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The sacroiliac joint dysfunction - clinical findings and manual therapeutic approach

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In childhood the SIJ is a synovial (diarthrodial) joint, but between puberty and adulthood it gradually transforms to a modified synarthrodial joint¹.

Together with the pubic symphysis they are defined as amphiarthrosis – secondary cartilaginous joints of minimal if any mobility^{2, 3}

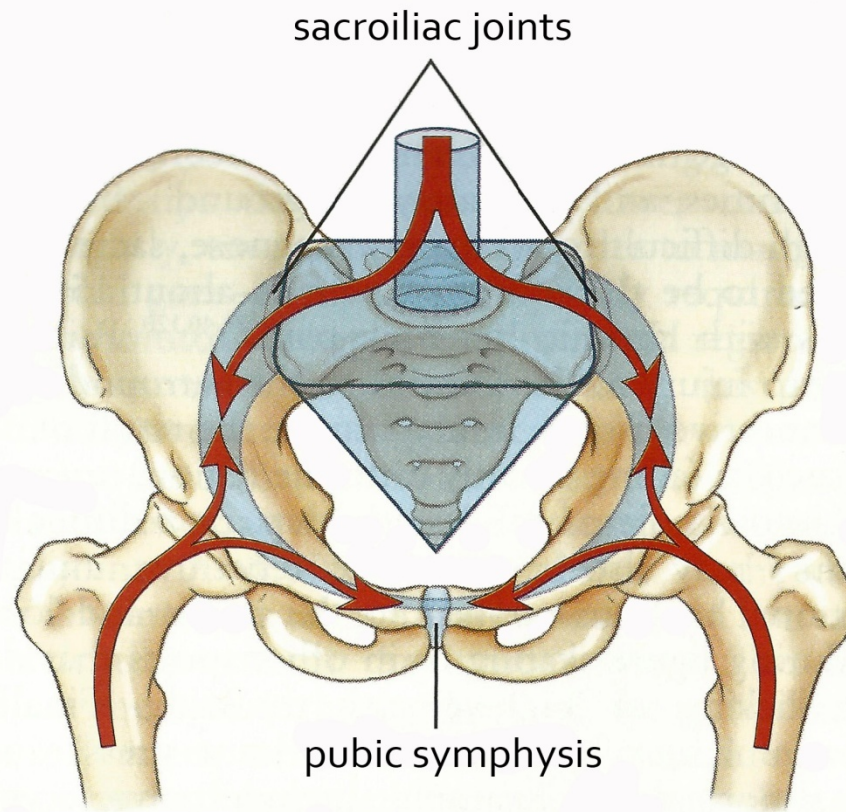
The range of motion in the SIJ is small, less than 4° of rotation and up to 1,6 mm of translation⁴.

¹ Standring S: *Gray's anatomy: the anatomical basis of clinical practice*, ed 40, St. Louis, Elsevier, 2009

² Kapandji A I: *The physiology of the joints*, vol III, 6th ed, Elsevier, 2008

³ Brunner C, Kissling R, Jacob H A: *The effects of morphology and histopathologic findings on the mobility of the SIJ*, *Spine*, 16: 1111 – 1117, 1991

⁴ Stuessen B, Uden A et al.: *A radiostereometric analysis of the movements of the SIJ in the reciprocal straddle position*, *Spine*, 25: 214 - 217, 2000



The pelvic ring

Bidirectional force transfer

Transition caudal end axial skeleton – lower appendicular skeleton



Pain caused by:



...function and its disturbances are rarely confined to one site or structure

K. Lewit

DYSFUNCTION



PAIN

A successful manual therapy usually results in relief of pain. But often a dysfunction is present even without a painful presentation or the pain is reported in a distant part of the body....

....so we have to find out how these are connected!

The evidence favoring the perspective that mechanical SIJ dysfunctions are related to the experience of back and referred pain is less than convincing^{1,2,3}.....

..so we have four clinical situations:

1. a patient with a dysfunction but no local pain;
2. a patient with a dysfunction and intra-articular pain;
3. a patient with a dysfunction and extra-articular pain;
4. a patient with a dysfunction and referred in the buttock region pain

¹ Kokmeyer D J, van der Wurff et al.: *The reliability of multi-test regimens with sacroiliac pain provocation tests*, J Manipul Phys Ther, 25: 42-48, 2002

² van der Wurff, Hagmejer R H et al.: *Clinical tests of the SIJ: A systematic methodological review, Part 1: Reliability*, Man Ther, 5: 30 - 36, 2000

³ Laslett M: *Evidence - based diagnosis and treatment of the painful SIJ: a clinical perspective*, J Man&Manip Ther, 16 (3): 142 - 152, 2008

On the other hand the SIJ as a sole pain generator is defined in just 5%¹ of the cases of low back pain, and a significant pain generator in 14,5%¹, 18,5%² and 13 to 30%³ in the different studies.
.....identifying the source of pain often is a difficult task!

¹*Sembrano J, Polly D: How often is low back pain not coming from the back, Spine vol 34(1): E27 – E32, 2008*

²*Maigne J, Aivalikis A, Pfefer F: Results of SIJ double block and value of sacroiliac pain provocation tests in 54 patients with low back pain, Spine vol21: 1889 – 92, 1996*

³*Schwarzer A, Aprill C, Bogduk N: The SIJ in chronic low back pain, Spine vol 20: 31 – 37, 1995*

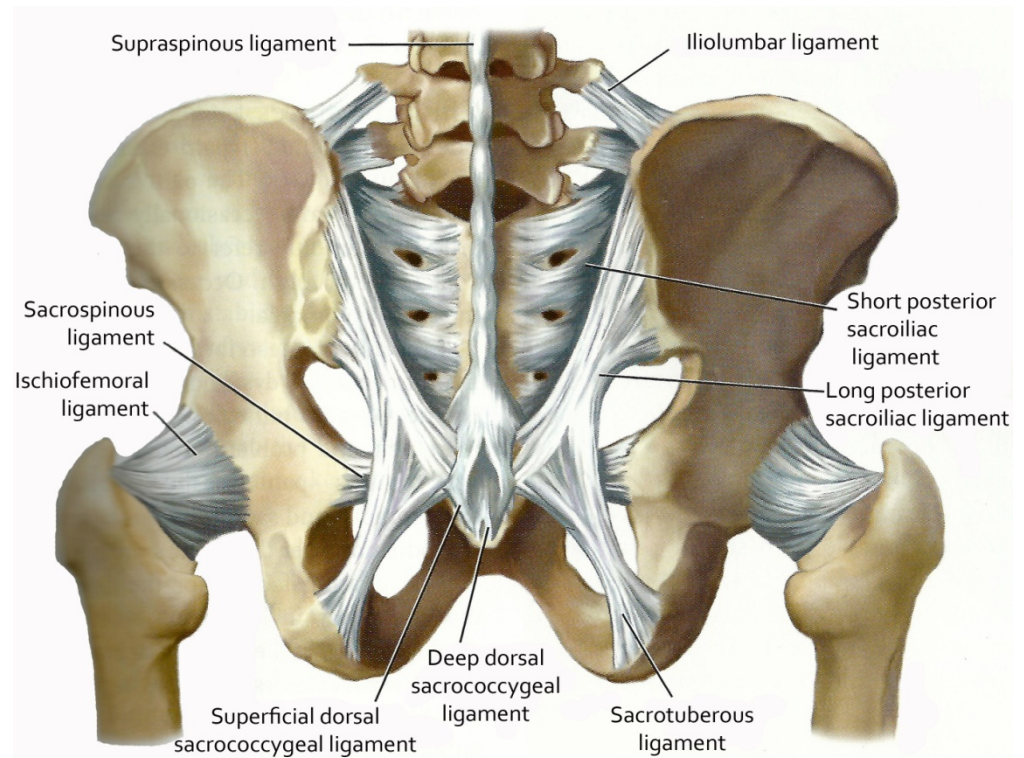
Ligaments that stabilize the sacroiliac joint:

- Primary:

- anterior sacroiliac;
- iliolumbar;
- interosseus;
- short and long posterior sacroiliac.

- Secondary:

- sacrotuberous;
- sacrospinous.



Do we have structural or functional pathology?

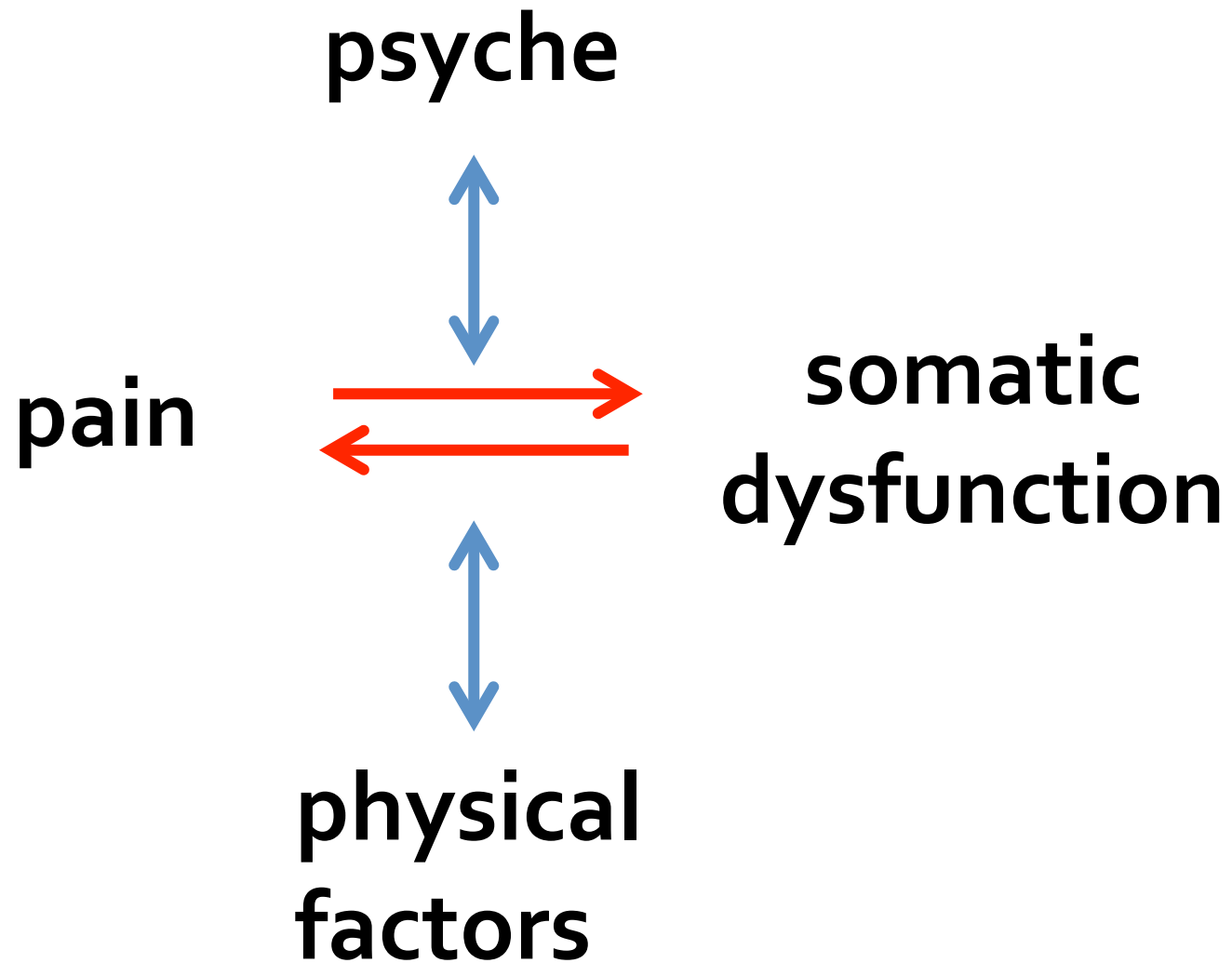
X-ray, CT, MRI.....

Do the structural changes observed correspond with the patient's complains?

.....if not, we have to examine further and consider applying Manual Therapy.

Important for the diagnosis is that:

- the morphological changes cannot explain the pathogenesis in most of the cases;
- the most frequent cause of pain in the locomotor system is the **somatic dysfunction** (joint, muscle, soft tissue, body statics/dynamics);
- the most important cause of dysfunction is the **overload**;
- the **compensatory movement patterns** developed to reduce pain could persist even when the primary cause is no longer present;



Radicular referred pain - do we have it or not?

It is associated with nerve root compression or irritation.

- sharp, shooting pain, corresponding to a dermatome
- if there is a real compression - usually paresthesia and muscle weakness are present, further on - paresis and anesthesia.

...so the radicular pain is a combination of referred pain originating from dural receptors and signs of neurological deficit.

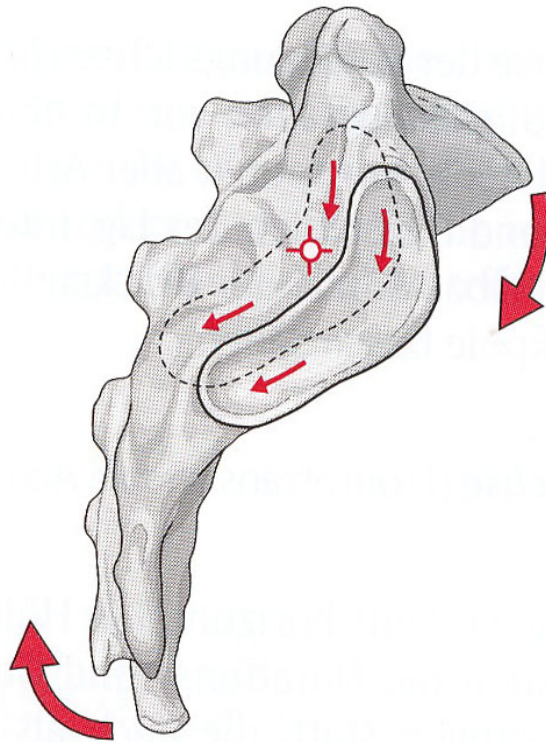
Referred (non-radicular) somatic pain - do we have it or not?

...a disrupted transmission occurs within the central nervous system, perhaps in the dorsal horn of the spinal cord, in the thalamus or in the brain!!!

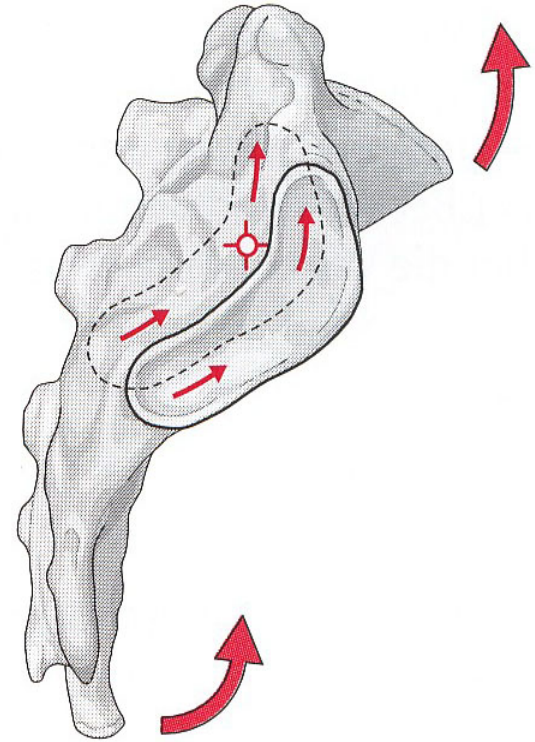
Characteristics of the pseudoradicular pain:

- poorly localized
- deep seated
- a dull, aching nature
- less local tenderness than expected
- local treatment is without success

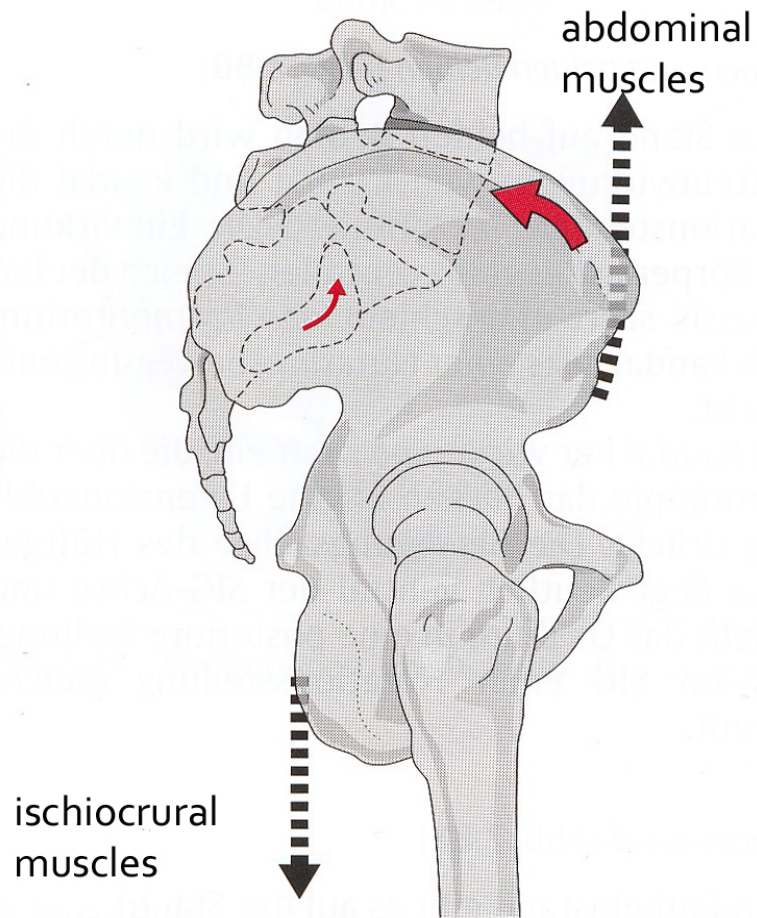
NB: Buttock pain may be referred from the lumbar spine in the presence or absence of low back pain. Any of the somatic, innervated structures in the lumbar spine may refer pain to the buttock. Look for trigger points in m. quadratus lumborum, m. piriformis and m. gluteus medius.



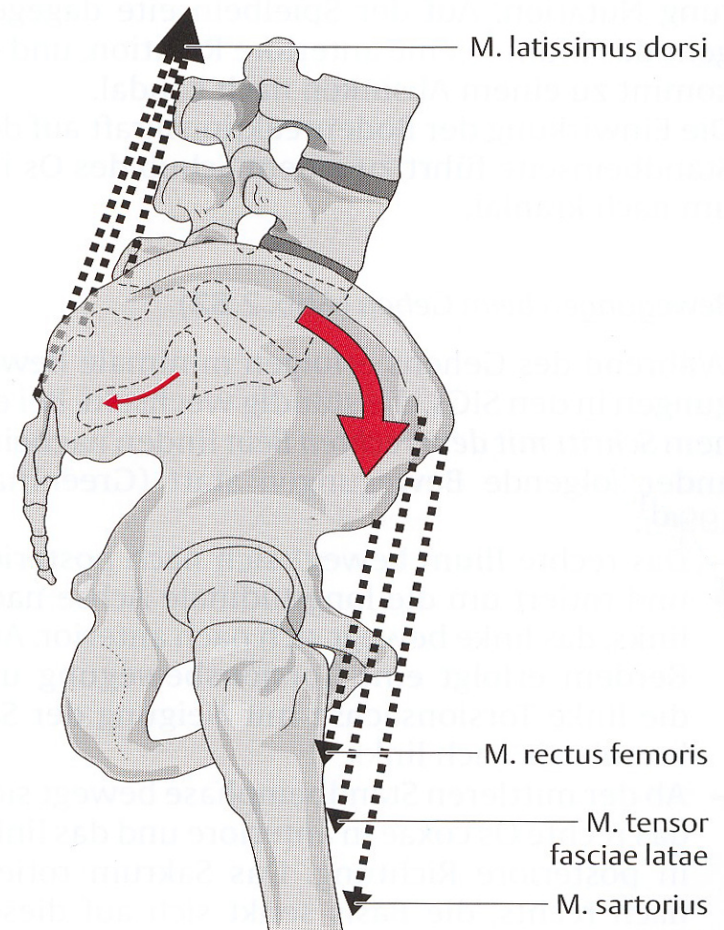
Nutation (flexion)



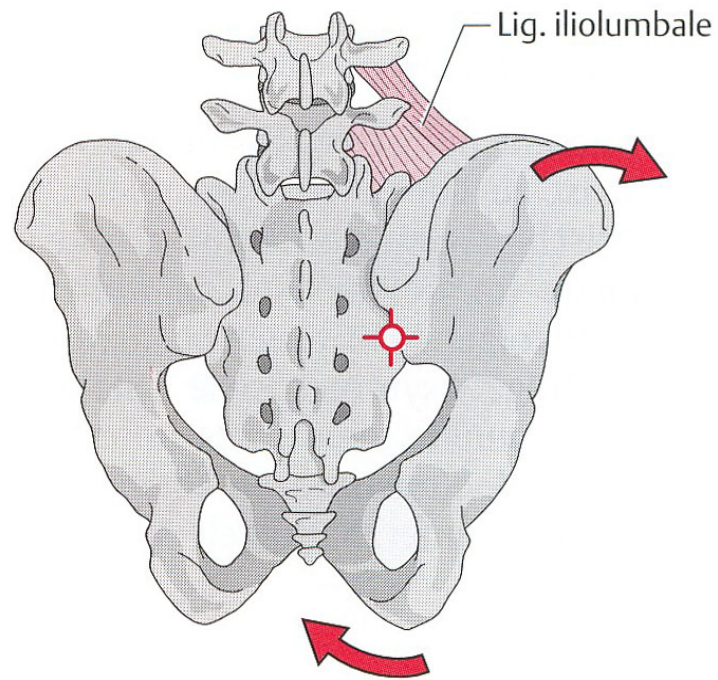
Counternutation (extension)



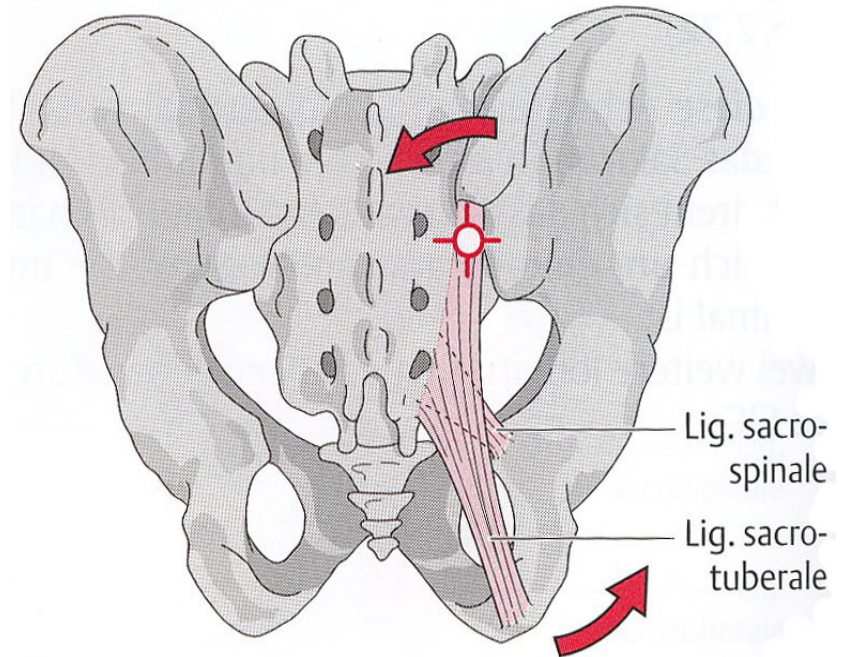
nutation mechanism



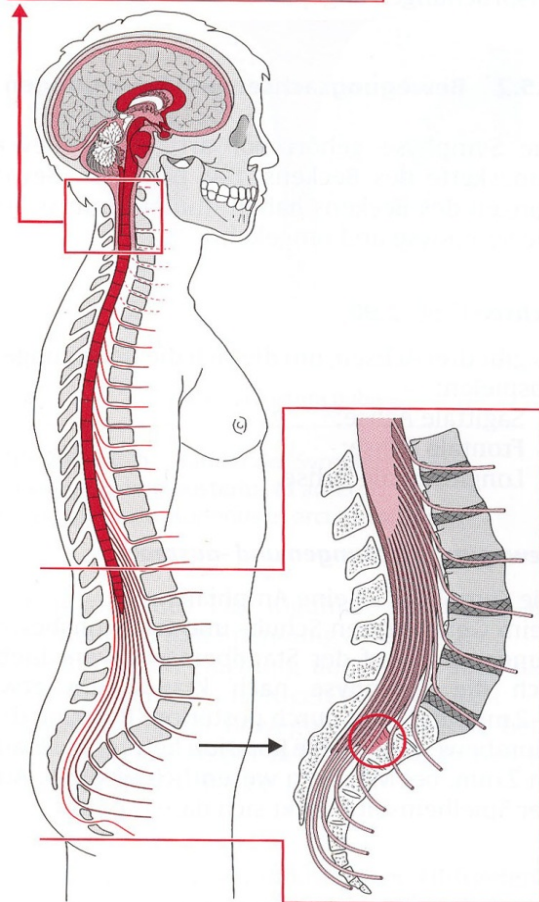
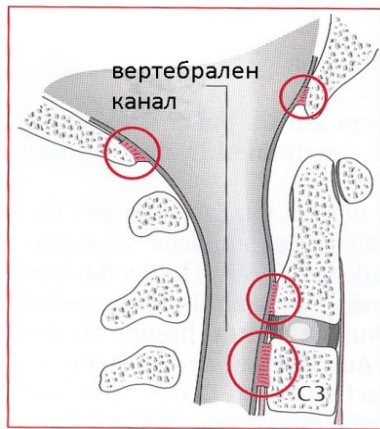
counternutation mechanism



Stretching of the iliolumbar ligament during nutation



Stretching of the sacrospinal and sacrotuberous ligaments during counternutation



Chain – connection Sacrum – Cranium.
Dura Mater attaches around Foramen Magnum, lower at C2/C3 (ventral), S2 (ventral) and Os coccygis (dorsal). The stretch capabilities of Dura Mater are limited, so positional changes in the pelvic region influence the cranio-cervical passage.

**Chain reactions of dysfunction with the SIJ involved:
lower limb - gait - swing phase - extension**

**small joints of foot
ankle joint
fibular head
sacroiliac joint
lower lumbar spine
(atlanto-occipital joints)
(atlanto - axial joints)**

**Chain reactions of dysfunction with the SIJ involved:
lower limb - gait - stance phase - flexion**

knee

hip

sacroiliac joint

superior lumbar spine

thoracolumbar junction

(atlanto-occipital joints)

(atlanto - axial joints)

**Chain reactions of dysfunction with the SIJ involved:
trunk - body statics**

atlanto - occipital joints

atlanto - axial joints

cervicothoracic junction

upper ribs

thoracolumbar junction (trunk rotation)

lumbosacral junction

sacroiliac joint

temporomandibular joint

Diagnostic criteria for sacroiliac joint syndrome as defined by the International Association for the Study of Pain (IASP)

1. pain in the region of the sacroiliac joint with possible radiation to the groin, medial buttocks and posterior thigh;
2. reproduction of pain by physical examination techniques that stress the joint;
3. elimination of pain with intraarticular injection of local anesthetic;
4. a morphologically normal joint without demonstrable pathognomic radiographic abnormalities.

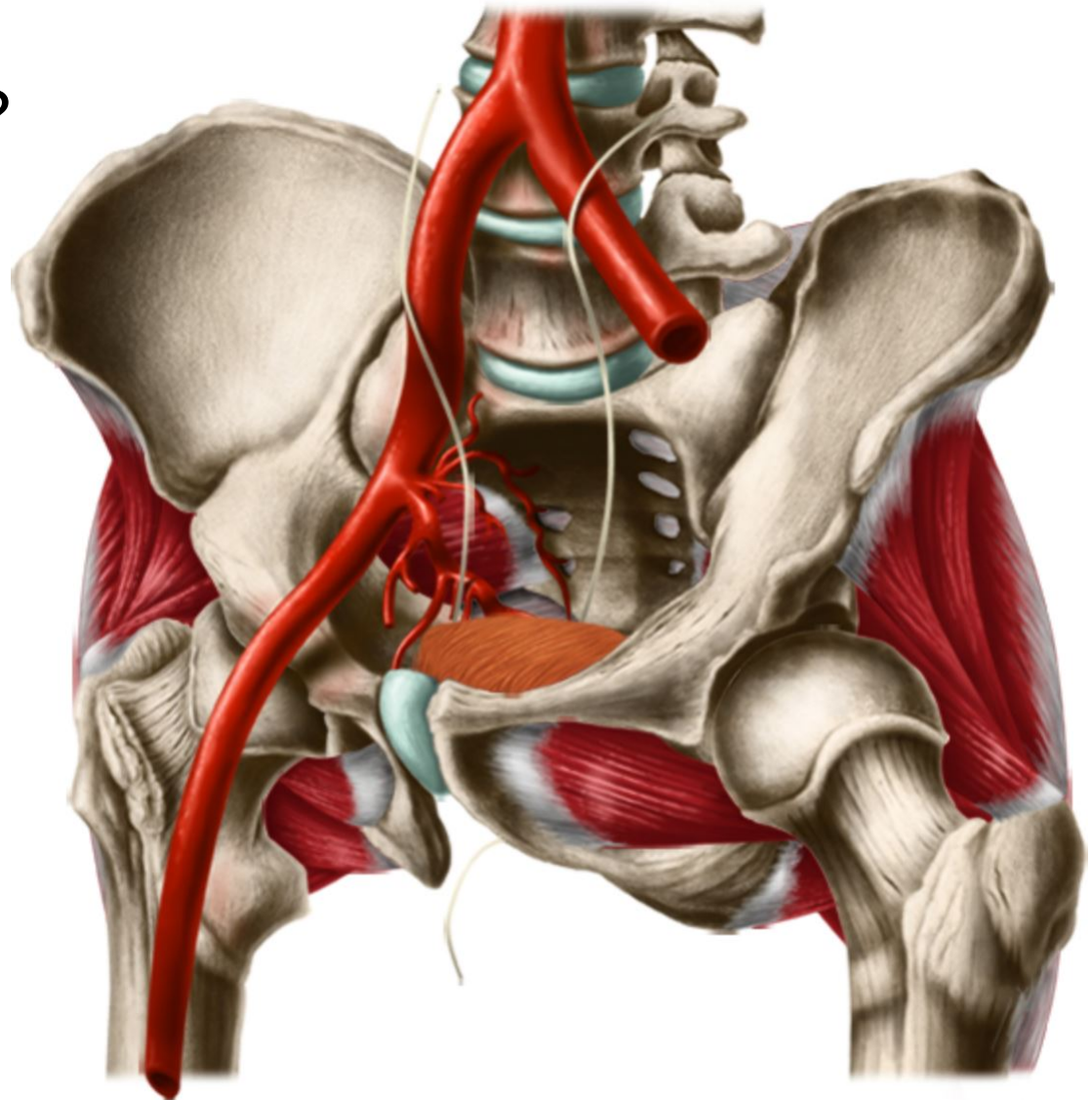
Clinical findings associated with a sacroiliac blockage:

- one-sided, irradiating towards the gluteal region pain
- asymmetric overpressure activities cause an increase of the pain (climbing stairs, getting in or off a car, etc.)
- the pain could disperse in a large areas of the lower limb and groin
- m. piriformis, m. gluteus maximus и m. erector spinae are stabilizers of the SIJ and become spastic
- usually affected is also the contralateral m. tensor fasciae latae

Manual Medicine tools:

- observation;
- palpation;
- kinesiology analysis;
- special tests;
- soft tissue techniques (incl. massage, myofascial techniques, etc.)
- muscle energy techniques (MET) / Neuromuscular Inhibition Technique (NMI) (incl. PIR and RI).
- mobilisations;
- manipulations (HVLA techniques);

Which of these
could we palpate?



Palpation

When examining soft tissues properties that need to be assessed are:

- resistance
- muscle spasm
- tenderness

Precise knowledge of the topographic anatomy is crucial!!!

Skin - temperature, sweating, vasoconstriction (sympathetic activity)

Muscles - assess tone, focal areas of thickening, TrPs, muscle length, muscle attachment points

Patient examination:

- patient history / anamnesis
- inspection (posture, dorsal/lateral/ventral aspect, seated patient)
- palpation:
 - hyperalgesic zones;
 - subcutaneous tissue and fasciae;
 - trigger points;
 - periosteal pain points;
 - radicular / pseudoradicular (referred pain) syndromes
- mobility / range of motion testing:
 - active mobility;
 - movement against resistance;
 - passive mobility;
- specific tests

Patient's history

- mechanism of injury;
- duration and time course of the pain;
- what was the situation before the injury / previous diseases;

Radiological and scanning techniques do not appear to be helpful towards the diagnosis of SIJ problems¹.

For many years the guided anaesthetic injections have been considered as the “gold standard” for SIJ diagnosis^{2,3}.

We have also manual diagnostic tests:

1. Pain provocation tests;
2. Movement palpation tests;

.....but there are so many tests, we maybe even need a Dictionary 😊

¹ Cohen S P: *SIJ pain: a comprehensive review of anatomy, diagnosis and treatment, Anesth Analg, 101: 1440 – 1453, 2005*

² Chen Y C: *The SIJ pain syndrome in active patients: a look behind the pain, Phys Sports Med, 30 (11): 30 – 37, 2002*

³ Carvillo O, Skaribas I et al.: *Anatomy and pathophysiology of the SIJ, Curr Rev Pain, 4 (5): 356 – 361, 2000*

Manual diagnostic tests dictionary

The spine sign test = the stork test = Rücklaufphänomen =
Gillet test

Springing test with patient supine = Thigh Trust Test

Patrick's test = Faber test = Kubis test

.....ASIS distraction test

.....Gaenslen test = Pelvic torsion test

Springing test with patient side-lying (almost =)Sacral
compression test

Springing test with the patient prone

.....sacral thrust test

Rosina's test

.....the drop test

Vorlaufphänomen = Standing flexion test
and others.....

The provocation tests

Laslett M, Young SB, Aprill CN, McDonald B. Diagnosing painful sacroiliac joints: A validity study of a McKenzie evaluation and sacroiliac provocation tests. Aust J Physiother 49:89-97, 2003

There was a 91% sensitivity and 78% specificity when double SI Joint injection was compared to >3 SI Joint pain provocation tests and clinical reasoning.

..but there is moderate evidence for the accuracy of diagnostic sacroiliac joint injections in the diagnosis of sacroiliac joint pain¹.

Diagnostic injection into the SIJ can provide data of an intra – articular source of pain, but not on pain arising from the extra – articular ligaments².

¹ *McKenzie-Brown A, Shah R, et al.: A systematic review of SIJ interventions, Pain Physician, 8: 115 – 125, 2005*

² *Laslett M et al.: Diagnosis of SIJ pain: validity of individual provocation tests and composites of tests, Man Ther 10: 207 – 218, 2005*

The reference standard for diagnosing SIJ pain is not perfect. Despite the shortcomings, **controlled blocks under fluoroscopic guidance** remain the best available reference standard for identifying intra – articular SIJ pain¹.

.....but what about the cases of extra-articular involvement in the pain generation?

¹ *Laslett M: Evidence – based diagnosis and treatment of the painful SIJ, J Man Manip Ther, 16 (3): 142 – 152, 2008*

The mobility palpation tests

for example Vorlaufphänomen = Standing flexion test

inter-examiner reliability of 42%, $\kappa = 0,052$, poor reliability

intra-examiner reliability of 68%, $\kappa = 0,46$, moderate reliability¹

sensitivity 17%

specificity 79%

positive predictive value 61%

negative predictive value 35%²

¹ Vincent-Smith B, Gibbons S: Inter – examiner and intra – examiner reliability of the standing flexion test, *Man Ther* 4: 87 – 93, 1999

² Levangie P K: Four clinical tests of SIJ dysfunction: the association of test results with innominate torsion among patients with and without low back pain, *Phys Ther* 79: 1043 – 1057, 1999

The problem is that there is no widely accepted reference standard for SIJ dysfunction. Any such standard must measure or identify the same phenomenon as the tests.

The only credible developed reference standard for SIJ mobility so far is the **radiostereometric x-ray analysis** (flexion/extension with imbedded metal markers).

.....so we need to find a credible reference standard and reevaluate the tests.

The evidence for the accuracy of provocative maneuvers in the diagnosing of sacroiliac joint pain is limited (Level II-3)¹
Evidence obtained from diagnostic studies of uncertainty
(according to "*Modified quality of evidence developed by USPSTF*" (*United States Preventive Task Force*)).

Modified quality of evidence developed by USPSTF	
I	Evidence obtained from multiple properly conducted diagnostic accuracy studies.
II-1	Evidence obtained from at least one properly conducted diagnostic accuracy study of adequate size.
II-2	Evidence obtained from at least one properly designed small diagnostic accuracy study.
II-3	Evidence obtained from diagnostic studies of uncertainty.
III	Opinions of respected authorities, based on clinical experience descriptive studies and case reports or reports of expert committees.

¹ Rupert M, Lee M et al.: *Evaluation of SIJ interventions: a systematic appraisal of the literature*, Pain Physician 12: 399 – 418, 2009

The evidence for the accuracy of diagnostic and therapeutic effectiveness of sacroiliac joint interventions varies from Level II to Level IV².

dual diagnostic blocks (Level II)

single diagnostic blocks (Level III)

cooled radiofrequency neurotomy (Level II-III)

steroid injections (intra- and peri-)(Level IV)

² Simopoulos T, Manchikanti L et al.: Systematic review of the diagnostic accuracy and therapeutic effectiveness of SIJ interventions, 18 (5): E713 – 56, 2015

Modified grading of qualitative evidence (developed with modification of multiple available criteria including those of the United States Preventive Task Force(USPSTF) criteria)

Level I	Evidence obtained from multiple relevant high quality randomized controlled trials or Evidence obtained from multiple high quality diagnostic accuracy studies
Level II	Evidence obtained from at least one relevant high quality randomized controlled trial or multiple relevant moderate or low quality randomized controlled trials or Evidence obtained from at least one high quality diagnostic accuracy study or multiple moderate or low quality diagnostic accuracy studies
Level III	Evidence obtained from at least one relevant moderate or low quality randomized controlled trial study or Evidence obtained from at least one relevant high quality non-randomized trial or observational study with multiple moderate or low quality observational studies or Evidence obtained from at least one moderate quality diagnostic accuracy study in addition to low quality studies
Level IV	Evidence obtained from multiple moderate or low quality relevant observational studies or Evidence obtained from multiple relevant low quality diagnostic accuracy studies
Level V	Opinion or consensus of large group of clinicians and/or scientists.

Manchikanti L, Falco F et al.: A modified approach to grading of evidence, Pain Phys 17: E319 – E325, 2014

The functional limitations in the range of motion of the cervical spine are treated by:

- manual mobilizations;
- manual manipulations;
- neuromuscular techniques - PIR, RI, etc.
- others.

Thank you!



Tony Nevin, 47, the world's only wildlife osteopath