +/-			
P flexion*					
P extension	++	++			
P side flexion* : l – r					
P rotation : l – r	Left ++ right +	Left ++ right +			
R flexion*					
R extension*					
R side flexion* : l – r					
R rotation : l – r					
Scapulae : A bilateral elev.					
Scapulae : R bilateral elev.					
A bilateral arm elevation	+/- neck pain				
R shoulder abduction : l – r	(+/-)				
R shoulder lat. rot. : l – r	(+/-)				
R elbow flexion : l – r					
R elbow extension : l – r					
R wrist flexion : l – r					
R wrist extension : l – r					
R thumb extension : l – r					
R adduction finger V : l – r					
Sensory deficit : where		Jerks : normal – weak – absent biceps – brachioradialis – triceps			
Plantar reflex : + or –					
Effect of repeated movement testing : no need for repeated movement testing; image is clear					

Section 5 : Accessory functional examination	
Not necessarily all tests have to be carried out	
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Mechanical disorders	Non-mechanical disorders
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<i>Spinal cord compression</i> : reducible – irreducible	Bilateral root pain
<i>Postural – dysfunction syndrome</i>	Patient < 35 years with root pain
<i>Facet joint</i> : arthrosis – rheumatoid arthritis	Arm pain > 6 months
<i>Capsulo-ligamentous problem</i>	A full articular pattern
<i>Muscle lesion</i>	Muscle spasm on P movements
<i>Symptomatic structural deformity</i>	R neck movements are painful and weak
<i>Other / undecided</i>	Side flexion away from the painful side is the only painful and limited movement
	Limitation of scapula elevation
	Horner's syndrome
	Too much weakness
	Paresis of more than two nerve roots
	Bilateral paresis
	Weakness without root pain

Related reading list

This book is a sequel of my previous publications, listed below :

- De Coninck S. : “Orthopaedic Medicine Cyriax, Updated Value in Daily Practice, Part I : Clinical Examination and Diagnosis” OPTP, 2003. ISBN 0966285840
- De Coninck S. : “Orthopaedic Medicine Cyriax, Updated Value in Daily Practice, Part II : Treatment by Deep Transverse Massage, Mobilization, Manipulation and Traction” OPTP, 2003. ISBN 0966285859
- De Coninck S. : “Cyriax compact, Updated Untersuchen und Behandeln”, Thieme, 2005, ISBN 3131404116

I also refer to some other interesting publications regarding Orthopaedic Medicine.

- Ombregt L. et al. : “A System of Orthopaedic Medicine”, Churchill Livingstone, Elsevier Science Limited, 2nd edition, 2003. ISBN 0443073708
- Kesson M., Atkins E. : “Orthopaedic Medicine, a practical approach”, Elsevier, Butterworth Heinemann, 2nd edition, 2005. ISBN 0750655631

Science is (r)evolution; the first track in which we implement new scientific impulses, described in different Journals and other publications, is on our continuing education courses.

Therefore I gladly refer to the powerpoint presentations provided during the ETGOM continuing education courses.

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Therapists involved in orthopaedic medicine i.e. diagnosis and treatment of soft tissue lesions of the locomotor system, share similar problems and questions: does our patient suffer from a muscle lesion (which muscle, where exactly within the muscle?), a bursitis, an arthritis, instability,...?

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