My patient presents whiplash injury
What to do ?
Diagnosis and management

10th April 2019

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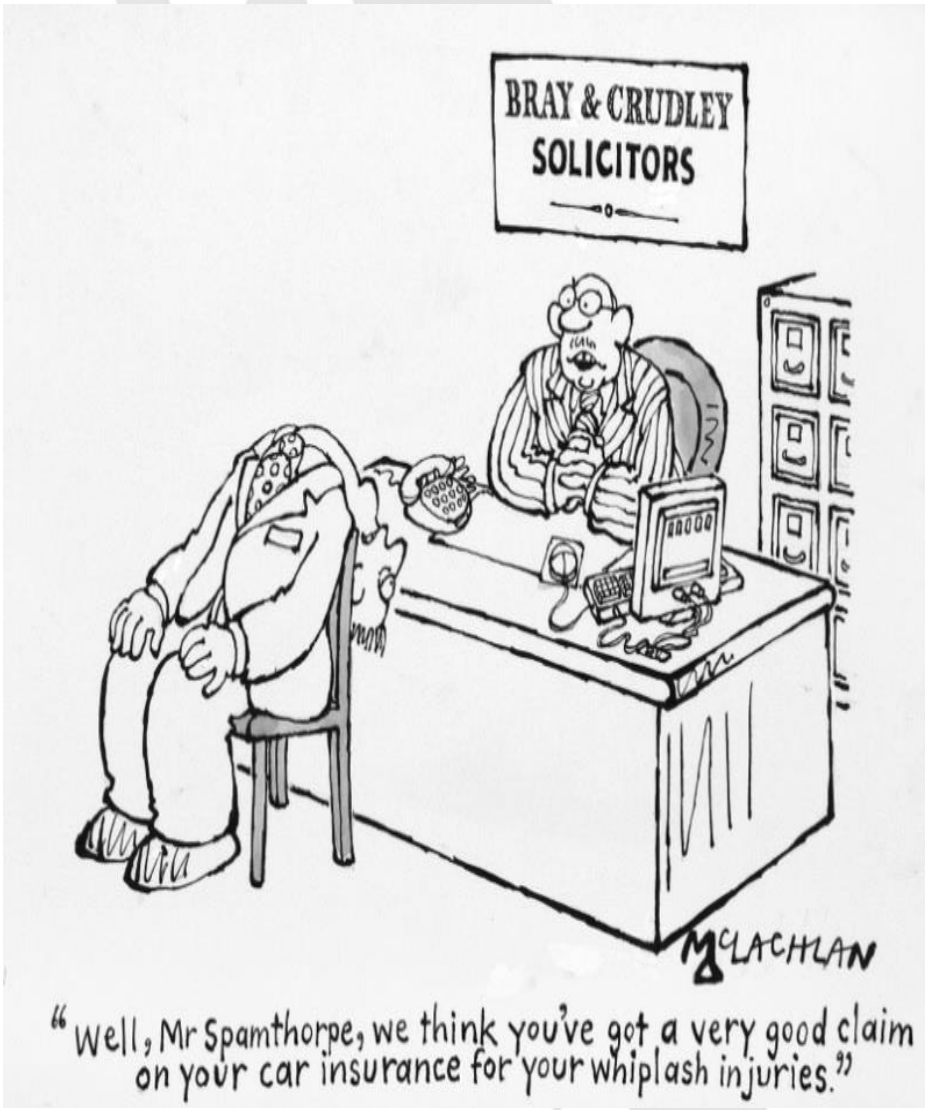

BRAY & CRUDLEY
SOLICITORS
MCLACHLAN
"Well, Mr Spamthorpe, we think you've got a very good claim on your car insurance for your whiplash injuries."


Oh come on, I barely touched you!
Whiplash! Whiplash!

Definition of Whiplash and WAD (Whiplash Associated Disorders)

- **Symptoms triggered by accelaration-deceleration injury from motor vehicle accidents or sport injuries.**

- **An intense, passively imposed, unexpected dorsal acceleration force sufficient to elicit a relevant translation, rotational or retroflexional movement of the cervical spine, usually followed by a less vigorous counterswing anteriorly.**

Obermann M, Naegel S, Bosche B, Holle D. An update on the management of post-traumatic headache. Ther Adv Neurol Disord 2015;8:311-5.

Clinical Presentation

- Neck pain
- Headache
- Vertigo
- Memory /Concentration problems
- Anxiety

Facts & Numbers

- Neck pain is fourth leading disability in the USA
- Life time prevalence of 50%
- WAD affects 1 % of general population
- WAD leads to chronic pain in 50% of patients
- Episodes of WAD range from 16 to 400/ 100.000
  - 80/100.000 in Denmark, Spain, France
  - 100/100.000 in Sweden
  - 200/100.000 in Germany
  - 300/100.000 in the UK
  - 400/100.000 in the USA

- 10 billions Euro the annual cost in Europe
- 34% return to work after one year
- 43% return to work after 3 years

- 1. Murray CJ, Atkinson C, Bhalla K, et al. The state of US health, 1990-2010:
- burden of diseases, injuries, and risk factors. JAMA. 2013;14:591–608.
- 2. Fejer R, Kyvik KO, Hartvigsen J. The prevalence of neck pain in the world
- population: a systematic critical review of the literature. Eur Spine J.
- 2006;15:834–848|
- 3. Tenenbaum A, Nordeman L, Sunnerhagen SK, Gunnarsson R, Gender differences after whiplash trauma PLoS ONE 12(4): https://doi.org/10.1371/journal.pone.0176328 April 25, 2017
- 4. Haiduk P, Benz T, Lehmann S, RNa, Gysi-Klaus F,Aeschlimann A, Michel B A, Angst F, Interdisciplinary rehabilitation after whiplash injury An observational prospective 5 years outcome study, Medicine (2017) 96:9 (e6113)
- 5. Sarrami P. , Armstrong E. Naylor JA, Harris I A Factors predicting outcome in whiplash injury: a systematic meta-review of prognostic factors J Orthopaed Traumatol (2017) 18:9–16

Poor Outcome Predictors

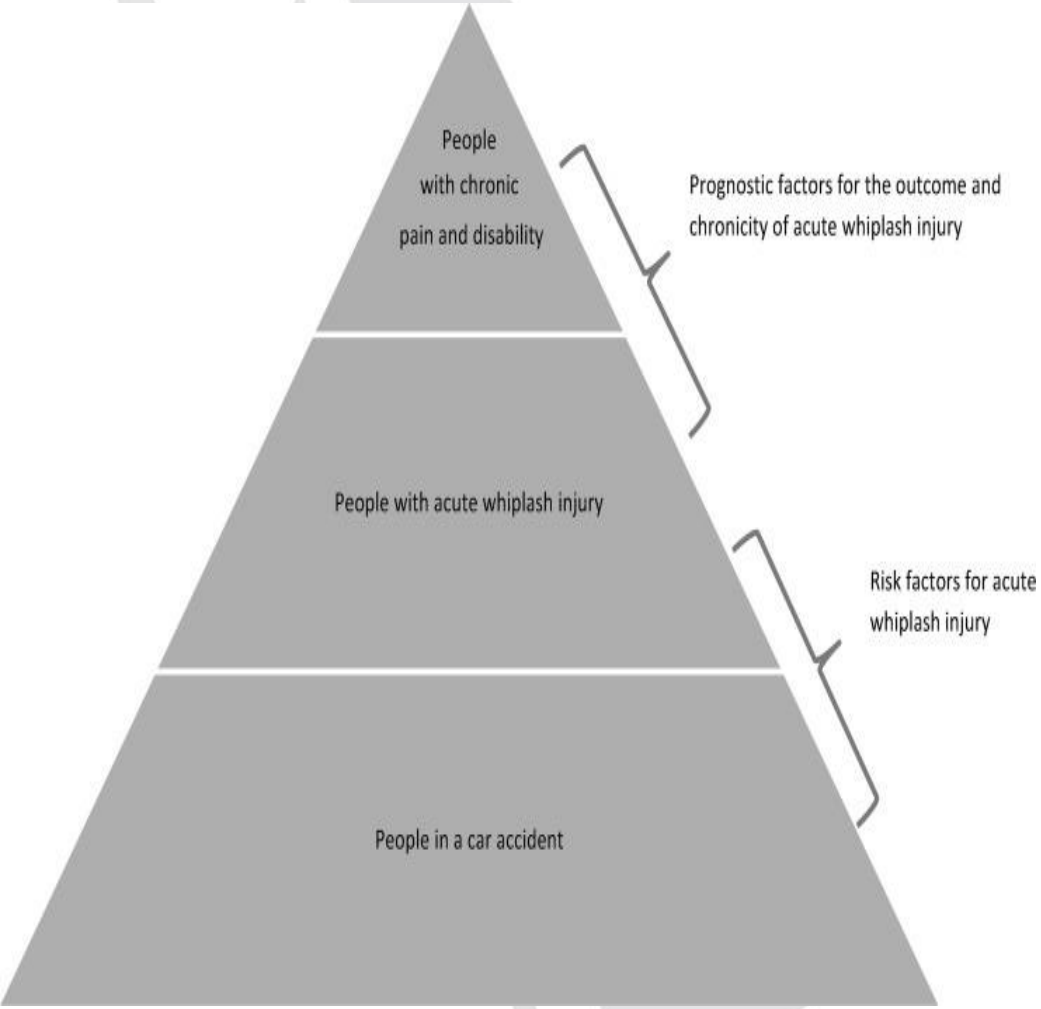
- **Severity of post-injury pain and disability**
- **Post-injury anxiety**
- **Catastrophizing**
- **Compensation and legal factors**
- **Early use of healthcare**

Sarrami P., Armstrong E. Naylor JA, Harris I A
Factors predicting outcome in whiplash injury: a systematic meta-review of prognostic factors
J Orthopaed Traumatol (2017) 18:9–16

Limited Role of Diagnostic Investigation

- History
- Clinical Examination
- Plain X-Ray
- CT
- MRI
- rCBF

Natural progress and prognosis of WAD



Sarrami P., Armstrong E. Naylor JA, Harris I A Factors predicting outcome in whiplash injury: a systematic meta-review of prognostic factors J Orthopaed Traumatol (2017) 18:9–16

- **Acute Phase (0-3 months) – likely recovery**
- **Subacute Phase (3-12 months)- recovery possible**
- **Chronic Phase > 12 month- recovery very unlikely**

Curatalo M. Pharmacological and Interventional Management of Pain after Whiplash Injury. Journal of Orthopaedic & Sports Physical Therapy October 2016 vol 46 (10) 845-50

Sources of pain after WAD by structures

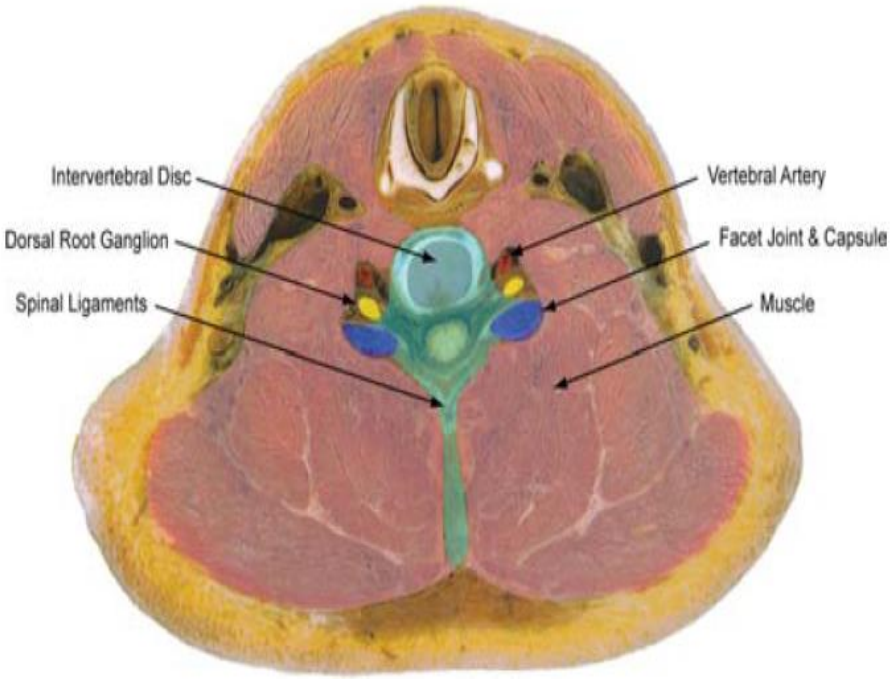
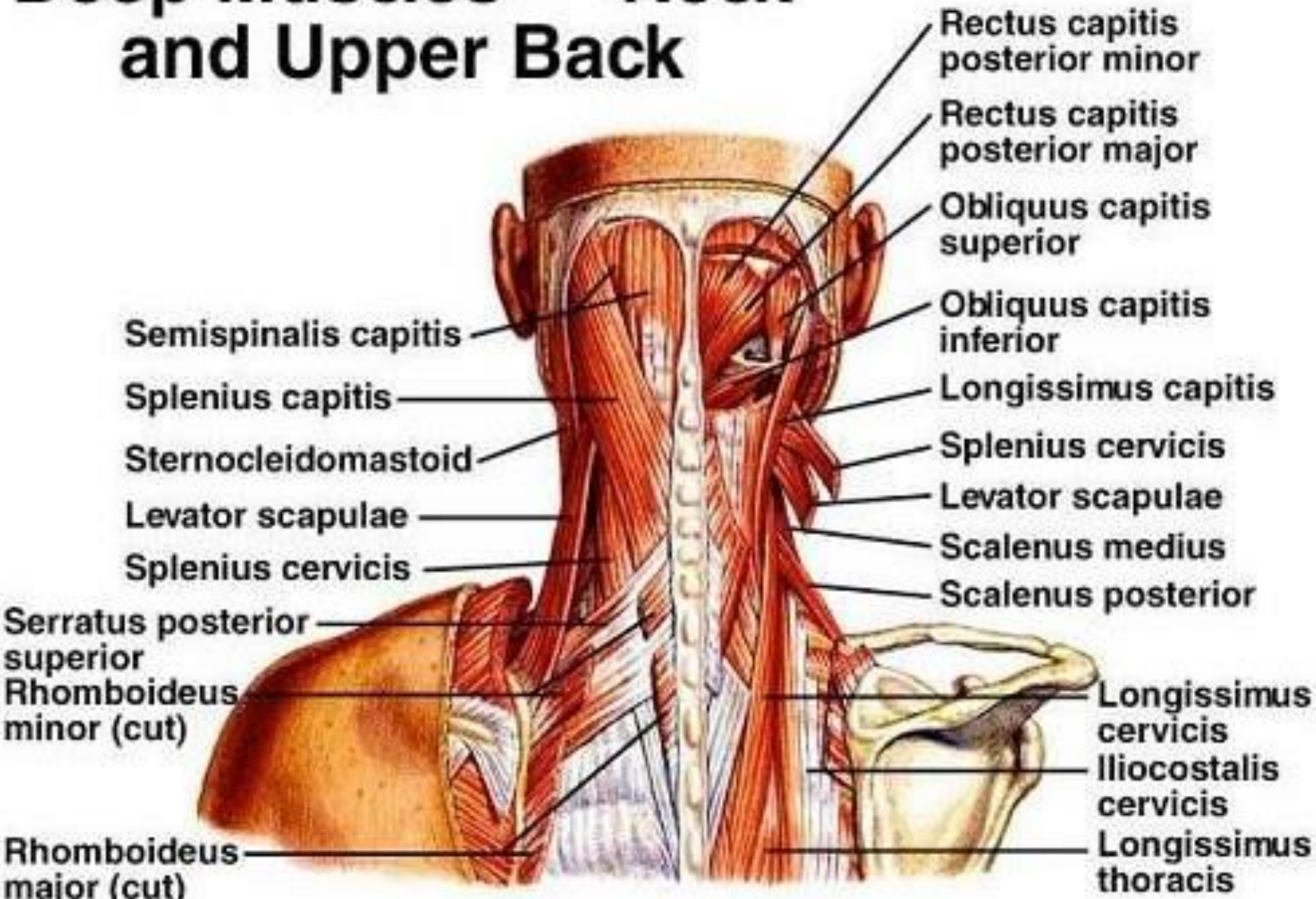


Figure 1 Cross section of the neck showing the anatomical arrangement of the proposed sites of whiplash injury. The shaded areas show muscle (pink), spinal ligament (aqua), facet joints (blue), dorsal root ganglia (yellow), vertebral arteries (red), and intervertebral disc (grey). (Adapted from Rohen and Yokochi 1993.)

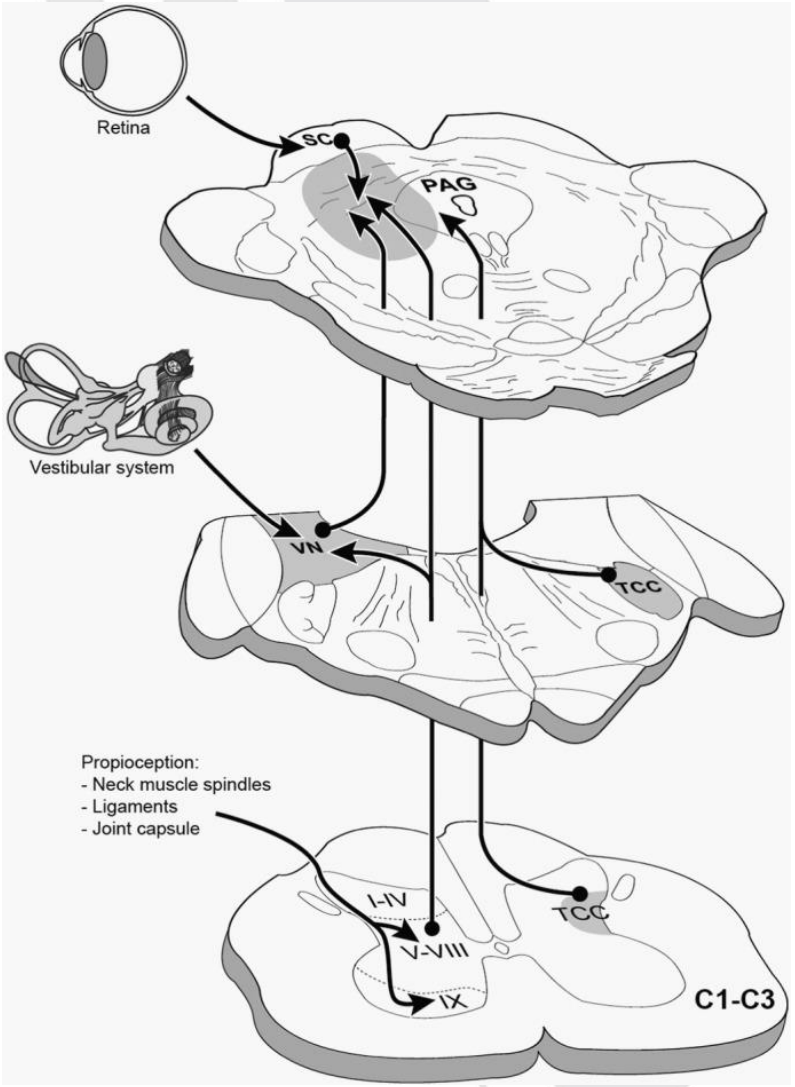
- **Cervical facet joints**
- **Neck muscles**
- **Spinal ligaments**
- **Intervertebral discs**
- **Dorsal root ganglia**
- **Vertebral arteries**

- *Siegmund, G P, Winkelstein, B A., Ivancic, P C., Svensson, M Y. and Vasavada, A(2009) 'The Anatomy and Biomechanics of Acute and Chronic Whiplash Injury', Traffic Injury Prevention, 10: 2, 101 — 112*

Deep Muscles — Neck and Upper Back



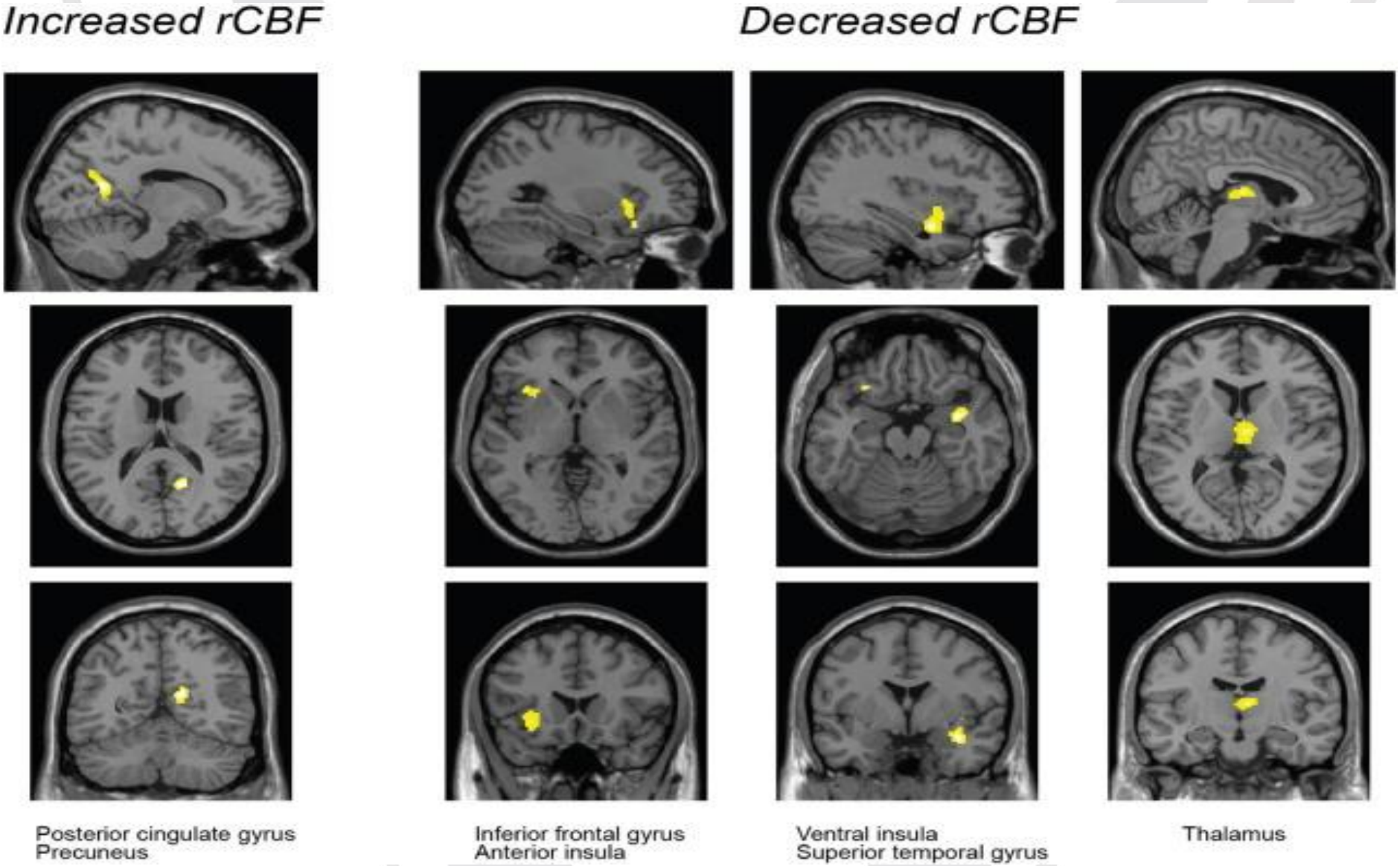
Pathomechanism of WAD



- **Close interaction between neck and midbrain structures**
- **Fibers originating from C1-C3 spinal segments from laminae VI, VII and VIII (ventrolateral horn) projecting to periaqueductal grey (PAG) and thalamus.**
- **Trigeminocervical complex maintains projections to PAG and is involved in development of migraine and headaches.**
- **All ascending pathways converge in neurons located in PAG and adjoining regions**

- *Vállez-Garcia D, Doorduin J, Willemsen ATM, Dierckx RAJO, Otte A. Altered regional cerebral blood flow in chronic whiplash. Ebiomedicine 2016;10:249-57.*

Pathomechanism of WAD



Vállez-Garcia D, Doorduin J, Willemsen ATM, Dierckx RAJO, Otte A. Altered regional cerebral blood flow in chronic whiplash. Ebiomedicine 2016;10:249-57.

WAD Management

Acute phase:

- **Reassurance/ counselling /education**
- **Medication for pain relief**
- **Waiting for spontaneous resolution.**
- **Physical therapy**

Persistent pain :

- **Medication to reduce pain and improve function**
- **Interventional management**
- **Resolution may no longer be expected.**

- *Skillgate E, Côté P, Cassidy JD, Boyle E, Carroll L, Holm LW. Effect of early intensive care on recovery from whiplash-associated disorders: results of a population-based cohort study. Arch Phys Med Rehabil 2016;5:739-46.*
- *Curatolo M. Pharmacological and interventional management of pain after whiplash injury. J Orthop Sports Phys Ther2016;46:845-50.*

Non-invasive Management

- **Mobilisation, manipulation, and clinical massage are effective interventions for the management of neck pain.**

- **Acupuncture, strain-counterstrain, relaxation massage and some passive physical modalities (heat, cold, diathermy, hydrotherapy, ultrasound) are not effective ?.**

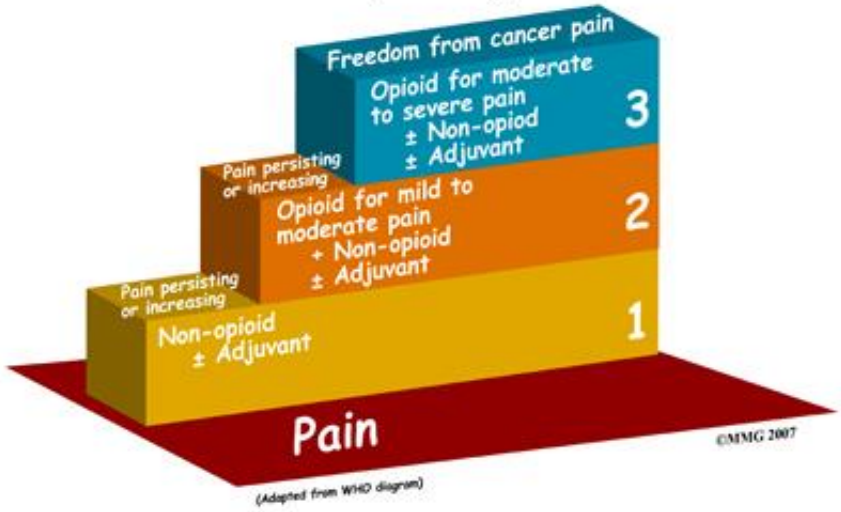
- *Wong JJ, Shearer HM, Mior S, Jacobs C, Côté P, Randhawa K, et al. Are manual therapies, passive physical modalities, or acupuncture effective for the management of patients with whiplash-associated disorders or neck pain and associated disorders? An update of the bone and joint decade task force on neck pain and its associated disorders by the optima collaboration. Spine J 2016;16:1598-1630.*

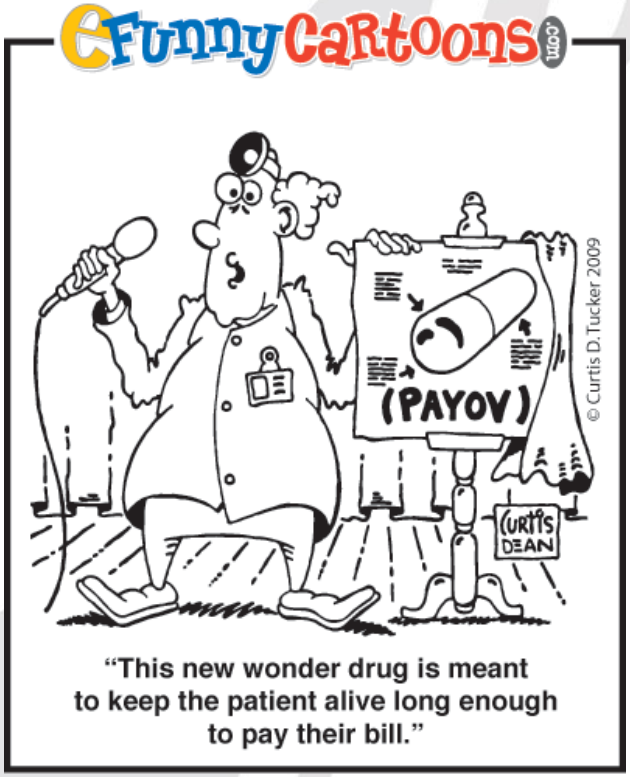
Medication

- **NSAIDs in acute phase.**
- **Insufficient evidence for muscle relaxants.**
- **Antidepressants can be considered in patients with WAD who display hyperalgesia, sleep disorder, or depression.**
- **Anticonvulsants may not be the first choice.**
- **Opioids in few cases.**

- *Curatolo M. Pharmacological and interventional management of pain after whiplash injury. J Orthop Sports Phys Ther2016;46:845-50.*

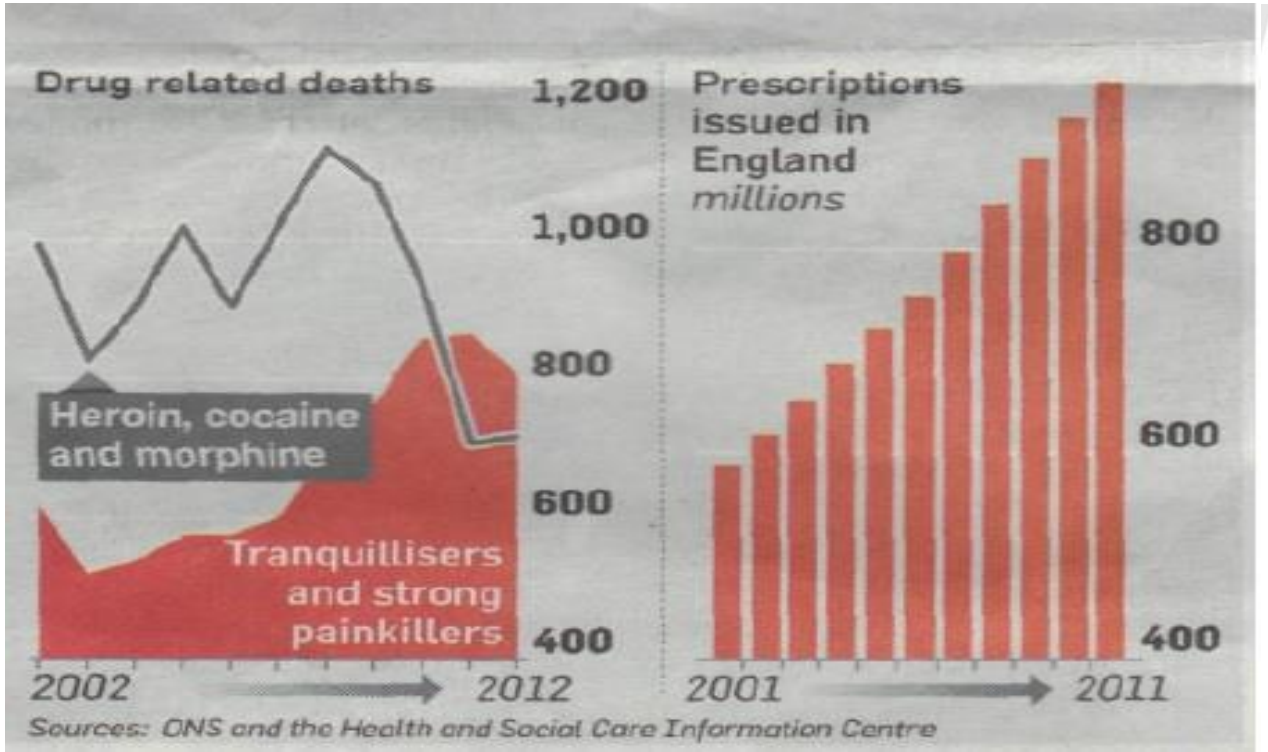
WHO Three-Step Analgesic Ladder





A nation of pill poppers

Painkillers and tranquillisers now kill more people than heroin and cocaine. How did Britain become so hooked?



Tapentadol in WAD ?

Journal of Pain Research

Dovepress
open access to scientific and medical research

Open Access Full Text Article

ORIGINAL RESEARCH

Tapentadol extended release for the management of chronic neck pain

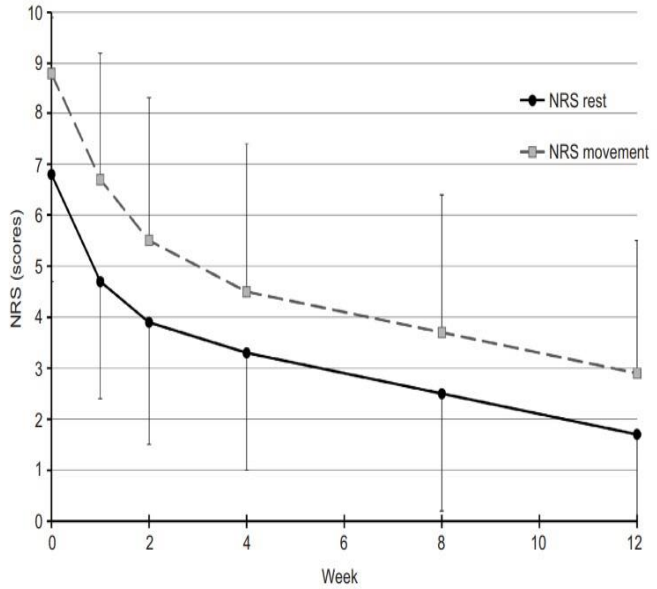


Figure 1 Mean and SD pain intensity (11-point NRS) over time (observed-case analysis) at rest and on movement.
Abbreviations: SD, standard deviation; NRS, numeric rating scale.

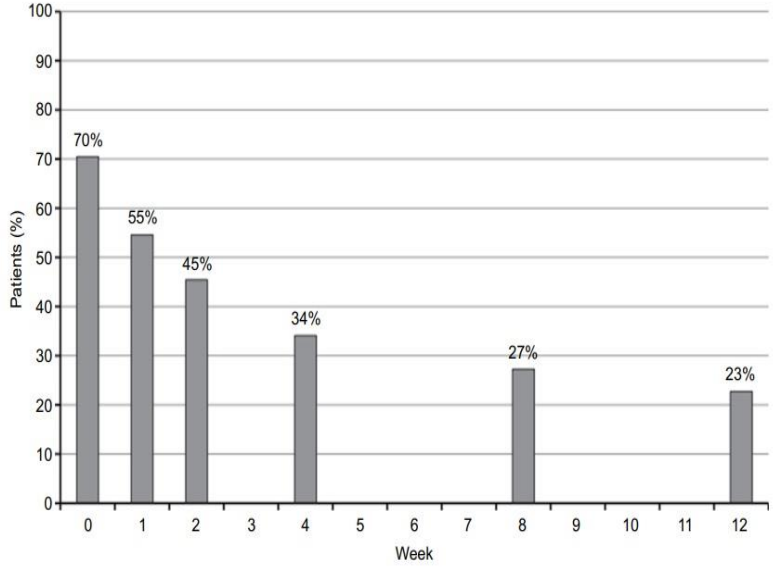


Figure 2 Percentage of patients with neuropathic pain 4 score ≥4 from baseline to week 12 (final evaluation).

Interventional Management

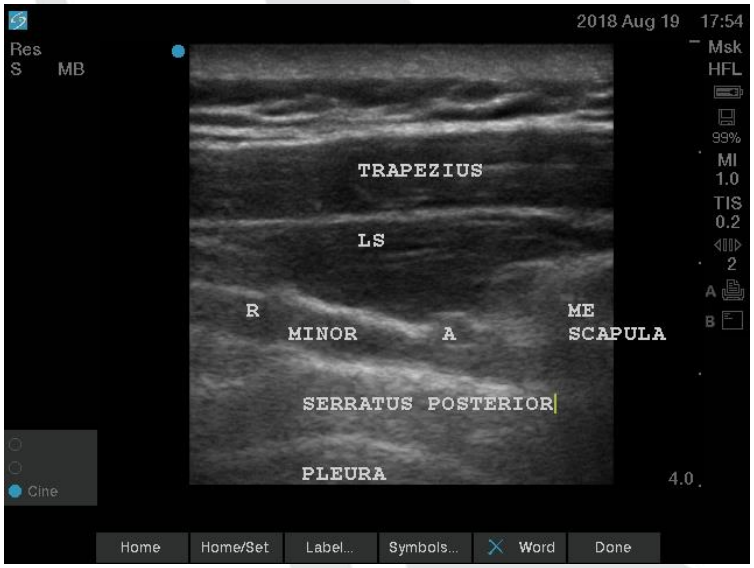
- **Myofascial trigger points (MTPs) are more prominent in patients with WAD as compared with mechanical neck pain.**

- **MTPs are related to current pain intensity and size of the spontaneous pain distribution in patients with WAD.**

Castaldo M. Ge HY, Chiarotto A, Villafane JH, Arendt-Nielsen L. Myofasical trigger point in patients with whiplash-associated disorders and mechanical neck pain. Pain Med 2014;15:842-9.

Ultrasound-Guided Interventional Procedures: Myofascial Trigger Points With Structured Literature Review

Kumbhare, Dinesh; Singh, Dhanveer; Rathbone H., Alasdair; More
Regional Anesthesia & Pain Medicine . 42(3):407-412, May/June 2017.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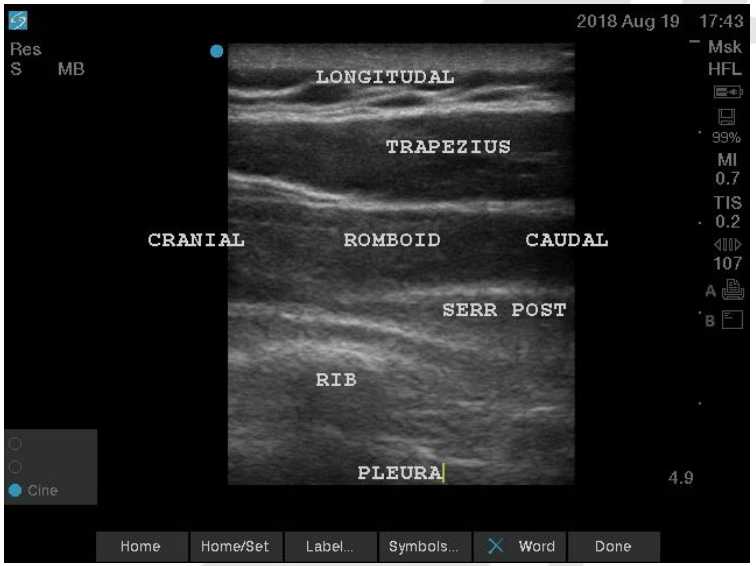
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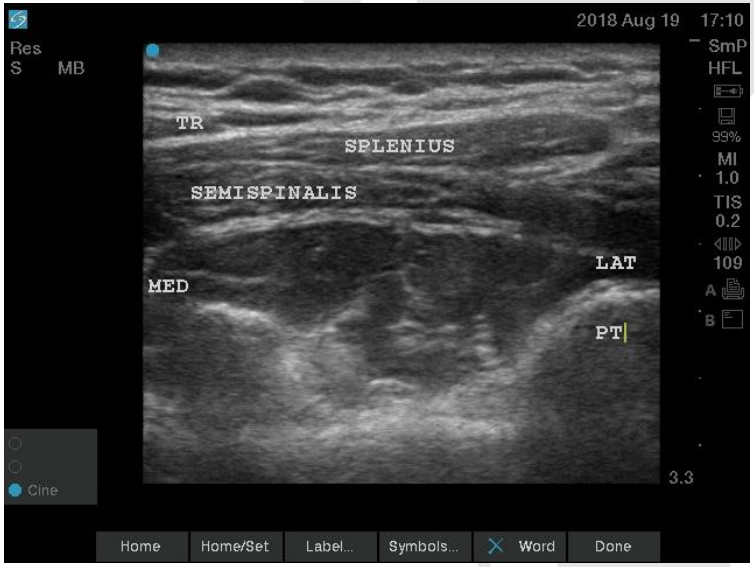
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Invasive Management

- **A substantial amount of patients with chronic WAD have their persistent pain emanating from cervical facet joints.**
- **Radiofrequency lesions of the rami dorsales of the spinal nerves in patients with chronic cervical facet joint pain can provide long lasting pain relief**
- **In patients with WAD, psychological stress factors resolved after pain relief due to cervical facet joint neurotomy.**

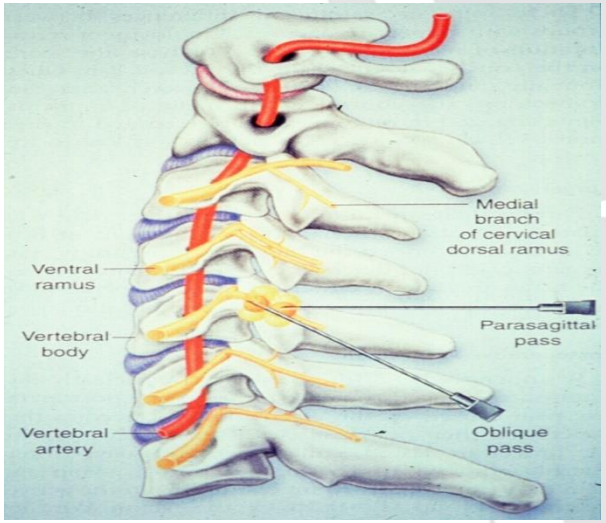
Lord SM, Barnsley L, Wallis BJ, McDonald GJ, Bogduk N. Percutaneous radio-frequency neurotomy for chronic cervical zygapophyseal-joint pain. N Engl J Med 1996';335:1721-6.

Persson M, Sörensen J, Gerdle B. Chronic whiplash associated disorders (WAD): responses to nerve blocks of cervical zygapophyseal joints. Pain Med 2016

Wallis BJ, Lord SM, Bogduk N. Resolution of psychological distress of whiplash patients following treatment by radiofrequency neurotomy: a randomised, double-blind, placebo-controlled trial. Pain 1997;73:15-22

Cervical Medial Branch

- Axial neck pain has been also associated and accelerated by whiplash injury. The involvement of facet joints in chronic neck pain has been estimated as more than 50%.
- There are no reliable clinical or radiological signs of specific facet joint involvement and diagnostic blocks of the cervical medial branches (MB) are the accepted gold standard.
- After 2 diagnostic blocks radiofrequency ablation is recommended



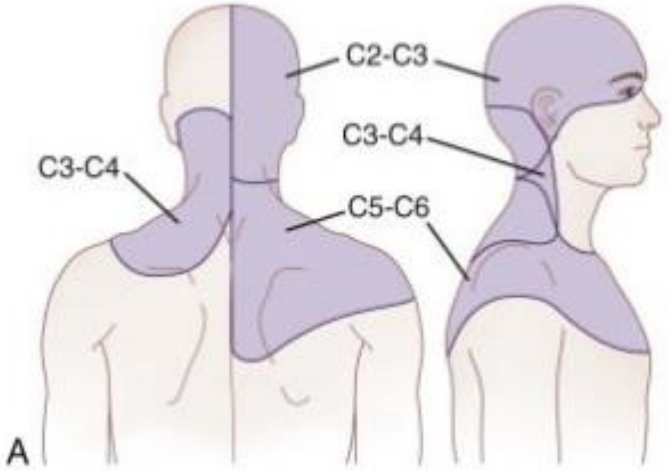
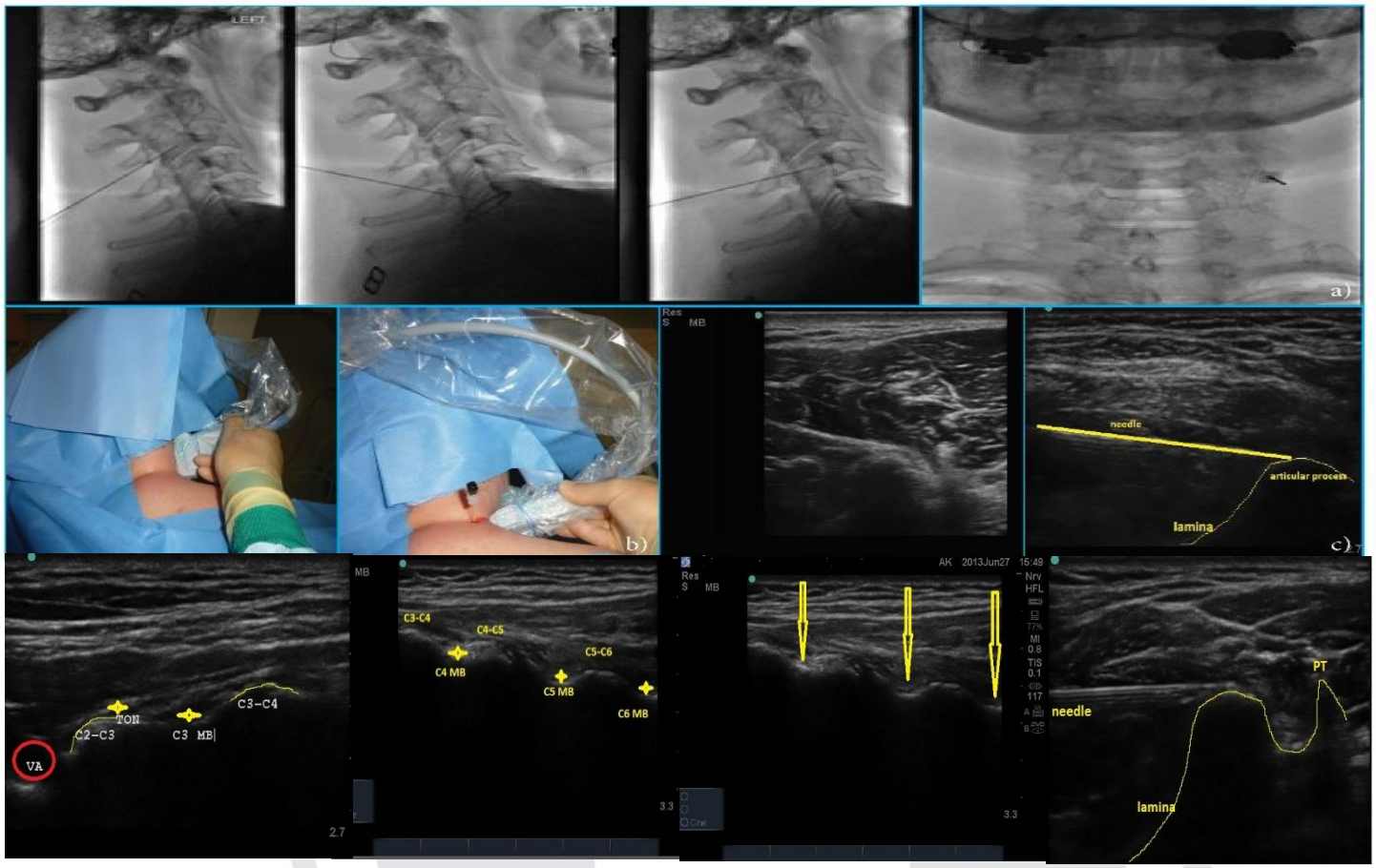


Fig. 12-1 Maps of referred pain from the cervical (A) a

Krol A, Van Tilburg K, Goroszeniuk T, My patient presents whiplash injury • What to do ? The best of both worlds-Fluoroscopy and Ultrasound Combined guidance for cervical medial branch block and radiofrequency denervation.



Regional Anesthesia and Pain Medicine • Volume 42, Number 5, Supplement 1, September-October 2017

> 500 patients at St George's Chronic Pain Service

Case Report 1

- 27 year old female
- 3 years since RTA associated with whiplash injury
- Neck and mid thoracic pain since , not helped with medications and physiotherapy
- No litigation on going

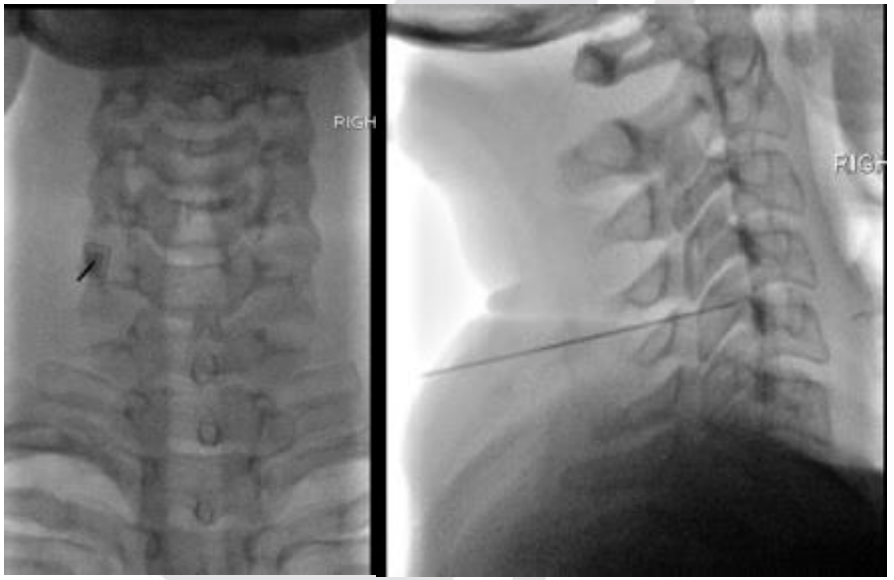
- She was involved in a road traffic accident about three years ago and has been suffering from neck and mid thoracic pain since. The pain started at about C4 level in her neck and radiates towards her shoulder blade mostly on the left but more recently to the right side as well and also to her right suprascapular area. In addition, she complains of mid thoracic pain between T6 and T9 across her back. Her symptoms are compatible with a WAD

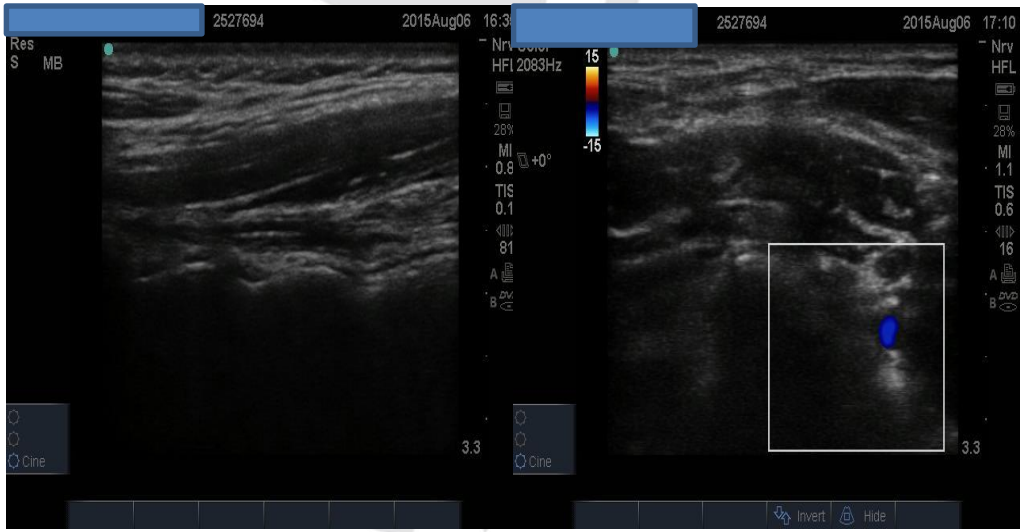
- She used to suffer from anxiety and low mood but this significantly improved when she stopped taking medications such as Amitriptyline, Tramadol and Pregabalin. At the moment, she only has been taking on and off Ibuprofen and Paracetamol. Apart from the pharmacology, she has tried acupuncture, chiropractor, osteopaths, Pilates classes, yoga,and has been doing regular exercises. She used to be very active going to gym three times a week but now it is restricted due to her discomfort. She has tried a TENS machine which she did not like and it did not give her any benefit. She has had trigger point injection with local anaesthetic and steroids to affected muscles which did not give her any relief and they were associated with some side effects likely due to the steroid dose and it consisted of nightmares, insomnia and increased anxiety. She has attended Pain Management Programme and found it very useful.

- There is straightening of the cervical lordosis but otherwise normal alignment of the cervical and thoracic spine. No fracture is demonstrated and there is little in the way of degenerative change. The spinal canal is capacious and no particular foraminal narrowing is demonstrated. The cord is of normal appearance with no focal signal abnormality.
- Sagittal T1, T2, STIR, axial T2 images.

Management Plan

- As she had explored most of the avenues of possible management, I have concentrated on the mechanics of whiplash injury and cervical facet joint involvement into the process. We discussed the possibility of a diagnostic block just with local anaesthetic to avoid the side effects of steroids and a possible denervation procedure if indicated. I gave her the appropriate leaflets and encouraged her to search the web. I warned her about potential complications like vertebral artery injury, spinal cord injury, and nerve injury.





Case report 2

- 32 year old male
- RTA 2009
- the right-sided neck pain from about C4 level and radiating to the base of his neck and the shoulder blade and the scapula on the right-hand side. He only describes very mild numbness in his index finger which is not permanent
- Shoulder surgery 2015
- He has tried all conservative treatment including physiotherapy, regular exercises, acupuncture and most of the available painkillers including Tramadol, Naproxen and Gabapentin. At present, he has been taking maximum dose of Pregabalin (600mg) and Codeine 60 mg four times a day.

Clinical history:RTA 2012 WAD. 2015 MRI c3-4 c6-c7 disc protrusion with mild cord compression. no improvemnet with conservative treatment to re assess before intervention: Cervical MB Block

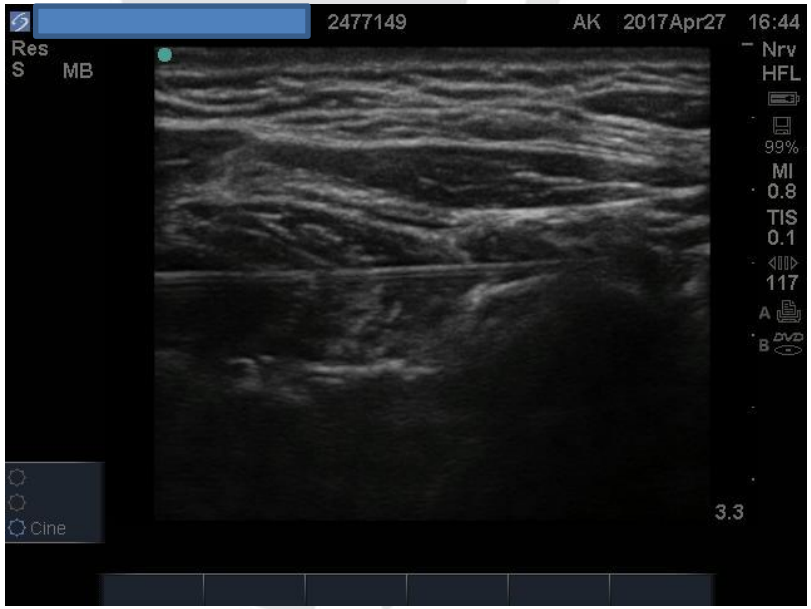
- MRI scan from 2015 has showed a right paracentral disc protrusion at C6/C7 with mild compression of the cord and also disc protrusion intending the theca at C3-C4 level with no nerve root compression

- Normal cervical and upper thoracic spinal alignment with preservation of vertebral body height and signal. Mild spondylotic disc changes with loss of normal signal but no reduction in intervertebral height or significant osteophyte formation. No facet joint hypertrophy. No large cervical rib.
  There has been interval maturation of the previously demonstrated acute appearing right disc protrusion at C6/C7 which no longer touches the cord or results in exit foraminal narrowing. No other central canal or exit foraminal narrowing. The imaged cord returns normal signal.

Management Plan

- I provided him leaflets about intervention and discussed potential risk and complication including a vertebral artery damage and spinal cord injury and he is happy to proceed

- Intervention : Right C4-C7 MBB . Informed that intervention might be effective but he still may suffer from some pain and discomfort. However, he should work on reduction of his Codeine and perhaps Pregabalin in the future once his symptoms improve after intervention.



The most common source of the neck pain after whiplash are

A. Cervical facet joints

B. Intervertebral discs

C. Neck muscles

D. All above

A. Cervical Facet joints

Patient with whiplash injury (WAD)usually presents

A.Neck Pain

B.Headache

C.Anxiety

D.All above

D All Above

Diagnosis of WAD can be made based on

- A.X-ray
- B.CT
- C.MRI
- D r-CBF
-

D r- CBF

In the early phase after whiplash injury recommended treatment would be

- **A. Cervical medial branch radiofrequency denervation**
- **B. Opioids**
- **C. Reassurance**
- **D. Trigger points injections**
- **C. Reassurance**

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Thank You