Torso and Spine Pain - Simeon Niel Asher

WHAT WE WILL BE EXPLORING

- **Torso and Spine Pain**
  - T4 Syndrome
    - IMS Multifidus
    - Exercise
  - Spondylolisthesis
    - TNAT
    - Advice
  - TNAT – Spondylolisthesis
  - TNAT - Hypothesis

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T4 Syndrome

- "upper thoracic syndrome", Rare and under-recognized.
- Based on the premise that dysfunction of the joints in the thoracic spine (including the intervertebral/ zygaphophseal, costovertebral and costotransvere joints) can refer pain and paraesthesia to the upper limbs and the hands.
- Symptoms autonomic dysfunction of the upper thoracic spine causing a pathologic condition at the location of insult as well as the occiput and either ipsilateral or contralateral upper extremity
- As sympathetic outflow to the upper limb is supplied by levels T2-5, the sympathetic nervous system could provide a pathway for referral from the thoracic spine to the upper limb.
- Sensitiization plays a key role
- Three times more common in women than men.

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Cluster of Symptoms

- Subjective reports of parasthesia, altered and extreme temperature perception and "puffiness" in the glove distribution of both hands
- Sensory symptoms are most often reported as unilateral or bilateral paresthesia in the hands and distal UEX. Symptoms, when bilateral, were often greater in one extremity
- A history, or current complaint of intermittent posterior thoracic pain or peri-scapula region
- Symptoms worse last thing at night or with activities involving thoracic flexion/slumping (e.g sitting at a computer/desk for long periods, laying with pillows under head)
- Position of most comfort tends to be laying completely flat (supine)

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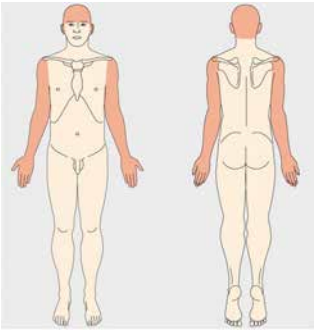
Objective assessment findings include:

PM Hirai - 2016 J Bodyw Mov Ther. 2016 Oct;20(4):722-727

- Increased cervical lordosis and cervico-thoracic kyphosis
- Flattened upper thoracic spine (T2-7)
- Minimal thoracic movement during single arm elevation to either side
- Notable restriction in upper thoracic movement
- Peculiar glove-like distribution of hand or forearm pain. Reduced sensitivity to light touch, pinprick, and proprioception in hand
- Local tenderness and symptoms reproduced with mobilisation of the spine anywhere between levels T2-7 (historically including T4)
- Local hypomobility of the vertebral segment associated with symptoms
- Positive upper limb tension tests, often limited on both sides by pain across upper thoracic spine
- Positive slump test



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Diagnosis

Pain provocation with palpation has been advocated as a reliable means for identifying symptomatic structures in T4 syndrome and is an important factor in clinical decision making.

Symptoms that do not appear wholly somatic in origin or those which are likely to be sympathetically maintained also provides clues towards the diagnosis (for example, a non dermatomal referral and pain patterns).

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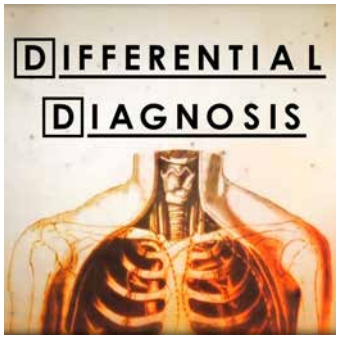
Differential Diagnosis

- TOS (vascular, true neurological or symptomatic)
- Carpal Tunnel Syndrome
- Cervical/Thoracic radiculopathy/disc disease
- Vascular disease (consider spinal stenosis)
- Neurological disease (e.g. MS)
- Multiple level space occupying lesions
- Zygaphophseal joint artrhopathy
- Ankylosing spondylitis
- Myogenic causes (trigger points, muscle strains)
- Vertebral or rib fracture
- Diffuse idiopathic skeletal hyperostosis (DISH)
- Intercostal neuralgia
- Visceral sources/drivers including cancer, cardiac, pulmonary, gall bladder, hepatobiliary, renal and gastroesophageal conditions as these can all cause referral to the thoracic or scapular regions



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Treatment

Trigger-point based approach to manual therapy in combination with a home exercise program consisting of:

- Localized thoracic exercises targeted at the movement dysfunction found at the relevant motion segments in the spine.
- Postural control exercises along with range of motion exercises will also play an important part in rehabilitation.

- Specific recommendation to manipulate T4 was given by several authors - Pedro Castex IAOM
- Functionally relevant positions (for example sports/work/activity specific).
- Average of three months.

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IMS to Multifidus – Dr. Bob Gerwin

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Exercise

Pic. 1: automobilisation of thoracic extension (e.g. with a black roll)

Pic. 2: automobilisation of thoracic rotation (with a little neurodynamic tension)

Pic. 3: dynamic strengthening of the back extensors with your body weight

Pic. 4: automobilisation of the nervous system in long slumped




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Spondylolisthesis

Spondylolisthesis is a fracture and posterior slippage of a spinal vertebra (usually lower Lumbar).

Can develop for a range of reasons and can vary in severity the majority fall into one of two categories: **Traumatic** or **Degenerative**.

Whatever the underlying reason, the result is that the vertebrae literally slip either forward on the one below (Anterolysthesis) or backwards (Retrolysthesis).

This can sometimes be felt as a palpable 'step' as you run your fingers down the patients' spine.

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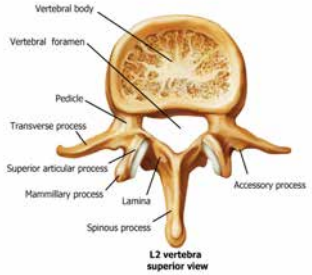
The Pars Interarticularis

Is the region of the vertebral body between which joins adjacent facet joints between the lamina and the inferior facet underneath the pedicle and the superior facet above.



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Symptoms of Spondylolisthesis

- A large percentage of patients with spondylolysis are asymptomatic
- Progression of a spondylolisthesis also may occur without symptoms
- **Difficulty standing straight**
- Back or **buttock pain**
- Pain that runs from the lower back down **one or both legs** (Sciatica)
- **Numbness** or weakness in one or both legs
- Difficulty walking
- Leg, back, or buttock pain that gets worse on bending over or twisting
- Loss of bladder or bowel control, in rare cases
- Pain getting up from a chair
- Morning pain and stiffness
- Back pain getting worse as the day goes on
- Pain usually is provoked by activity, particularly back extension activities
- Poor tolerance of activities requiring excessive spine loading, including running and jumping
- Sitting usually is better tolerated


Phalen Dickson sign


Hamstring tightness

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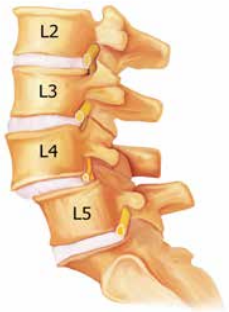
Types of Spondylolisthesis

The most widely utilized classification of spondylolisthesis is that of Newman and Wiltse, in which five types are described based on their etiology.

Type I Congenital/Dysplatic spondylolisthesis
Type II Isthmic spondylolisthesis
Type III Degenerative spondylolisthesis
Type IV Traumatic spondylolisthesis
Type V Pathologic spondylolisthesis
Type VI Postsurgical



Wiltse LL, **Newman** PH, Macnab I. A working classification of of spondylolisis and spondylolisthesis. Clin Orthop Relat Res. 1976 Jun;(117):23-9.

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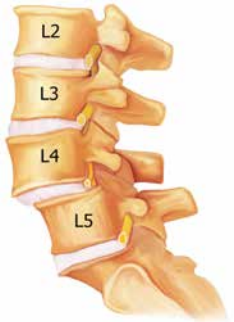
Traumatic/Isthmic

- Isthmus Spondylolisthesis is rare – often due to displacing a small fracture in the pars interarticularis (spondylolysis). Pars interarticularis defect often occurs because the bone didn't fully form from its infantile cartilage (this can be due to a lack of folic acid during pregnancy amongst other things).
- Traumatic Spondylolisthesis usually affects the lower part of the spine, most commonly the 5th lumbar vertebra (82%), but sometimes the 4th lumbar vertebra3.
- The usual mechanism is that a child or youth falls heavily onto the coccyx region and the cartilaginous pars splits. This type of fracture usually occurs around 5-7 years of age; however the symptoms may not be felt until adulthood. Usually a traumatic slippage is a grade I or II and is well adapted and compensated for by the body over time. However, it is not uncommon to see young boys (mainly) of 14/15 years old coming to you with acute spondylolisthesis-induced low back pain.
- Younger patients are at higher risk than older patients for developing progressive spondylolisthesis. The risk for progression in adults is rare when the main problem is at L5



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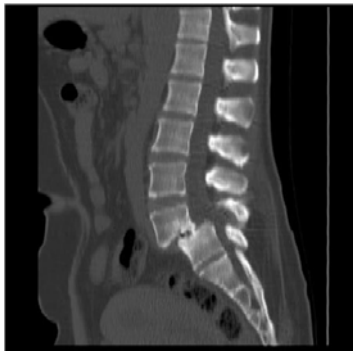
Degenerative

- Usually due to aging, a degenerative spondylolisthesis happens where the spine's support system (bones, joints and ligaments) weaken and are no longer able maintain alignment.
- Degenerative spondylolisthesis is most common in the 5th decade onwards and usually occurs at the L4/5 zone because that's mechanically weaker due to the maximal angle of the lumbar lordosis. This is sometimes also called a 'stress fracture'. It occurs more commonly in **females** with a **5:1 female to male ratio**. The incidence increases after age 40 years.



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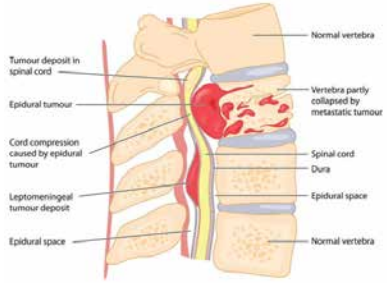
Pathogenic

- Can occur as a result of any bone lesion that might weaken the posterior bony structures.
- Generalized skeletal diseases including Osteomalacia, Syphilitic disease, and Von Recklinghausen disease are some reported causes.
- Bony destructive lesions, including primary or secondary metastatic tumor or infection, are other potential causes.



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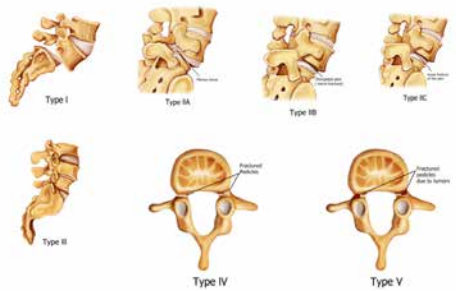
Mechanics of Spondylolisthesis

Group I: Starts with a slippage at the joint.
Group 2: Moves to a fracture of Pars Interarticularis.
Group 3: A frank slippage of degenerative joint.
Then to **Group 4**: Fracture all the way to the Pedicle and finally
Group 5: An attenuated Pedicle.



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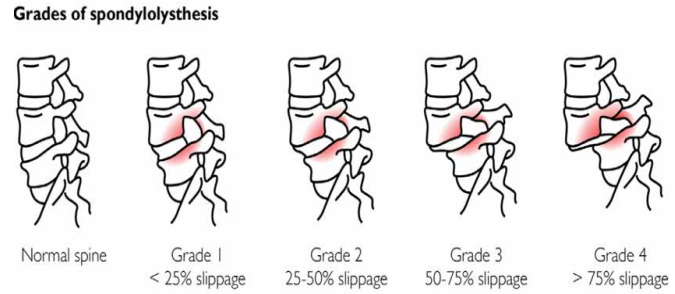
Grades



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Spondylolisthesis Fact Sheet

- **The L4-L5 interspace is affected 6-10 more times than any other level**
- **Approximately 82% of cases of isthmic spondylolisthesis occur at L5-S1**
- **Another 11.3% occur at L4-L5**
- **Degenerative spondylolisthesis occurs more frequently with increasing age especially after 40**
- **Congenital/dysplastic spondylolisthesis has been documented in children as young as 3.5 months**
- **Heavy athletic activities requiring predispose some athletes to developing pars defects**
- **Isthmic Spondylolytic defects affect roughly 1.1% of black females**
- **The most commonly affected group is the white male with an incidence of 6.4%**
- **Arkara Plains Indians and Aleut people groups have a very high incidence of Spondylolytic defects, due to a combination of genetic and environmental factors**
- **Degenerative spondylolisthesis affects black females more commonly than white females (females more affected than males)**

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Lifestyle changes to discuss with patient

Spondylolisthesis

- Reduce the amount of long period sitting – stand up during the course of the day, walk around, stretch and then resume working
- **Don't rest excessively** – keep moving - Avoid standing for long periods
- Sit on an ergonomically correct chair for office area
- Sit with **correct posture**
- Place a **small pillow** in the curve of the lower back
- Sleep with a **pillow under knees** when sleeping on back
- Sleep with a **pillow between legs** whilst sleeping on side – preventing pelvic rotation
- **Weight loss**
- Stress management - stress can cause muscle tension which in turn can cause back pain - this can be done through counseling, yoga, breathing techniques
- **Modify environment** – adjust mattress to sleep on a **softer mattress**, prevent sleeping on stomach, reduce amount of time walking in high heel shoes, use softer chair
- **Quit smoking** – smoking contributes to the degeneration of spinal disks
- Discontinue with any activities that **aggravate symptoms** such as bending over, heavy lifting and any quick twisting or jerking motions. Avoid standing or sitting (e.g. driving) for extended periods as it will increase strain to the spine and aggravate disc pain. At home, keep away from overstuffed and low furniture, because it is difficult to stand back up after sitting in them

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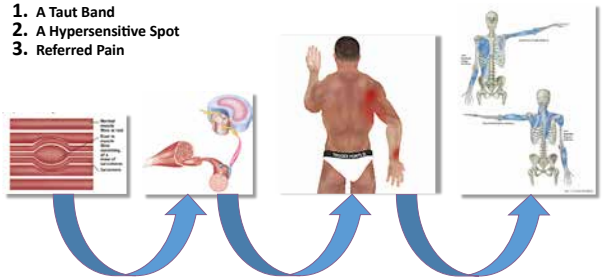
TRIGGER POINTS 101

1. A Taut Band
2. A Hypersensitive Spot
3. Referred Pain



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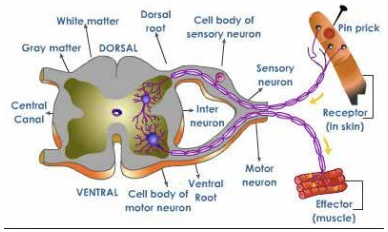
Trigger Points and Lumbo-Pelvic Pain

- Trigger points may play a hugely important role in activating, perpetuating and also relieving Lumbo-Pelvic Pain
- Peripheral and Central Sensitization
- Nociceptive drive
- Dorsal Horn Wind-up



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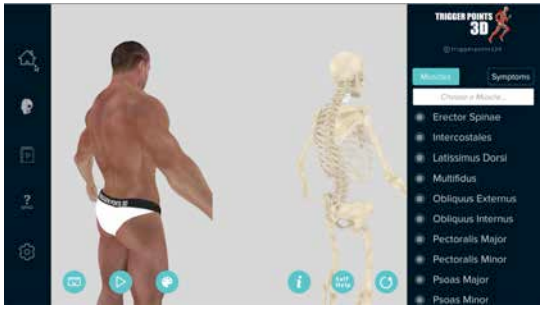
Trigger Points and Spondylolisthesis
Muscles Involved

- Lumbar Erector Spinae
- Multifidus
- Piriformis
- Gluteus Medius
- Gluteus Maximus
- Hamstrings



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Holding Pattern

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REMEMBER

- TNAT is about stimulating a neural sequence rather than making sure you have stretched out every single muscle in pain.
- In the case of a Spondylolisthesis it's not a good idea to completely relax all the muscles – they are doing the important job of holding and protecting the spine.
- We are aiming to use the trigger points as feedback inputs to change the relationship between the brain and the holding pattern around the Spondylolisthesis.

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Trigger Points – TNAT Spondylolisthesis Algorithm

- What's TNAT?
- How do I think it works?
- What is Sensation Modification?
  - Increases in muscle extensibility observed immediately after stretching and after short-term (3- to 8-week) stretching programs are due to an alteration of sensation only and not to an increase in muscle length

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Sensation Modification

- Various theories have been proposed to explain increases in muscle extensibility observed after intermittent stretching.
- Most of these theories suggest a mechanical increase in length of the stretched muscle. The mechanical theories include viscoelastic deformation, plastic deformation, increased sarcomeres in series, and neuromuscular relaxation.
- More recently, a sensory theory has been proposed suggesting instead that increases in muscle extensibility are due to a modification of sensation only. The purposes of this article are to review each of these theories and to discuss the implications for research and clinical practice.

Perspective

Increasing Muscle Extensibility: A Matter of Increasing Length or Modifying Sensation?

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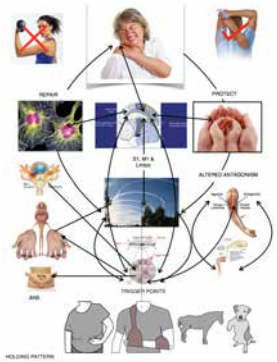
TNAT – Neuroplastic Trigger Point Hypothesis



TNAT – Hypothesis

Spinal cord reflex responses:

- Konstamm reflex
- Reciprocal inhibition
- Post-Isometric relaxation
- Post-activation depression

Autonomic (ANS) responses

Neuroplastic:

- Co-coordination
- Co-facilitation

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Lecture Series – Academy of Physical Medicine

- **Lumbo-Pelvic Pain**
  - The SI and the Sacrotuberous ligament
  - Sciatica and the piriformis
- **Knee and Foot Pain**
  - Runners Knee
  - Achilles Tendinopathy
  - Plantar Fasciitis/Heel pain
- **Chaos, Vitalism and "Super Trigger Points"**
  - Trigger points as strange attractors

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