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## Musculoskeletal Medicine - Cervical and Thoracic Spine - Pre-Conference Workshop

Thursday, 20 June 2013

Start 8:30am

Duration: 120mins

Works



**Rotorua GP CME 2013**  
NZMA  
New Zealand Medical Association

General Practice Conference & Medical Exhibition

**20-23 June 2013 | Energy Events Centre | Rotorua**



# MUSCULOSKELETAL MEDICINE OVERVIEW AND C SPINE

**Presented by Dr Rick Bernau and  
Dr Ian Wallbridge, and Helen  
Wallbridge**

**Rotorua 2013**

# PREVIEW

- ***What is Musculoskeletal Medicine?***
- ***Pain terms***
- ***Not getting better???? What do we look for...***
- ***Breathing***
- ***Posture & Ergonomics***
- ***The neck***



# WHAT IS MUSCULOSKELETAL MEDICINE?

*The field of medicine addressing dysfunctions of the musculoskeletal system, normally resulting in pain and/or incapacity, whether in the area of dysfunction or referred.*



# USEFUL PAIN TERMS

- SOMATIC - *Local*
  - *Referred*
- RADICULAR – *is always referred*
- Other distinctions: -
  - *Radiculopathy, which is often confused with radicular pain, but is altered motor, or sensory function, due to pressure on a nerve root*
  - *Can have radicular pain without radiculopathy and visa versa*
- *Duration of the pain – acute, sub-acute (3-6 months), or chronic (> 6 months)*

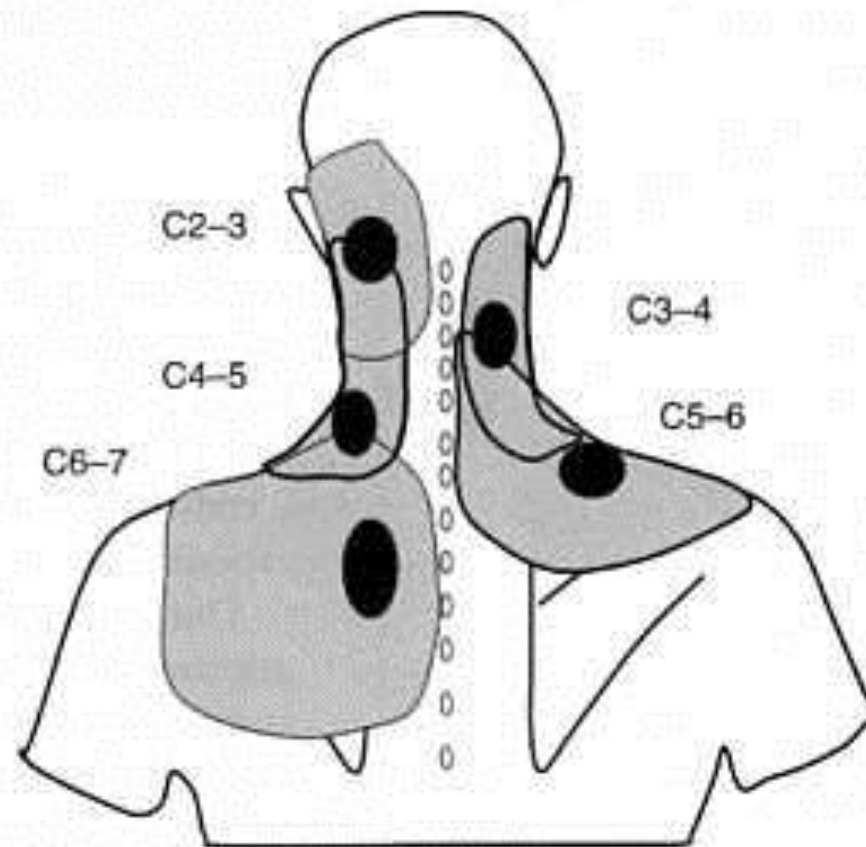


# SOMATIC PAIN

CAN BE LOCAL OR REFERRED

- **Local:** pain felt typically in muscles around the joint. The brain often can not differentiate between muscle and joint pain, if the enervation is from the same segment. Even other joints with the same segmental nerve supply can refer to each other (example hip and knee).
- **Referred:** Pain referred centrally such as *headache* or pain referred peripherally such as shoulder/arm/leg pain that is not radicular.
- *Typically dull aching and deep in character.*

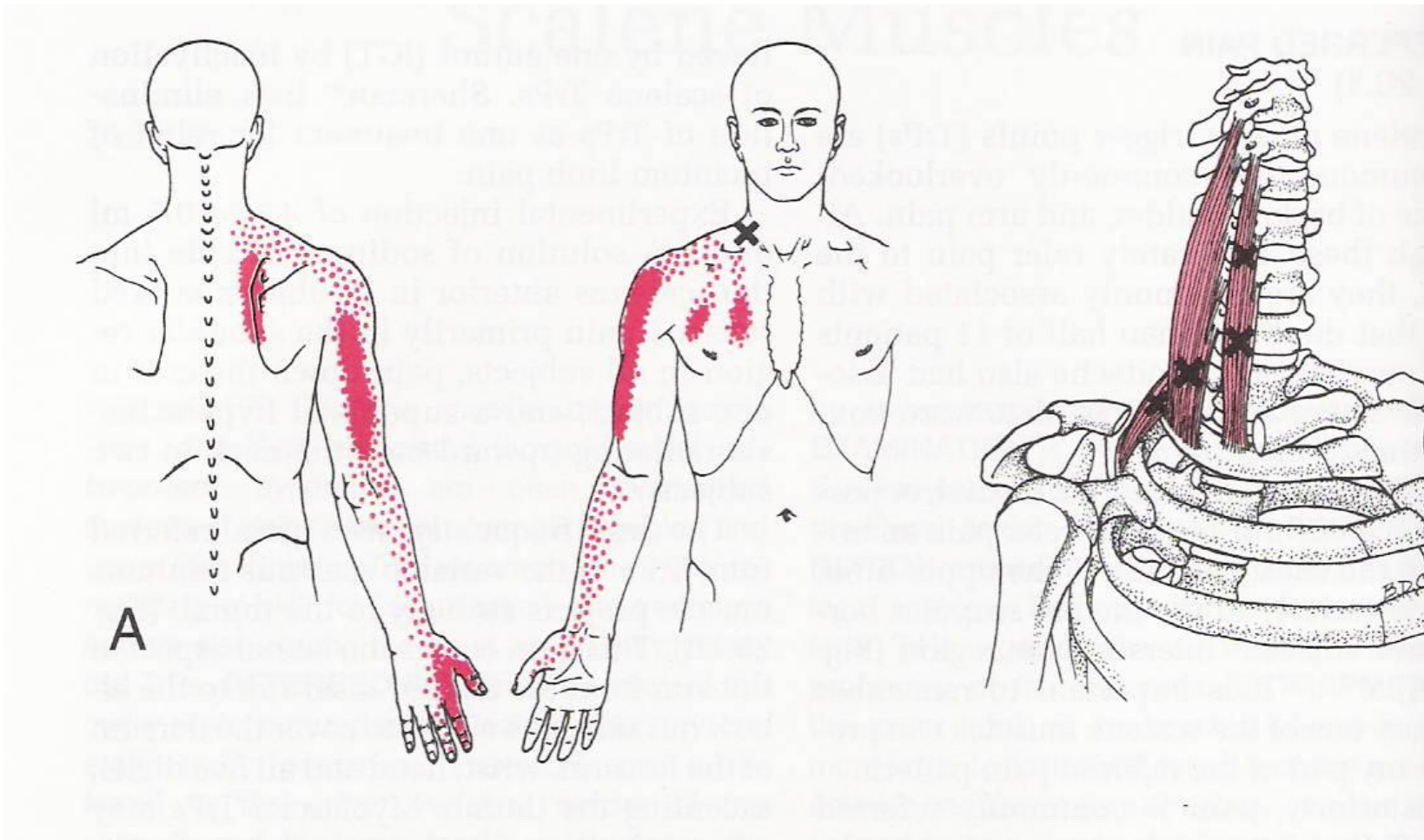




**Figure 5.1** Centroids for the segmental origin of referred pain from the cervical spine. The shaded areas indicate the typical zones of referral, from the segments indicated, in normal volunteers and patients. The dark areas represent the centroids, or core areas, where patients feel the pain maximally when it arises from the segment indicated.



# REFERRED PAIN FROM SCALENE TRIGGER POINTS





# RADICULAR PAIN

- ***Pain comes from nerve root inflammation +/- compression***
- Usually from disc- but may be other...
- May be accompanied by radiculopathy, but most often not...
- ***Typically sharp, shooting, lancinating and superficial***
- *Sciatica* should be called radicular pain, as in most cases the affected area is central to the sciatic nerve (also may be from the femoral nerve i.e. femoralgia)
- Slipped disc is a misleading term and should be called a ***protruded, prolapsed, or extruded disc*** and it is this that inflames the nerve roots causing the pain (“sciatica”)
- Compression of the nerve root on its own will cause radiculopathy.



# RADICULOPATHY

- **Altered sensation**, other than pain - can be *decreased sensation through to total loss, or can be altered sensation such as pins and needles, heat (can be burning), cold.*
- **Altered motor function** - can be weakness *through to total loss of function, with or without altered reflexes.* Can also have *altered proprioception* (e.g. in the neck, with loss of balance, tinnitus, or giddiness and in the ankles where injured ligaments don't get better due to loss of proprioception and constant re injury)



# NOT GETTING BETTER?

- *Is the diagnosis (dysfunction) correct?...*
- *Incorrect initial ACC certification preventing correct treatment*
- *Red Flags*
- *Are there changes due to the initial dysfunction which have caused secondary changes preventing recovery, such as **non diaphragmatic breathing**...*
- *Consider pre existing conditions...*
- *Other factors such as posture and ergonomics preventing recovery*



# ACC CERTIFICATION

- *Beware narrow and/or incorrect diagnosis which may preclude later adequate investigation/treatment.*
- *Remember other areas...*
- *Remember the onion skin...*



# RED FLAGS

- ***Fractures***
- ***Tumours – bony metastases***
- ***Radicular pain and/or radiculopathy***
- ***Infection – osteomyelitis / discitis***
- ***Visceral – cardiac / thyroid***
- ***Vascular – arterial dissection***



# STRESS (DYSFUNCTIONAL) BREATHING

- *If the patient is breathing incorrectly, this may be a major factor in non resolution*
- *Non diaphragmatic breathing will lead to:*
  - (1) ***Excessive muscle tightness***
  - (2) ***Loss of Core Stability***



# THE IMPORTANCE OF BREATHING IN MUSCULOSKELETAL MEDICINE

- *Breathing with normal respiratory mechanics has a potent role in the neuromuscular system.*
- *Respiratory mechanics play a key role in both posture and spinal stabilisation*






## **40 YEARS OF LOW BACK PAIN**

**Chronicity doesn't mean untreatable, rather the need to establish a correct diagnosis and find what is preventing recovery**



# PETER IS A 58 YEAR OLD FINANCIAL ADVISER WITH ALMOST 40 YEARS OF LBP

- Started to get LBP over 40 years ago, as a teenager and unaware of what started it
  - In a marathon training program in his 20's and had an injury, which forced him out of the program. Has never been able to run seriously since
  - Ongoing problems, with numerous injuries aggravating his symptoms. At times confined to bed for two weeks, at others just rest. Also numerous courses of physio, NSAIDs and other medication
  - Has lived with pain for 40 years, with associated muscle spasm, for no apparent reason. At night gets muscle twitching. At times has referred pain down right thigh and upper shin anteriorly
- 

## 40 YEARS LBP CONTINUED

- Used to be aggravated by working long hours and under “pressure”. However, has removed these factors and it has made no difference
- Has kept active with walking, tennis, golf and run a little when not too bad, always with pain. Tried Pilates, where his most recent injury occurred
- Background pain is lumbosacral and when has spasm pain radiates out to left, more than right SI joint/ilic crest
- He has a high pain threshold and rates his background pain at 10 – 20/100 and up to 50/100
- An asthmatic, on regular medication until 1966. Now copes without



# CLINICAL PRESENTATION & TREATMENT

- A lean reasonably well muscled man, with stooped posture and non diaphragmatic breathing
- Left iliac crest elevated and anterior, with generalised left sided muscle tightness, particularly in his hip flexors, trapezius and pectoral muscles, SLRs (L) -> 45 degrees and (R) -> 55 – 60 degrees, with normal neurology. (L) > (R) SI, plus Th 4-6 extension restriction

## DIAGNOSIS:

- (1) Acute on chronic SI strains, with present flare/injury, (L) > (R)
- (2) Non diaphragmatic breathing, excessive left sided muscle tightness and incorrect posture, aggravating his symptoms and preventing recovery

## TREATMENT:

- Breathing correction and mobilisations -> a level pelvis, a reasonably full ROM, pain free, with SLRs -> 80 degrees
- A full explanation of the probable underlying basis of his symptoms and the rationale of treatment, plus the role played by posture and breathing, along with core (postural) stability, in his symptoms and his failure to get better
- Biofeedback breathing training, postural modification and specific exercises

# PROGRESS

ONE WEEK LATER: - Has made a big difference, with little or no discomfort. Feels so good that postural change only makes a slight difference. Played golf the previous night with much less discomfort and no after effects. Breathing so much easier

- Breathing full, mod Th 5-6 and (L) > (R) SI, SLRs (L) -> 55 – 60 degrees and (R) -> 65 degrees – mobilised -> almost full, SLRs -> 85 degrees
- Discussed and wants to run the marathon he was prevented doing in the 20's (a “bucket list” thing). Is a supinator and running shoes discussed. Suggested that needs time to settle first and discuss again in a month

ONE MONTH LATER: - His first words were that his treatment had been “superb”, he felt “fantastic” and “Why have I had to put up with 40 years of crap?”. The previous day had played 18 holes of golf without pain, for the first time he could remember, with only slight muscle tightness

- Residual slight thoracic and (L) > (R) SI restriction with SLRs -> 65 and 70 – 75 degrees. Mobilised -> reasonably full, SLRs -> 85 degrees, limited by hamstring tightness
- Marathon training on hold for 6-8 weeks. To work on flexibility and suggested Body Balance, rather than Pilates. In view of longstanding nature of problem, see once more in 6 weeks



# ROUTINE CLINICAL PRACTICE

- *In musculoskeletal medicine, the evaluation of respiratory mechanics should be a routine part of every physical examination, especially for patients with **chronic cervical symptoms and with sacroiliac dysfunction***
- *In the practical section, I will show you how to assess breathing patterns*



# MUSCLES OF RESPIRATION

- *The primary muscles responsible for respiration are the **diaphragm, intercostal muscles, scalenes, transversus abdominus, muscles of the pelvic floor and the deep intrinsic muscles of the spine***
- *Each of these muscles, in addition to respiration, serves a dual role in postural function as stabilisers*
- *The **scalene muscles** lift and expand the rib cage during inspiration and are active at a low level during every inspiratory effort and are therefore considered a primary, not an accessory muscle*

# BREATHING DYSFUNCTIONS AND COMMON PAIN SYNDROMES

- *The **diaphragm plays a vital role in spinal stability***
- *When its function is compromised, the spine is inevitably affected*
- *The reverse is true. **When there is muscle dysfunction, as in neck pain, or sacroiliac dysfunction, it is very common to find abnormal breathing patterns***



# FAULTY BREATHING PATTERNS

- *The most important fault in respiration is **lifting the thorax with the accessory muscles and not, or only partially, using the diaphragm, instead of widening the thorax in the horizontal plane***
- ***This over-strains the cervical and upper chest muscles, leading to chronic cervical strain***
- ***It also perpetuates sacroiliac dysfunction***





# ACCESSORY MUSCLES OF RESPIRATION

- *The **pectoralis major, pectoralis minor, latissimus dorsi and trapezius** are not typically considered **accessory respiratory muscles***
- *In **dysfunctional, or paradoxical breathing**, they assume a more respiratory than postural function and contribute to the faulty pattern of lifting the ribcage up during inspiration*
- *This can lead to **overuse syndromes** in these muscles - ?? **Fibromyalgia***



# MANAGEMENT

THIS COMMONLY REQUIRES THREE  
THINGS:

1. ***Treatment of underlying causative factors***
2. ***Breathing re-training with correct biomechanics***
3. ***Practice until this new program becomes “sub cortical” and functionally integrated***  
***“If breathing is not normalised – no other movement pattern can be”***

***- Karel Levitt***



- *Respiratory mechanics must be intact for both normal posture and spinal stabilisation to be possible*
- *A normal motor program for respiration must be **sub cortically “set”** in the nervous system*



# RESPIRATORY TRAINING

- **KEY ADVICE:** *correct posture*, avoid tight clothing, holding tension in the abdomen and be mindful of signs of stress
- **KEY FACILITATION EXERCISES:** *respiratory training*, yoga, qi gong, or tai chi
- **KEY RELAXATION EXERCISES:** scalenes, upper trapezius and levator scapulae



# A FINAL WORD

***“Thinking of breathing, one naturally has in mind the respiratory system. Yet it is the motor system that makes the lungs work and coordinate the specific respiratory movements with the other motor activity. This task is so complex, that it would take a miracle, if disturbances did not occur.”***

***- Karel Levitt***



# PRE EXISTING CONDITIONS

- *Asthma/COPD almost invariably result in non diaphragmatic breathing*
- Osteoarthritis / degenerative change
- Spondyloarthropathies
- Nutrition
- *Reconsider red flags especially over 50 years old*
- *Psychosocial factors in the non acute...*



# POSTURE AND ERGONOMICS

- Ergonomic factors including *incorrect lifting, poorly designed work stations, particularly incorrect computer setup*, all play a part in causation and maintenance of the condition.
- *Incorrect posture aggravates/causes incorrect breathing, and conversely correct posture enhances correct breathing....*
- This, in itself is a full presentation / for another time



# THE MIND CAN ABSORB ONLY AS LONG AS THE SEAT CAN ENDURE

BE QUIET BACK  
THERE!...I CAN'T  
HEAR WHAT  
HE IS SAYING!

OUCH! OUCH...  
HOW MUCH  
LONGER???  
I'VE HAD  
ENOUGH!!





# THE PROCESS

- An interactive approach to the management of neck pain
- The Algorithm is your worksheet
- I will run you through with plenty of 'hands on' experience, to consolidate what you already know, hopefully to learn some new skills and to simplify the management of neck problems in General Practice
- Have some fun!
- Please ask questions at any stage and give me feedback



# SUMMARY

- Discussion about the neck and it's functions
- Neck Pain, what is it, where is it felt and what is associated with it?
- Natural history
- Examination of the neck and allied structures
- Other factors to be considered
- Imaging
- Treatment
- The non responder
- Referral



# THE NECK

- **WHAT ARE IT'S MAIN FUNCTIONS?**

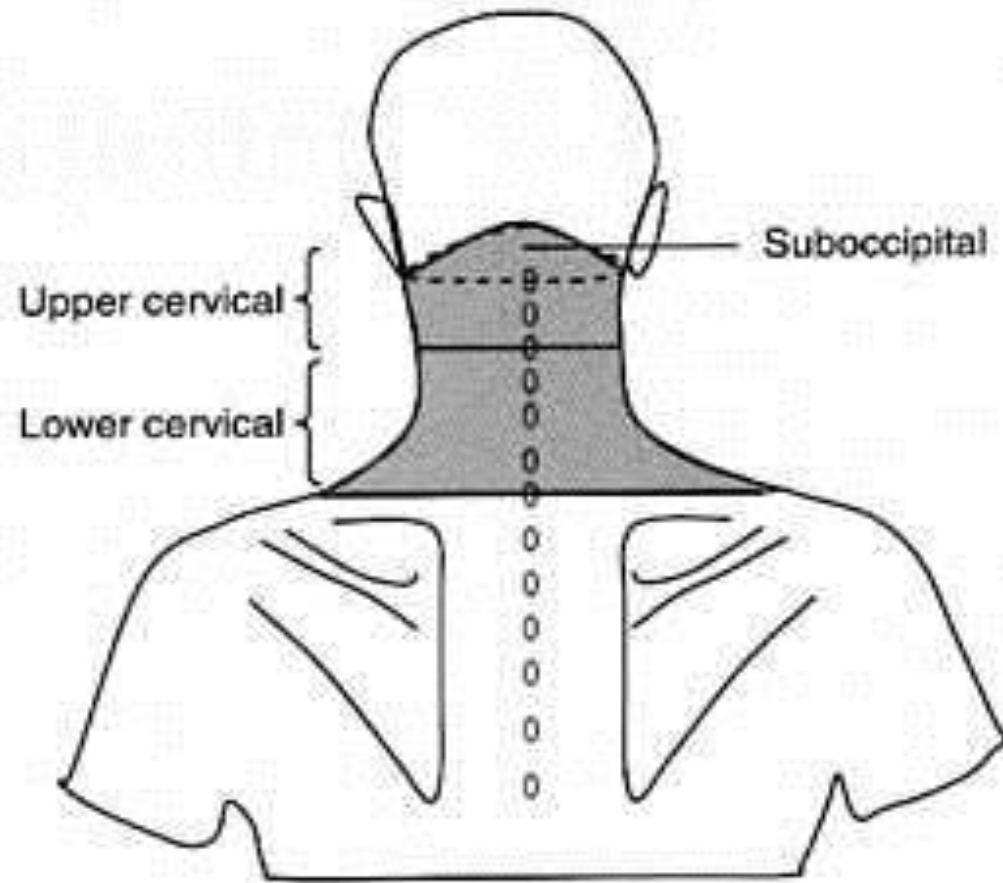


# POSSIBLE FUNCTIONS OF THE NECK

- *To hold up the head*
- *To provide a safe conduit for the spinal cord*
- *To provide a passage for air to enter the lungs*
- *To provide a passage for food and water to the stomach*
- ***To hold up the arms***
- ***To provide a mobile platform for the eyes***
- *And to a lesser extent for the ears*



# IS THIS NECK PAIN?



B



# WHERE IS THE PAIN FELT?

- *At the level of the injury*
- *Referral patterns for each segment*
- *Referral to the shoulder and/or arm*
- *Referral patterns from involved neck muscles (Trigger points)*
- *Radicular pain from nerve root involvement*



# ASSOCIATED CONDITIONS

- *Very few neck problems present solely with symptoms in the neck*
- *There may be referred pain to the shoulders and arms*
- *Commonly other areas of the musculoskeletal system are involved*
- *Almost invariably the upper thoracic spine*
- *In a large number middle and lower back*
- *Most shoulder injuries have a cervical component*



# EPIDEMIOLOGY

- Point prevalence for acute: 10 - 35%
- Lifetime prevalence for acute: 35 - 50%
- Lifetime prevalence for chronic: 14 %





**HISTORY IS ALMOST ALWAYS  
MORE VALUABLE THAN  
EXAMINATION**



# PAIN (HISTORY) ....

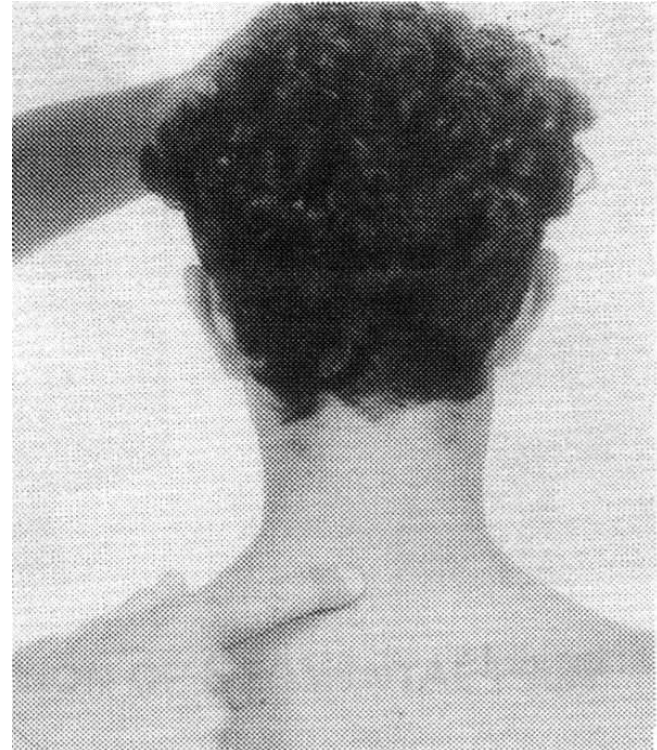
- ***Cause***
- ***Duration***
- ***Position and Radiation***
- ***Quality – Somatic / Neurogenic***
- ***Intensity / VAS score***
- ***Aggravating / Relieving factors***
- ***Pain Drawing***
- **Associated Features**



# LANDMARKS



**C2 Spinous process**



**C7 Spinous Process**



# WHAT IS THE CAUSE OF

- HEADACHE?

- ARM PAIN?

- SOMATIC REFERRED PAIN



# THE CHARACTER OF THE PAIN

- *Deep, spreading, aching, dull, sore - think **somatic***
- *Superficial, moving, stabbing, shooting, burning - think **radicular/neurogenic***
  - *“is it like anything you can imagine?”*
  - *“is it like other sensations you've felt?”*



# FURTHER DISTINCTION

- **KEY POINT: - *Character***
- *Shooting, distal arm radiation, and neurological signs - think **radicular origin***
- *Aching, only proximal arm radiation, and no neurological signs – think **somatic origin***

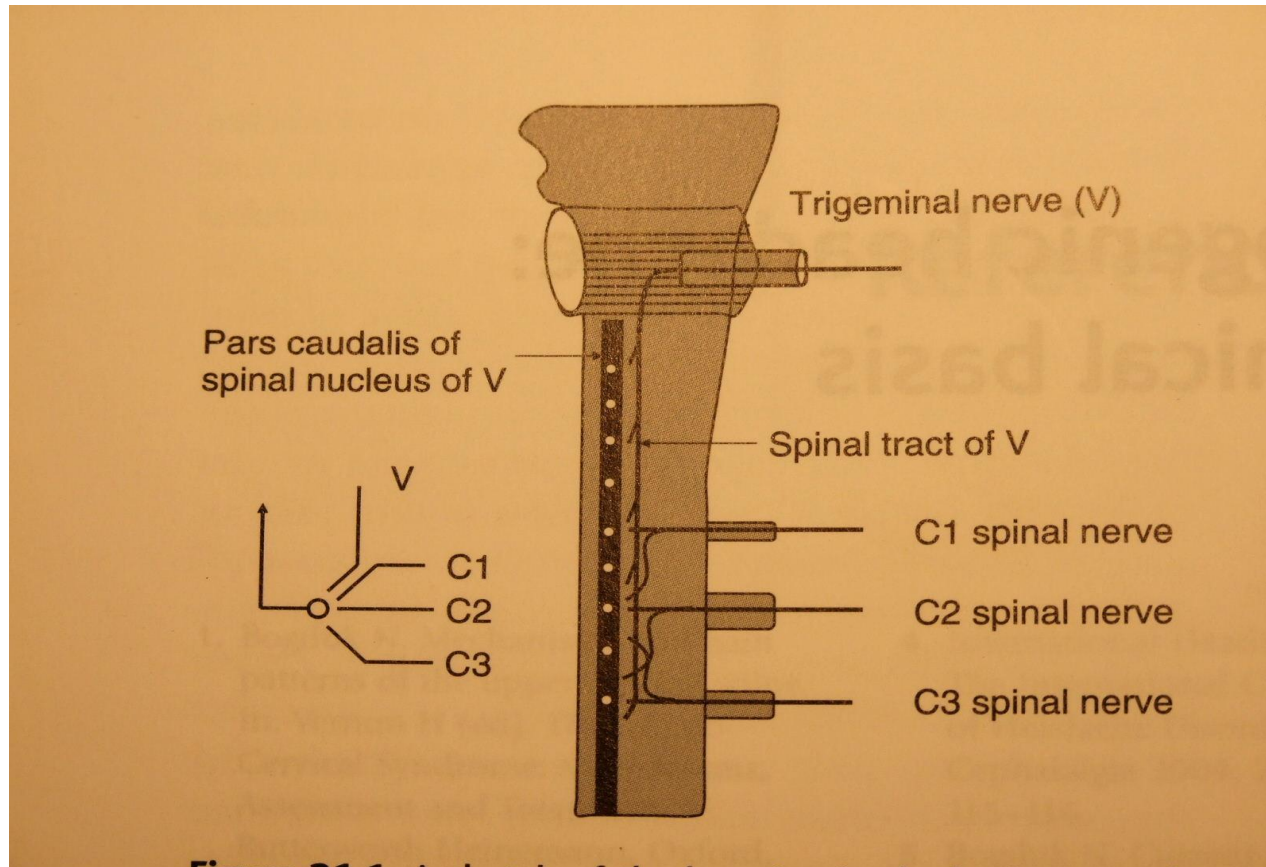


# RADIATION

- *The most important issue is where the pain is felt consistently, not the extent of the radiation*
- *Does it **stay** or does it **start and spread**?*
- *Distinguish radiation from the neck, rather than radiation to the neck (think visceral)*



# CERVICOGENIC HEADACHES





# RED FLAGS

- *Tumours*
- *Fractures*
- *Radicular pain and/or radiculopathy*
- *Infection – osteomyelitis / discitis*
- *Visceral – cardiac / thyroid*
- *Vascular – arterial dissection*



# NATURAL HISTORY OF ACUTE NECK PAIN

- ***Prognosis is largely favourable***
- ***40% of patients can expect to recover fully***
- ***25% will retain only mild symptoms***
- ***7% will have severe disabling symptoms***

## ***OF PATIENTS FOLLOWING WHIPLASH***

- ***80% can expect to recover rapidly and be fully recovered within one year***



# EXAMINATION

- **Look** for asymmetry, restriction and abnormal breathing patterns
- **Feel** for tenderness over facet joints and in cervical muscles, particularly feeling for trigger points (see later)
- **Move** the neck to check for restriction, both active and passive to determine level(s) of injury



# CERVICAL ROTATION

- *Upper cervical rotation, mainly C 1-2, is 50% (45 degrees). Examine in full flexion, which isolates to above C3*
- *Lower cervical rotation, from C3 to Th1 is also 50% (45 degrees). Examine in full extension, which excludes upper cervical rotation*



# OTHER EXAMINATION

- *Assess the rest of the spine, as other areas may be involved and aggravating symptoms / preventing resolution*
- *Assess shoulder ROM, as restricted shoulder mobility may affect the neck*
- *Check breathing. Is it full diaphragmatic? or is the patient using accessory muscles, particularly trapezius, pectoralis major and minor, with excessive use of the scalenes*



# RADICULOPATHY

- *Lets us determine the level of involvement, when altered sensation is present, but does not apply to (radicular) pain*
- **C6**, *if the thumb is involved*
- **C7**, *if the middle finger*
- **C8**, *if the little finger*



# TREATMENT

- *Most will resolve with simple treatment, or will go directly to an alternative practitioner (physiotherapist, osteopath or chiropractor)*
- *You will probably treat with, paracetamol, NSAIDs and possibly physiotherapy referral*
- *EBM states that heat is the most effective in the first 24 hours and paracetamol is as effective as NSAIDs*
- *Provided there are no **RED FLAGS**, there is no need for referral or imaging studies*



# THE NON RESPONDER

- *What would you do?*
- *How long before referral?*
  - *No response to treatment / six weeks*
  - *New or changing symptoms*
  - *Concern about possible **Red Flags***





## IMAGING

- ***Would you order X rays?***
- ***When should you order an MRI?***



# CRITERIA FOR SELECTING PATIENTS FOR X RAYS

	LR
○ Midline posterior tenderness	1.9
○ Neurological deficit	7.0
○ Abnormal level of consciousness	11.8
○ Immediate onset of pain	2.9
○ Impaired ROM	2.5



# CERVICAL SPONDYLOSIS

- *Age related changes are seen in asymptomatic individuals.*
- *Disc degeneration or zygapophyseal joint osteoarthritis is **NOT** a significant predictor for neck pain.*
- *Odds ratio for women 0.97*
- *Odds ration for men 1.4*
- *It has a false positive impact.*
- *Osteoarthritis is an age related change.*



# MRI

- ***Only really useful in suspected neurological injury.***



# DEATH BY POWER-POINT



# THE NON RESPONSIVE PATIENT

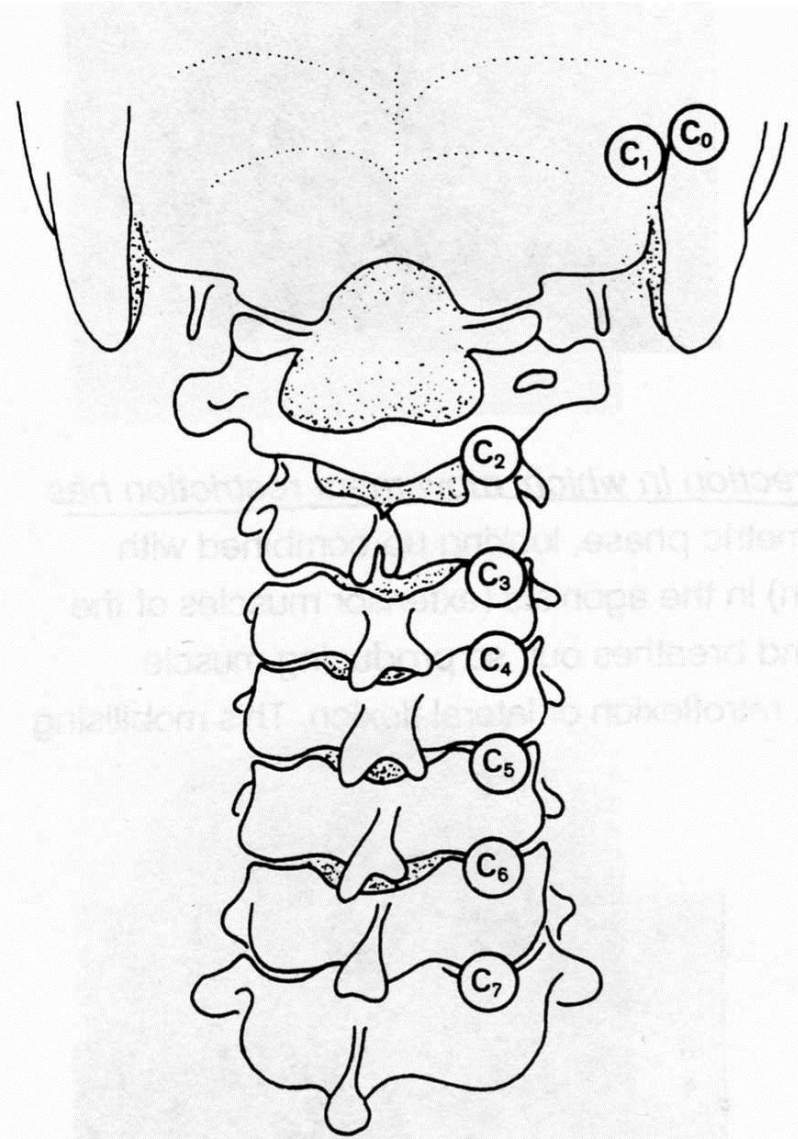
- ***Persistent headaches*** and/or ***Migraines***, usually following an upper cervical whiplash-type injury
- ***Chronic neck pain, with or without somatic referred pain*** (remember headaches are somatic) at lower levels, where mechanism of injury is similar



(superior view)

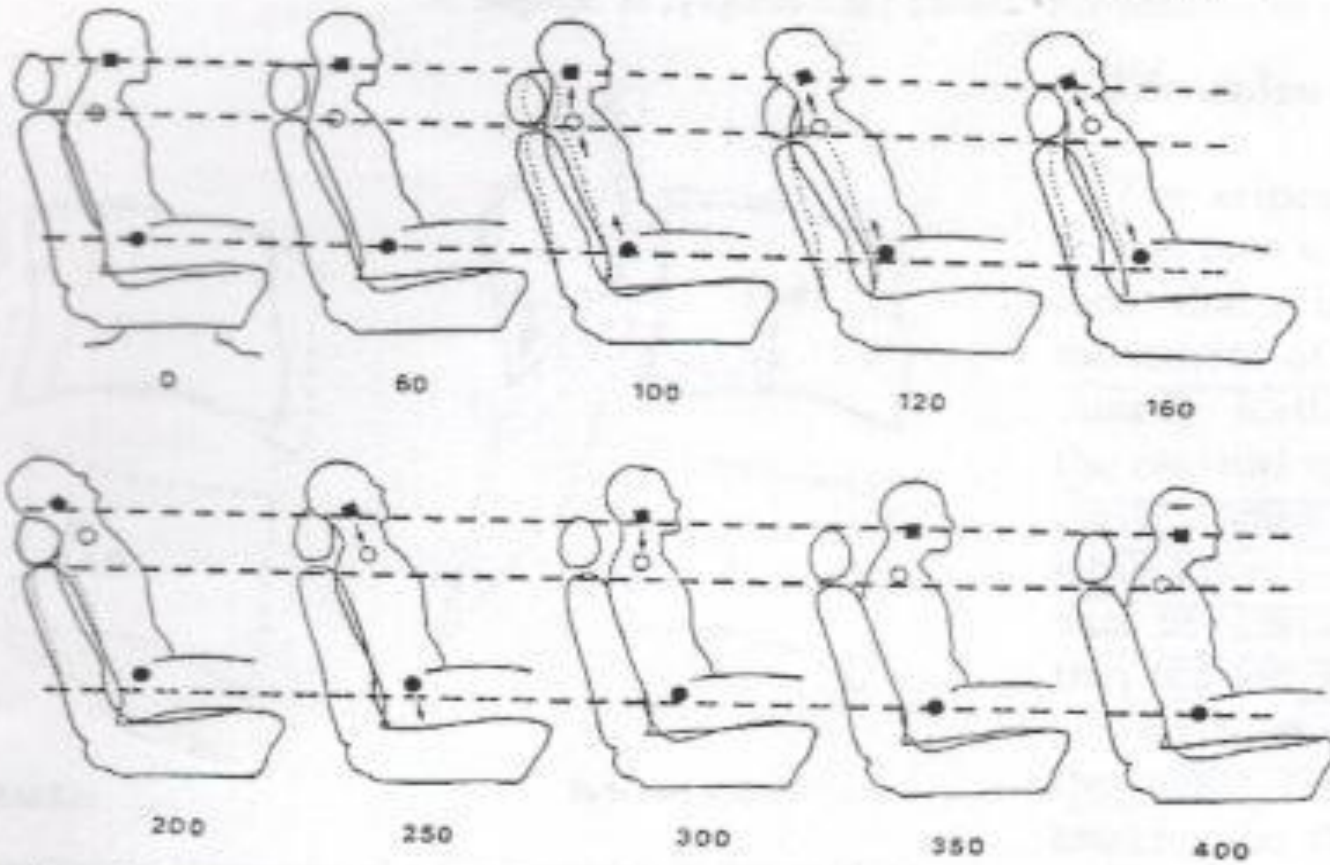


2nd



# WHIPLASH

*N. Bogduk, N. Yoganandan / Clinical Biomechanics 16 (2001) 267-275*



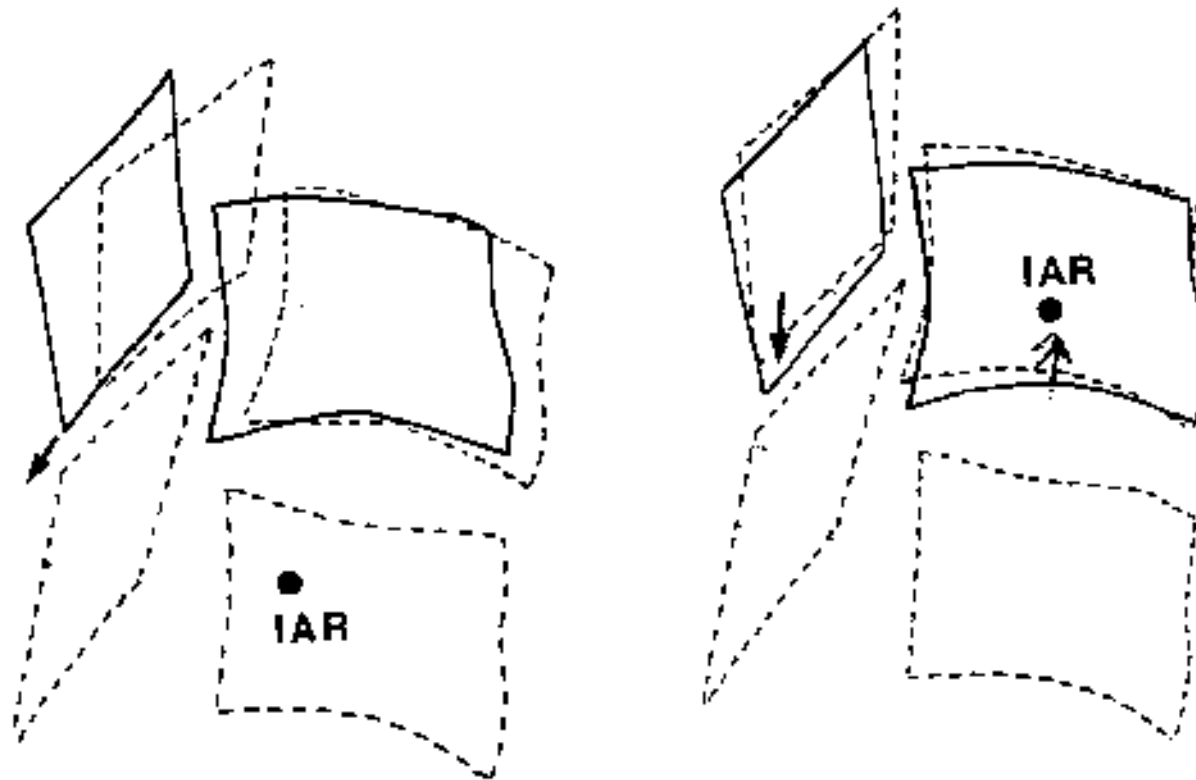
neck and head after...



# MECHANISM OF INJURY

*N. Bogduk, N. Logunov*

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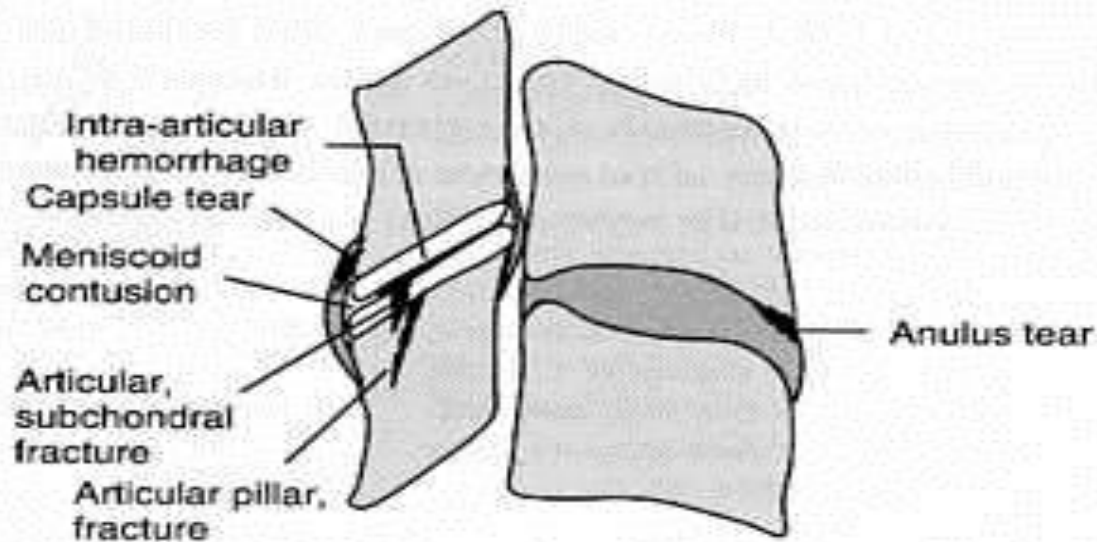


**NORMAL**

**WHIPLASH**

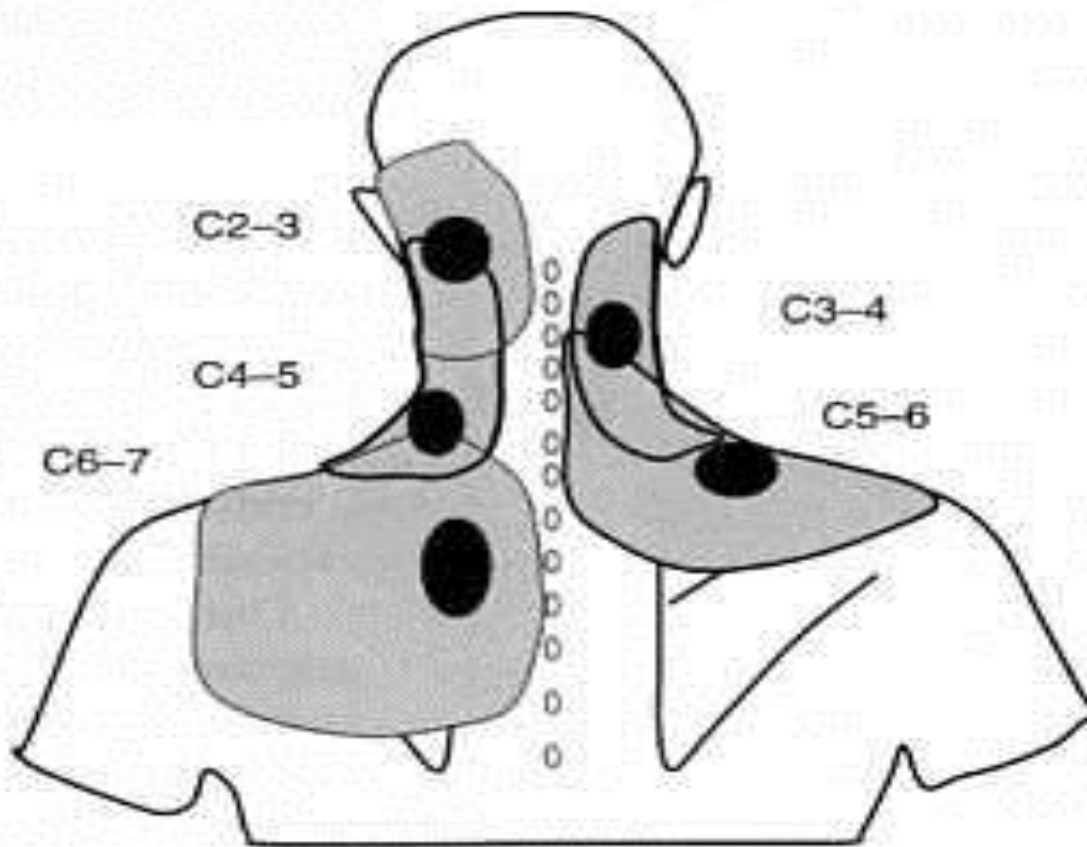


# ZYGOAPOPHYSEAL JOINT INJURY



**Figure 17.5** A sketch of the possible lesions of whiplash, as predicted by biomechanics studies.





**Figure 5.1** Centroids for the segmental origin of referred pain from the cervical spine. The shaded areas indicate the typical zones of referral, from the segments indicated, in normal volunteers and patients. The dark areas represent the centroids, or core areas, where patients feel the pain maximally when it arises from the segment indicated.



# INCIDENCE OF PAIN ARISING FROM ZYGOAPOPHSEAL JOINTS

- Z joint pain 45% in all cases of neck pain (Bogduk and Aprill)
- 60% in patients with neck pain following whiplash (Barnsley et al)
- 88% in high speed car crashes



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# MRI

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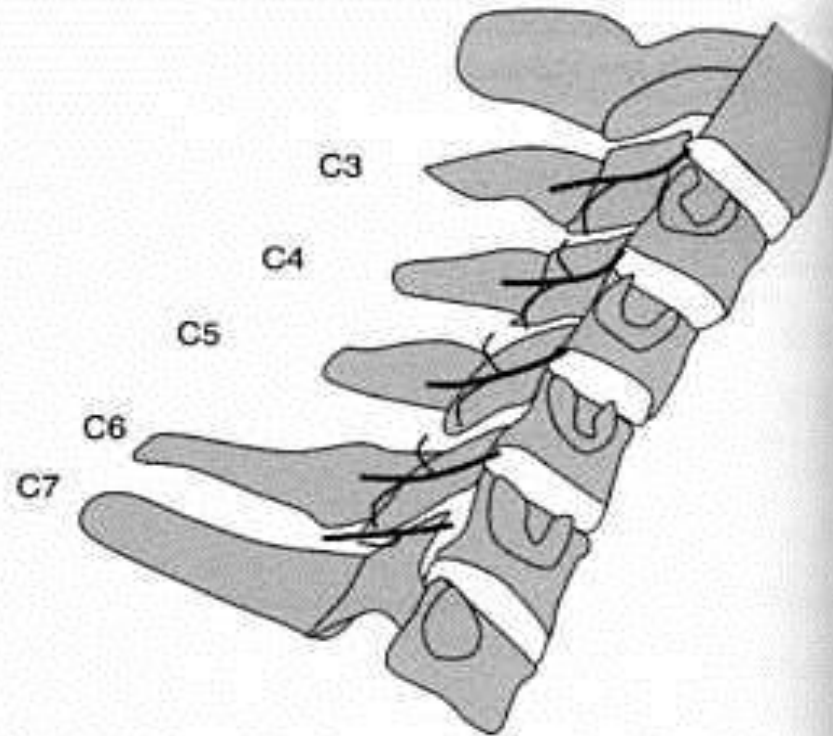


## WHAT ELSE CAN BE DONE?

- *Isolate the involved segment by Medial Branch Blocks (MBBs)*
- *If two concordant MBBs are positive then Radio Frequency Neurotomy can be considered*
- *This is selectively funded by ACC, but is expensive (around \$10,000)*



# MEDIAL BRANCHES OF DORSAL RAMI



**Figure 13.3** A sketch of the medial branches of the cervical dorsal rami and their articular branches to the cervical zygapophysial joints.







# NURSING PERSPECTIVES

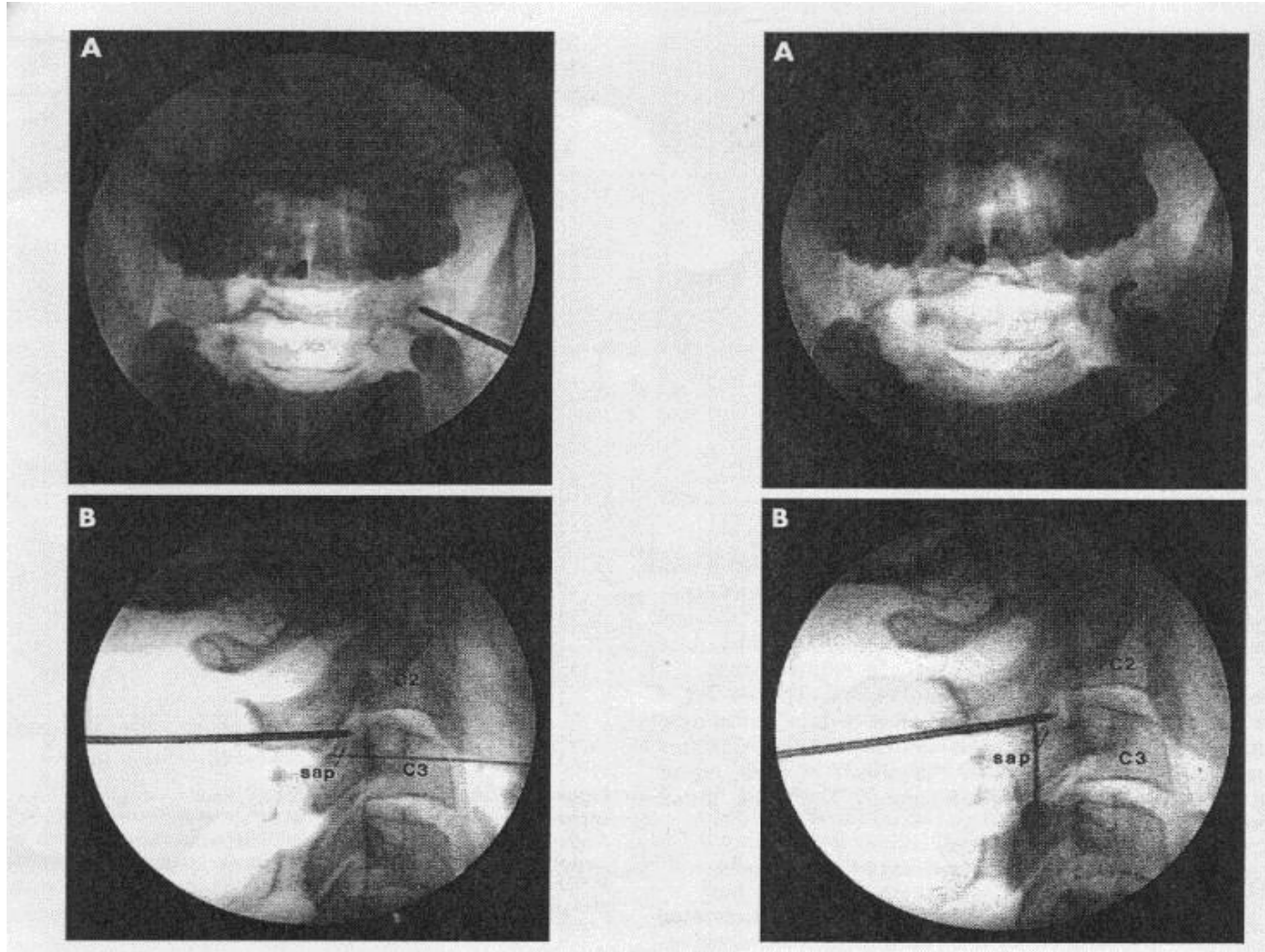
- Pre op check (eg warfarin, pregnancy, consent)
- Patient expectation (block not radiofrequency)
- Post op check (plot pain with time, 3 activities)



# MEDIAL BRANCH BLOCKS



# RADIOFREQUENCY NEUROTOMY



## CERVICAL PRFN #3

GOVIND J, KING W, BAILEY B, BOGDUK N. RADIOFREQUENCY NEUROTOMY FOR THE TREATMENT OF THIRD OCCIPITAL HEADACHE. *J NEUROL NEUROSURG PSYCHIAT* 2003; 74:88-93.

Third occipital nerve/C23 joint

Successful outcome = complete relief of pain > 90 days, restoration ADL's, and no drug treatment

49 patients

86% complete relief of pain.

median duration relief 297 days

86% (12/14) regained complete relief with repeat treatment



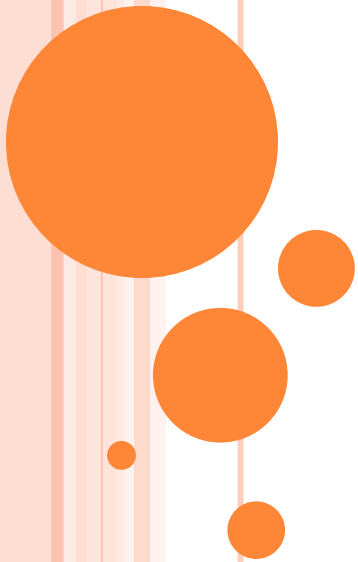
# LONG TERM RESULTS

- *Median nerve neurotomy of cervical spine – 71% had complete pain relief for median duration of 422 days.*



# TRIGGER POINTS

RELATIVE TO THE NECK



# THE BIG FOUR MUSCLES

Sternocleidomastoid  
Scalene  
Trapezius  
Levator scapula

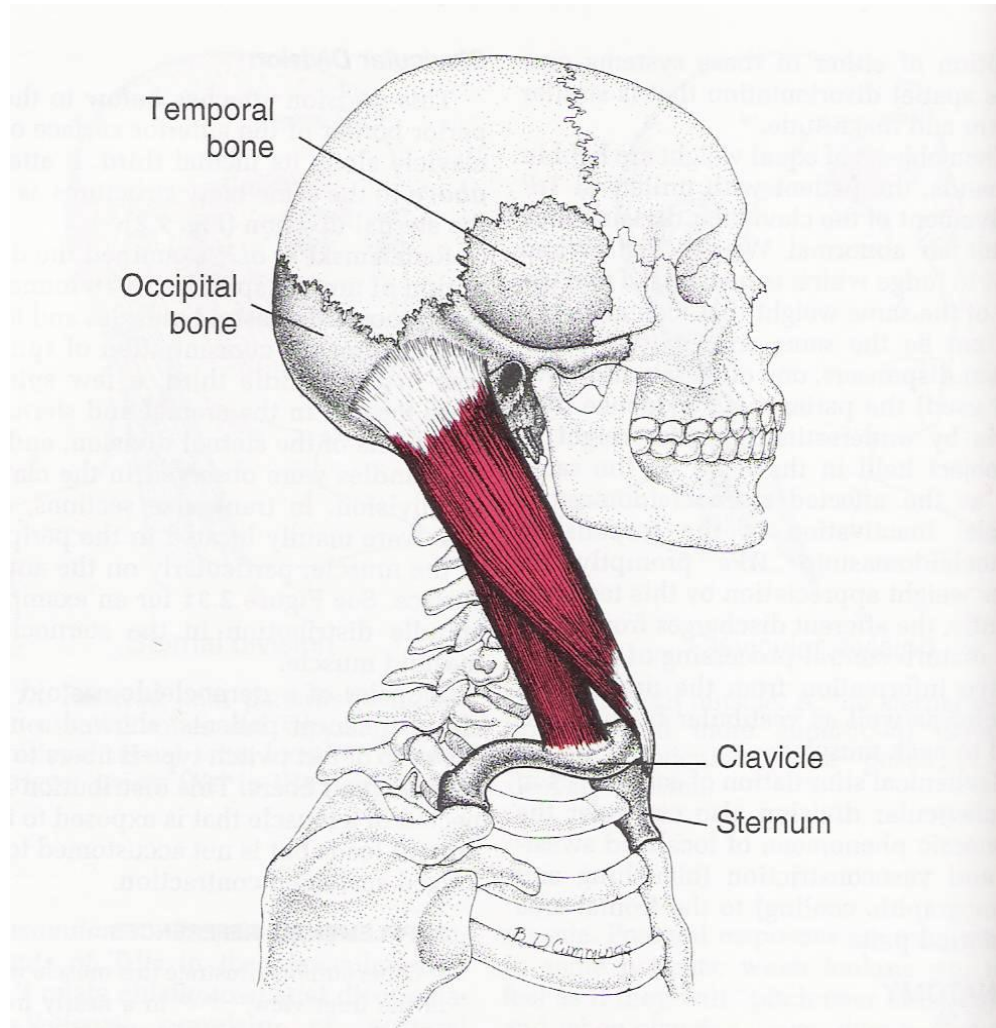
...think 3 things...

Origins and Insertions  
Referred Pain Patterns  
Examination & Treatment

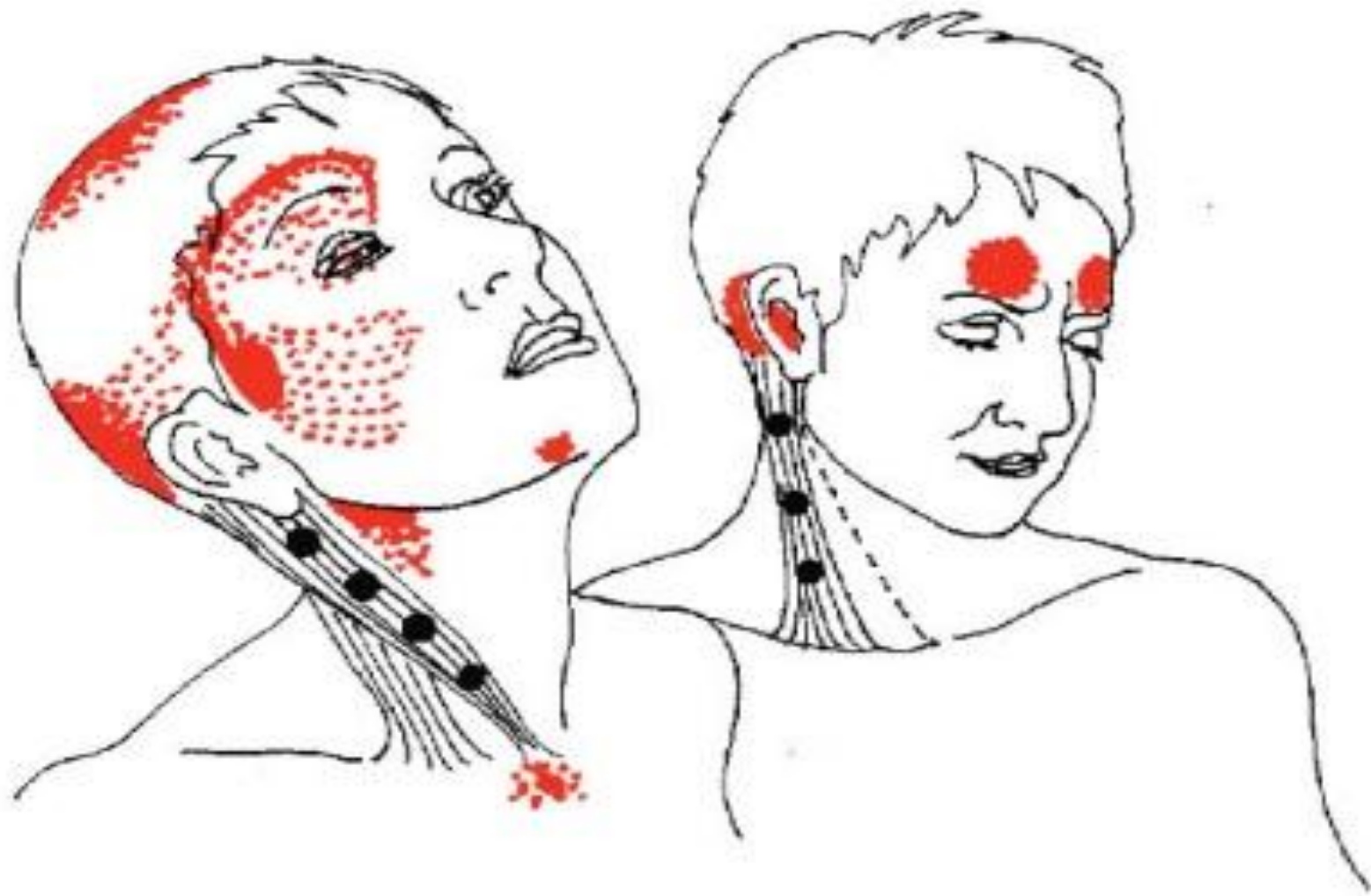




# STERNOCLEIDOMASTOID- ORIGIN AND INSERTION

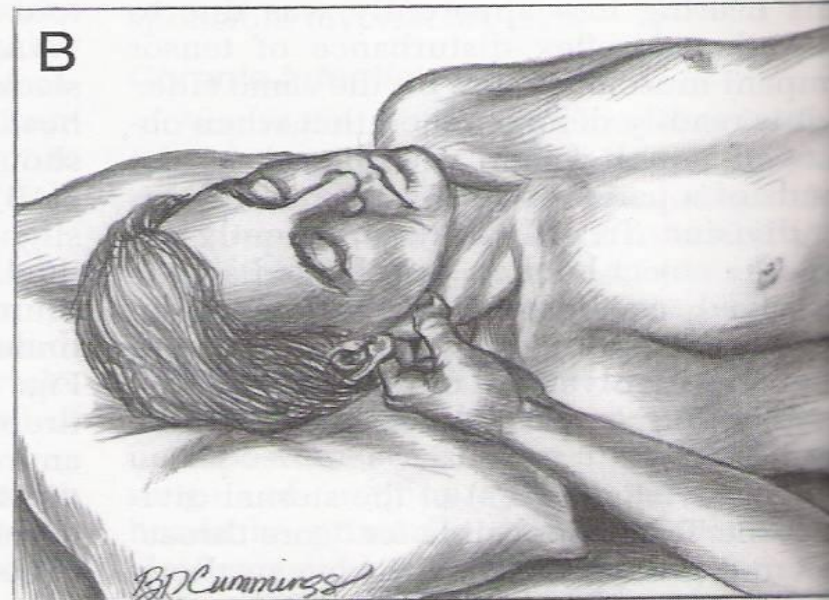
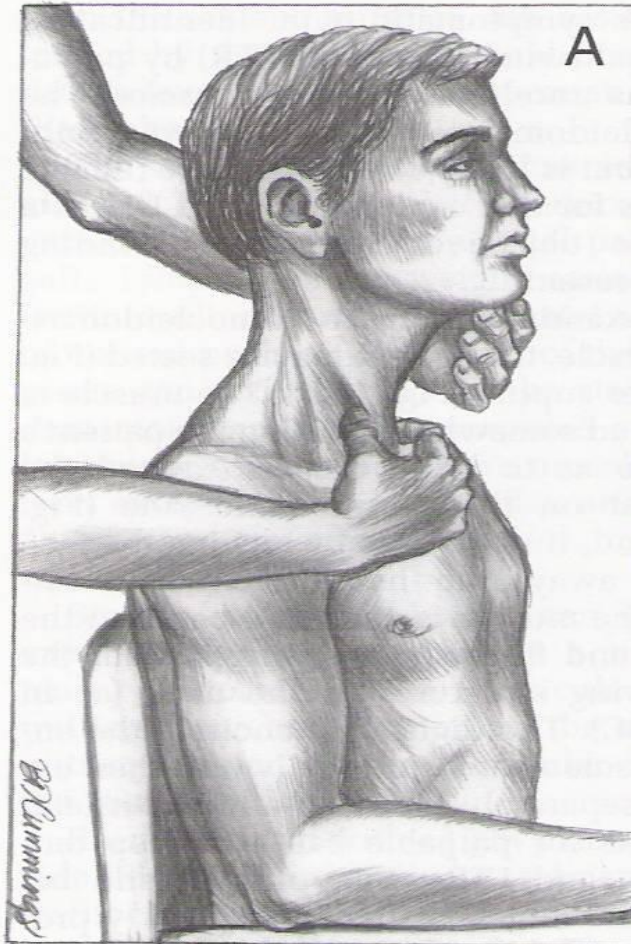


# STERNOCLEIDOMASTOID - REFERRAL PATTERNS

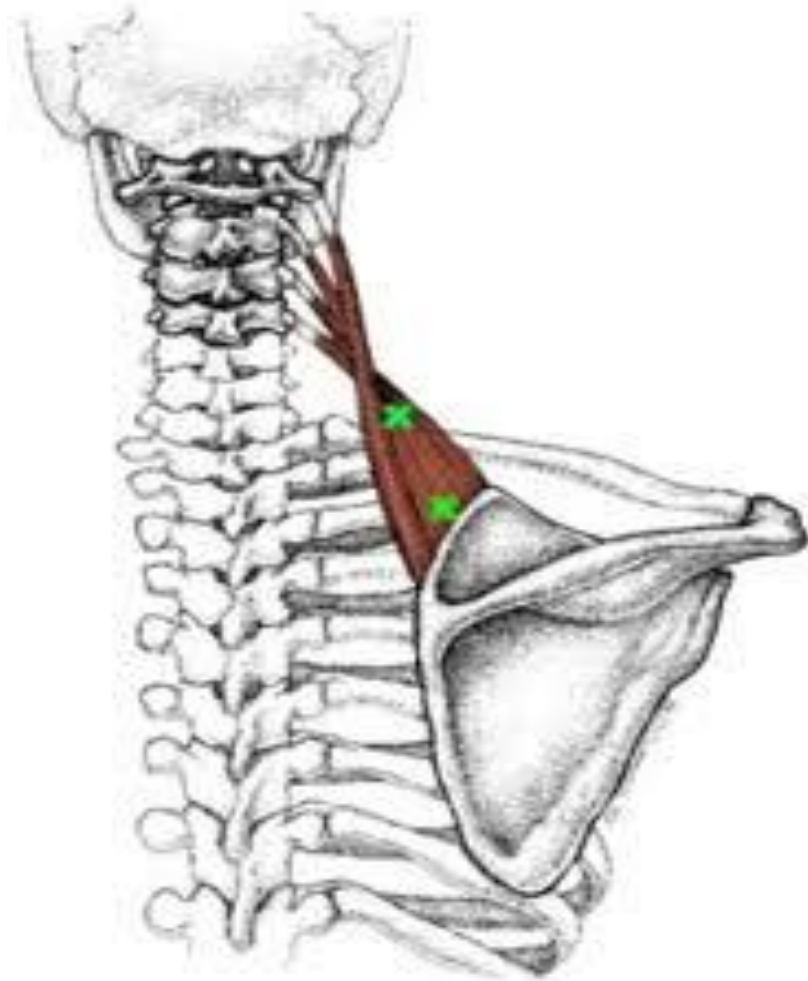


# STERNOCLEIDOMASTOID

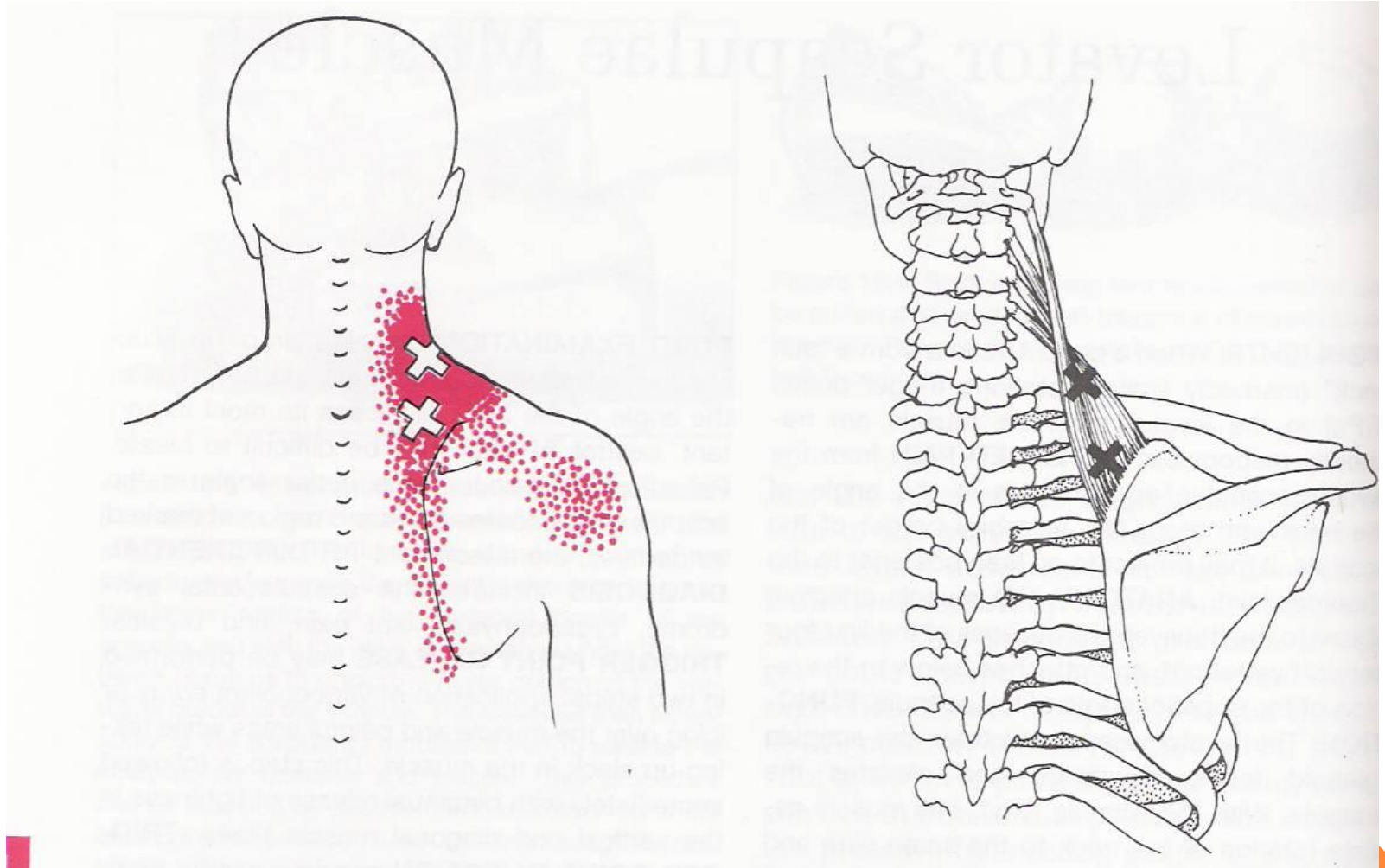
## EXAMINATION - SEATED & SUPINE



# LEVATOR SCAPULAE- ORIGIN AND INSERTION



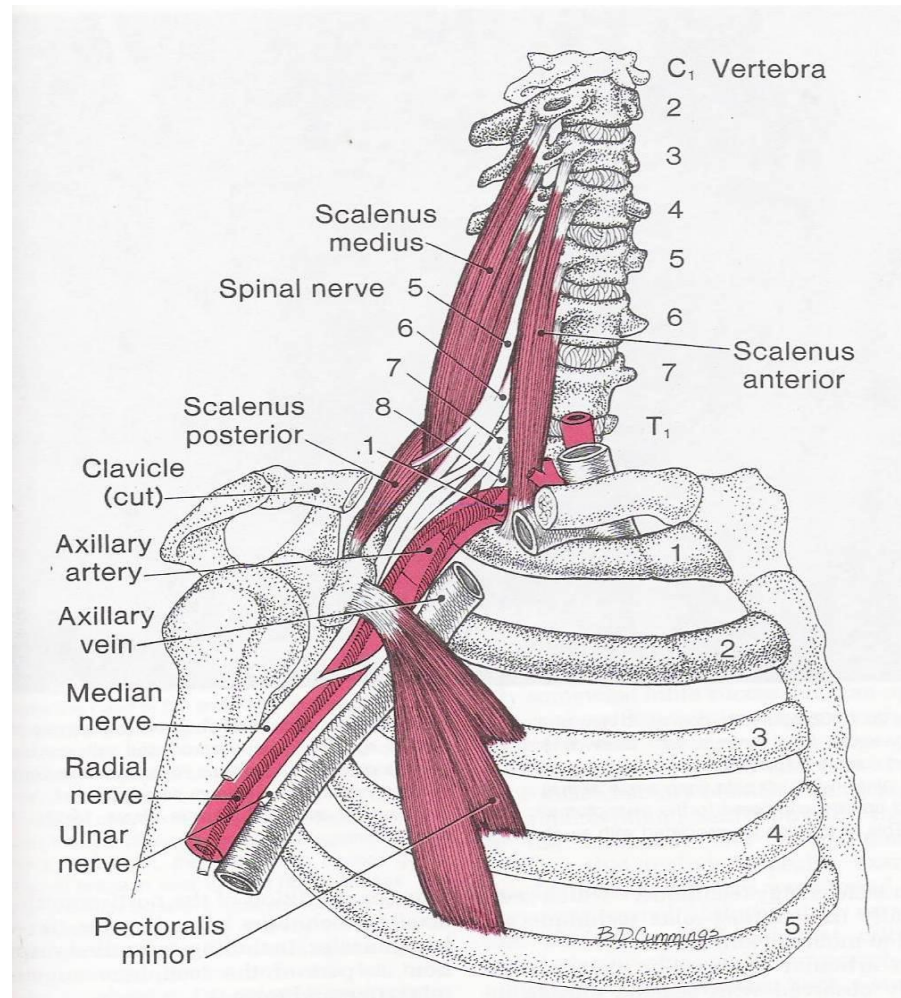
# LEVATOR SCAPULAE REFERRAL PATTERNS



# LEVATOR SCAP - EXAM & TREATMENT



# SCALENES – ORIGIN AND INSERTION



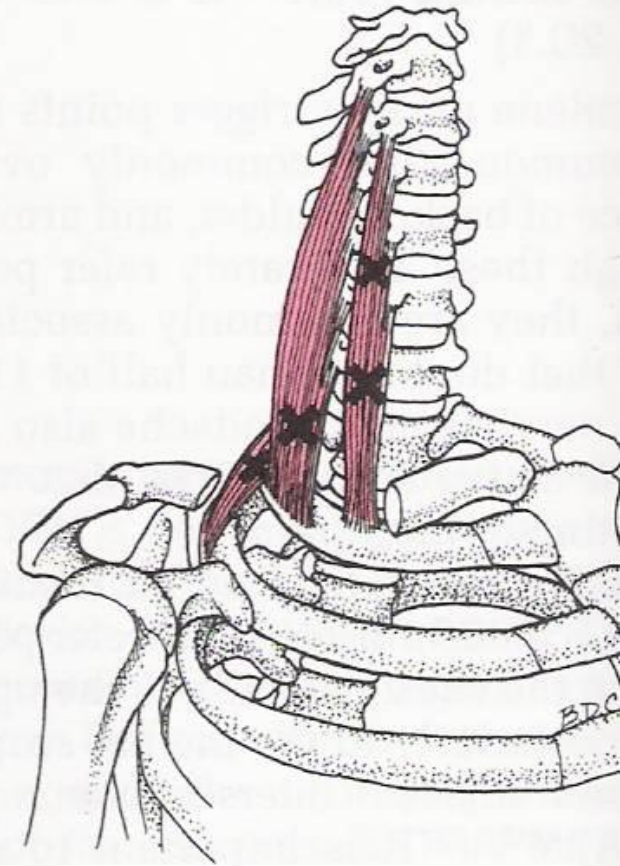
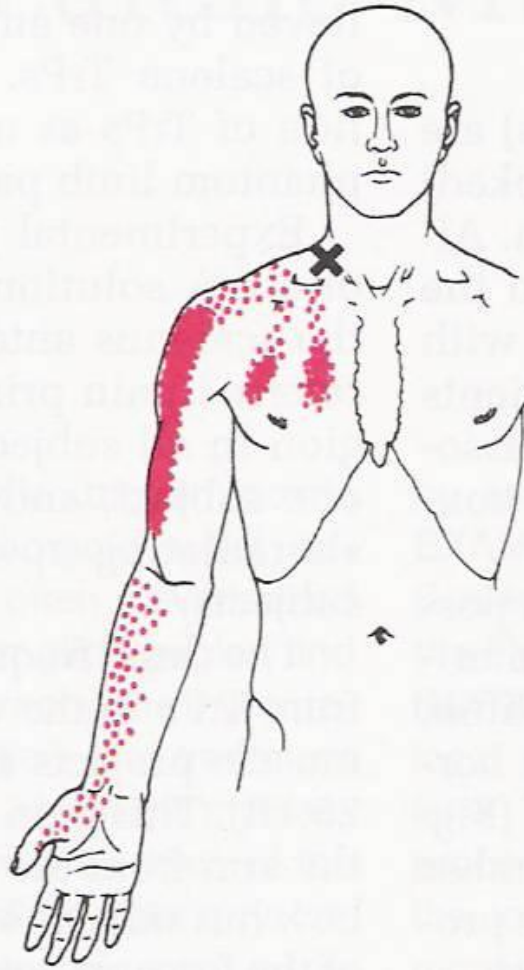
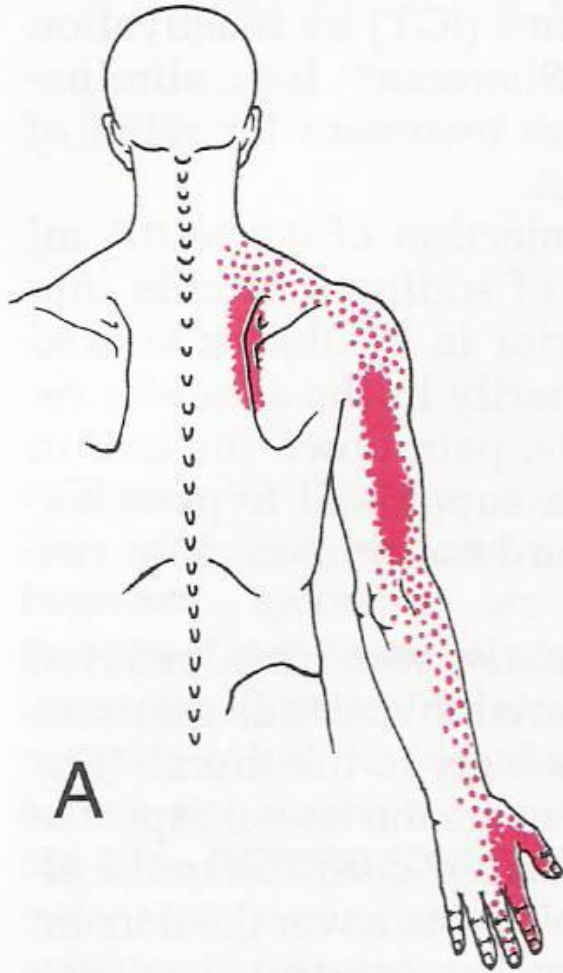
# SCALENES – REFERRAL PATTERNS

## Scalene Trigger Points and Referred Pain Patterns

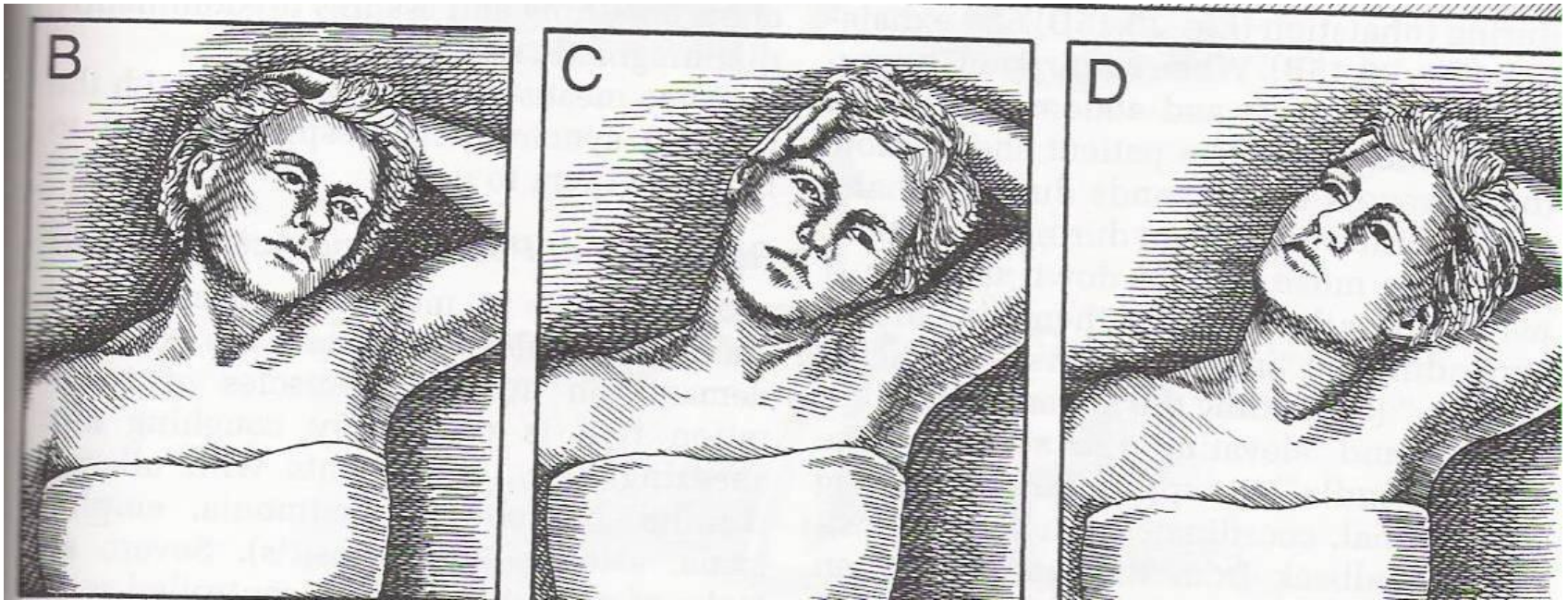


Composite pain patterns (solid red areas are the essential pain reference zones, and stippled red areas are the spillover reference zones) with locations of some trigger points (Xs) in the right scalene muscles (medium red). Scalenus anterior, medius, and posterior. Some trigger points may have only one essential reference zone.





# SCALENE: - POSTERIOR, MIDDLE, ANTERIOR - TREATMENT



# TAKE HOME POINT

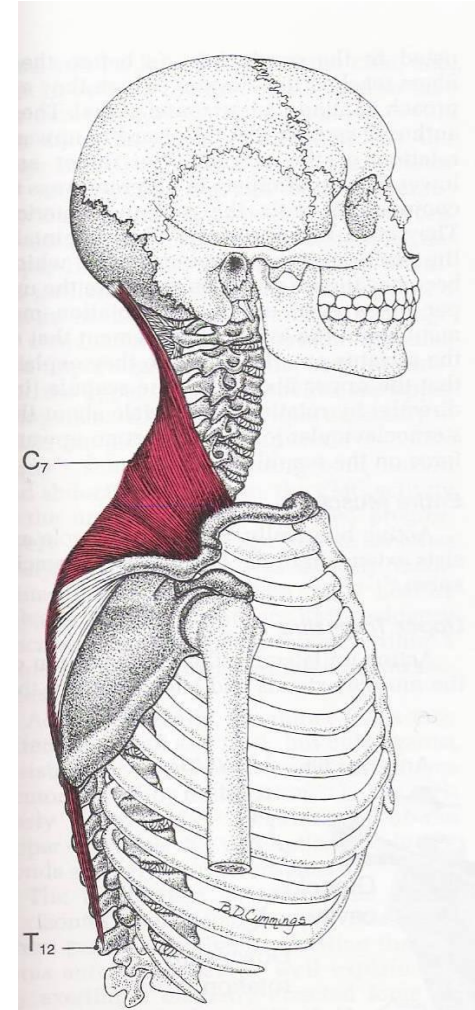
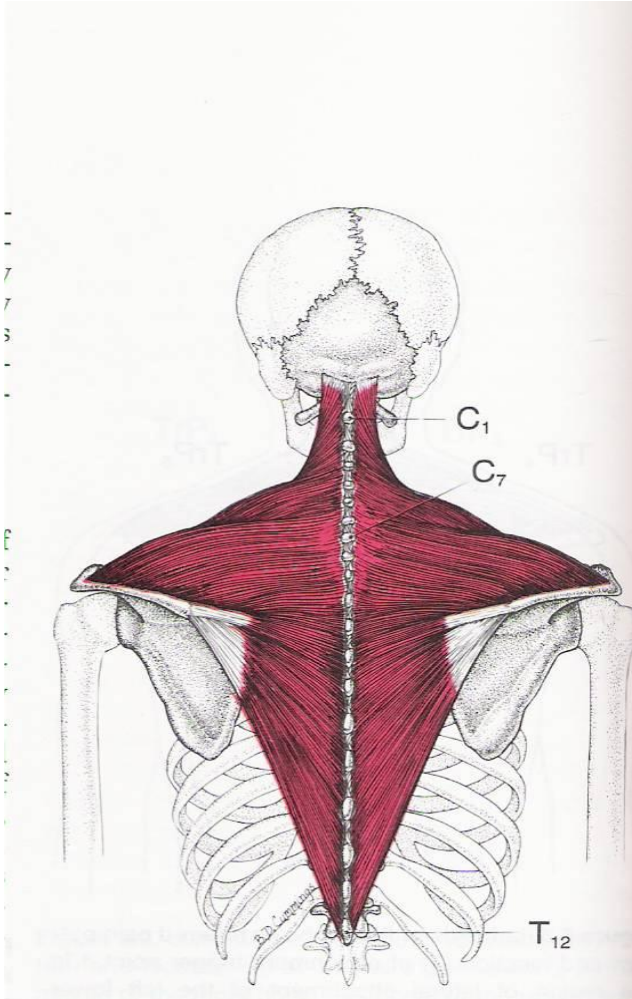
Medial Border Scapula Pain

... think..

**SCALENE**

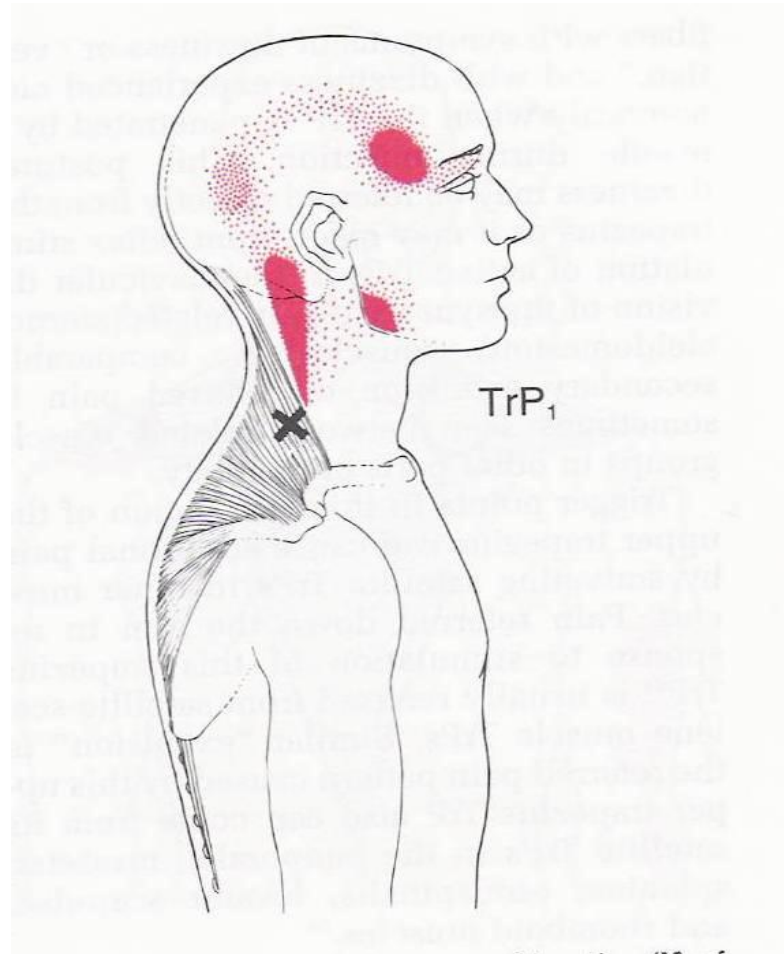


# TRAPEZIUS- ORIGIN AND INSERTION

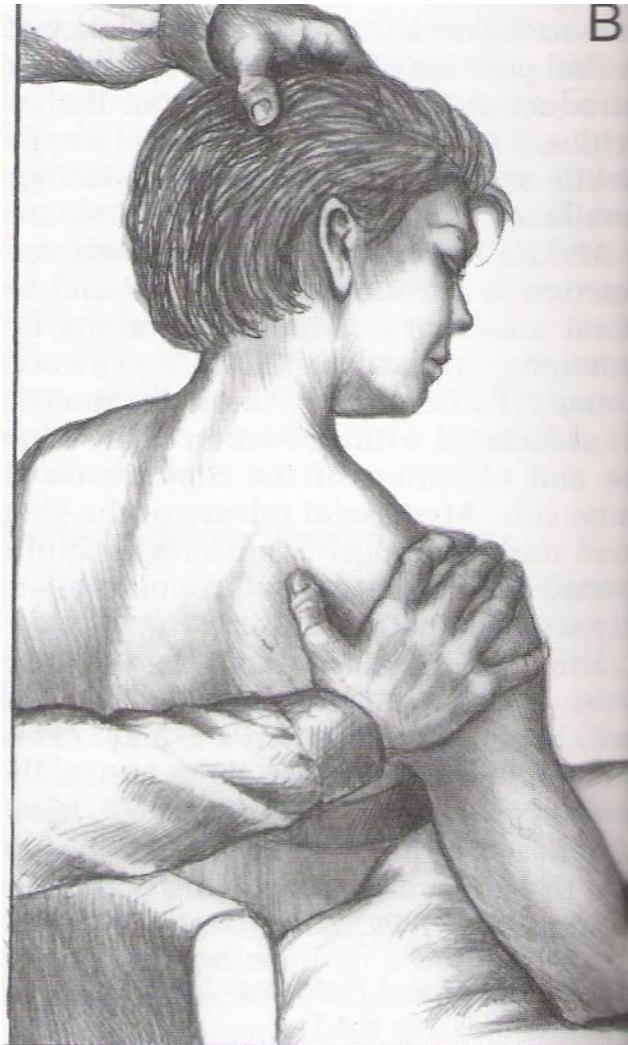


# TRAPEZIUS (UPPER VERTICAL FIBRES)

## -REFERRAL PATTERN



# TRAPEZIUS – EXAM AND TREATMENT



# PUTTING IT TOGETHER

## THE BIG 4

- **Sternocleidomastoid**
- **Levator scap**
- **Scalene**
- **Trapezius**



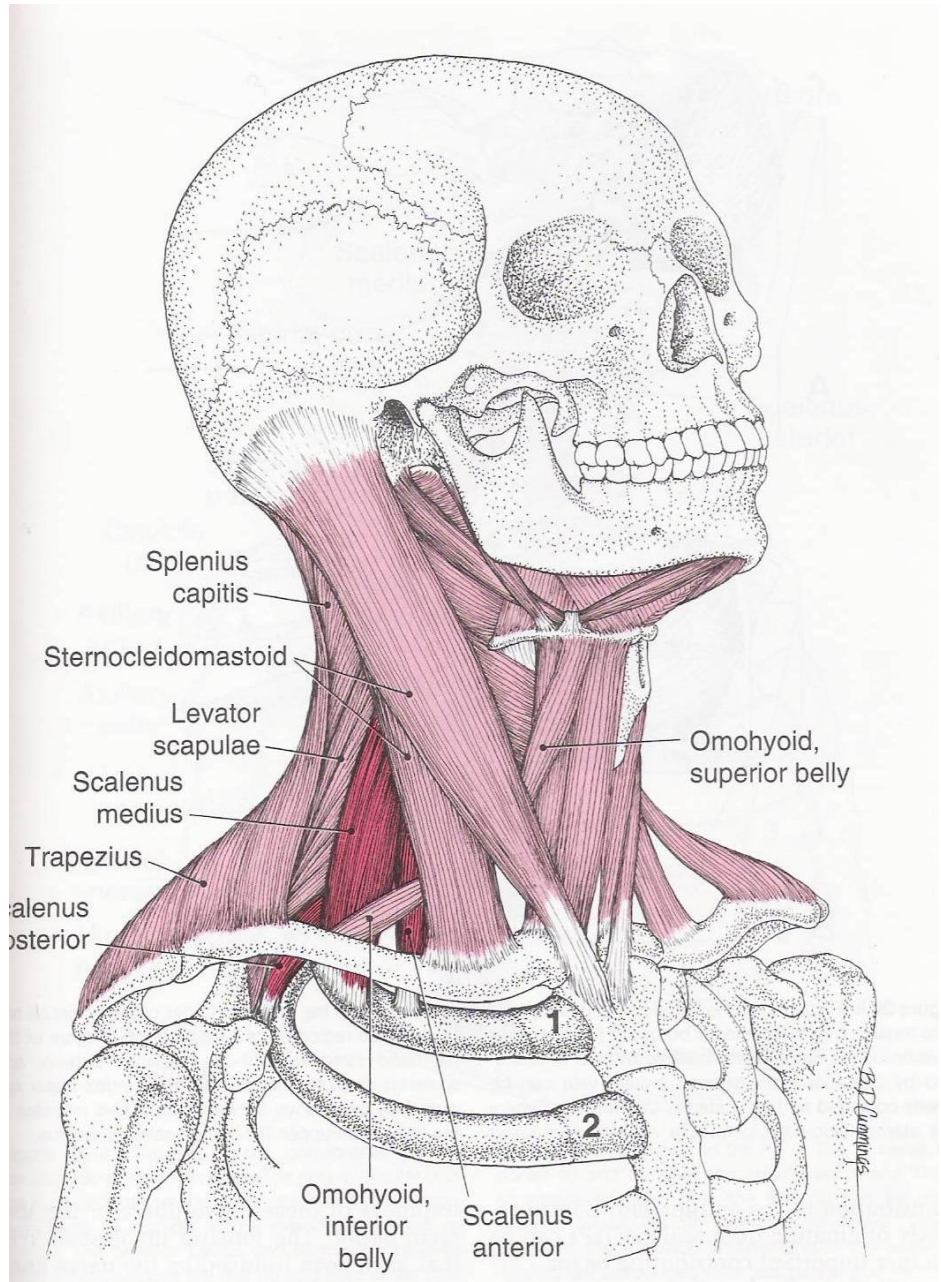


Figure 20.7. Neighboring muscles (medium red) that though they do not have the same fiber direction. It

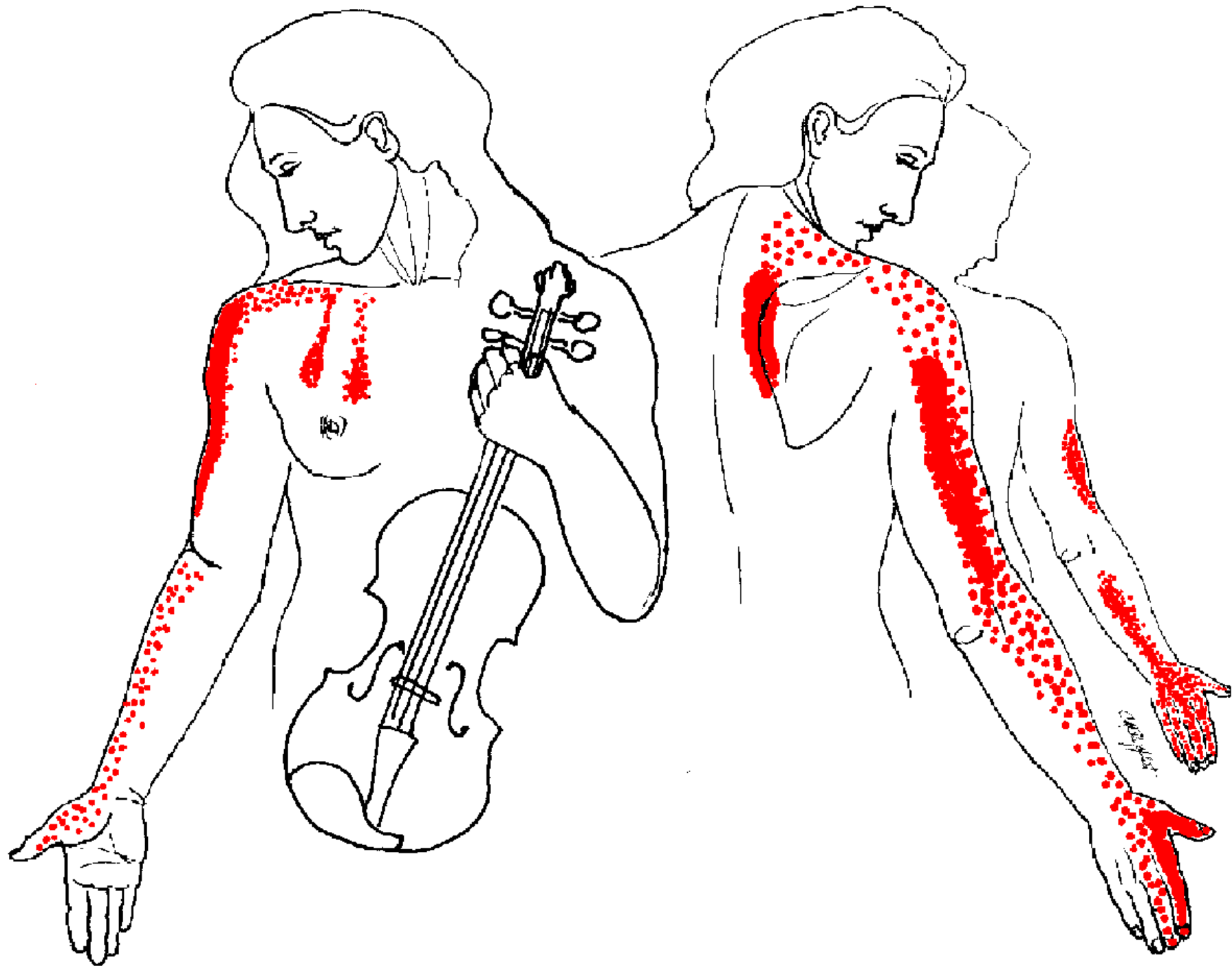




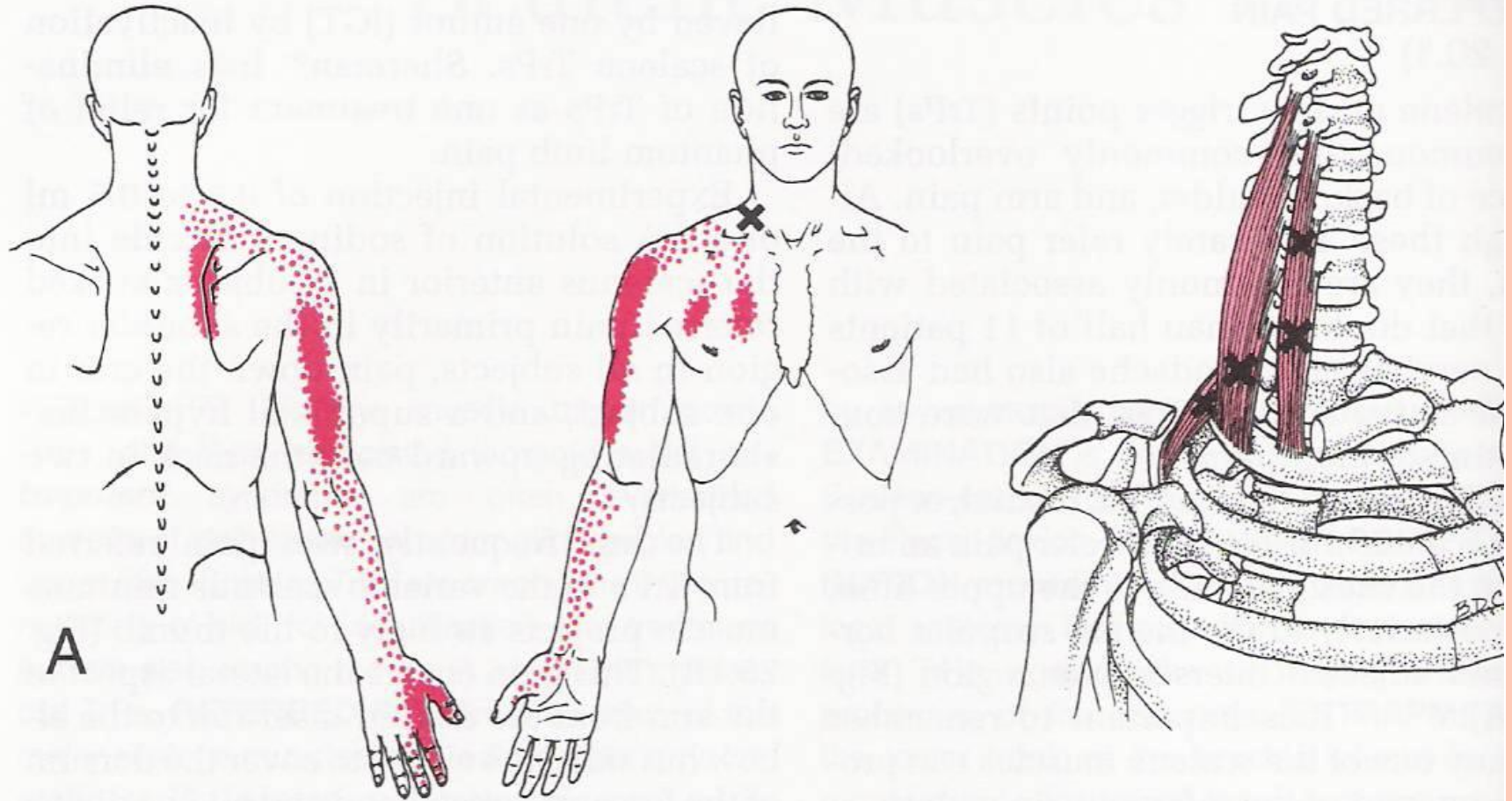
QUIZZZZZ !!!!

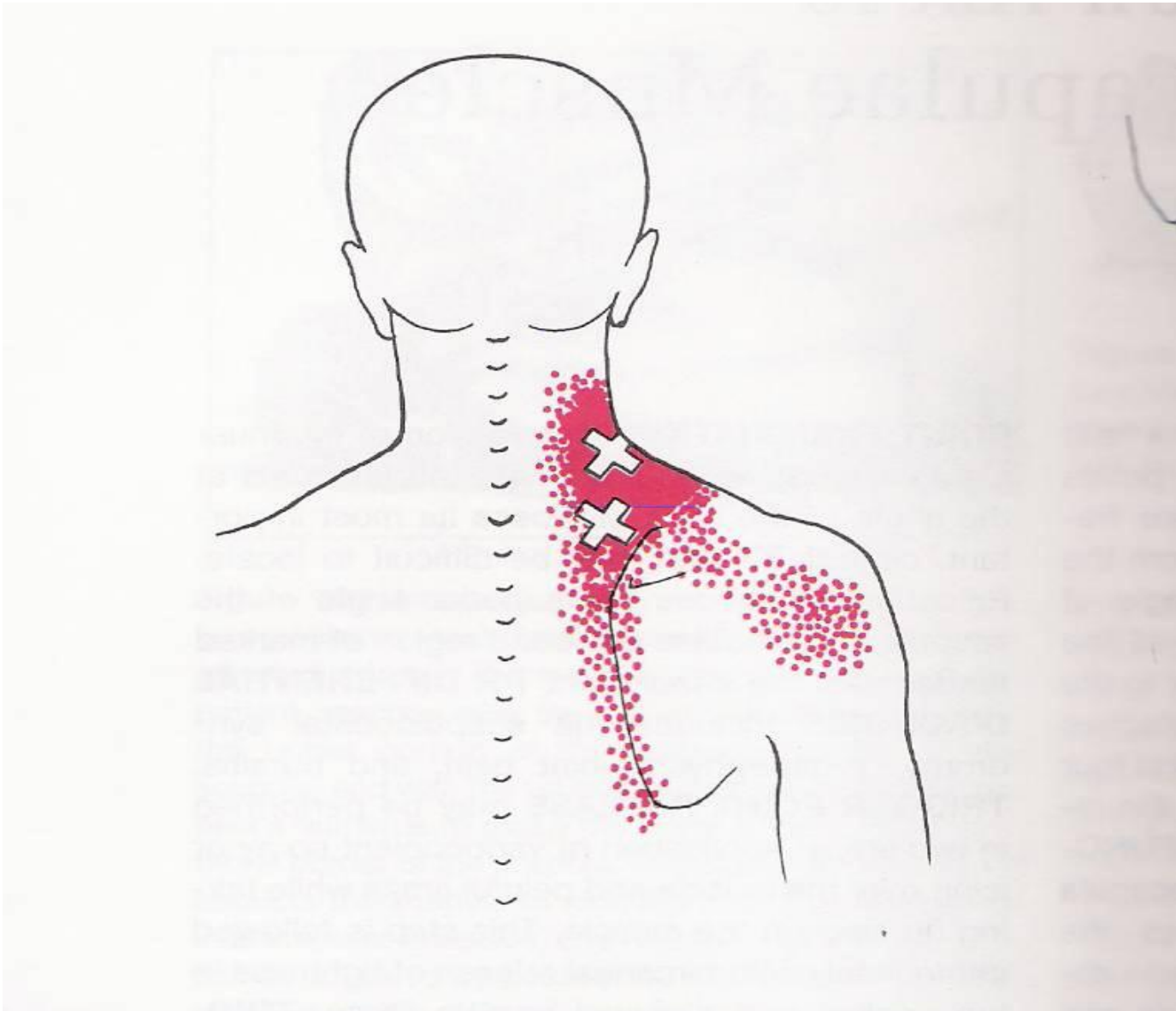
WHAT MUSCLE HAS THESE  
REFERRAL PATTERNS?



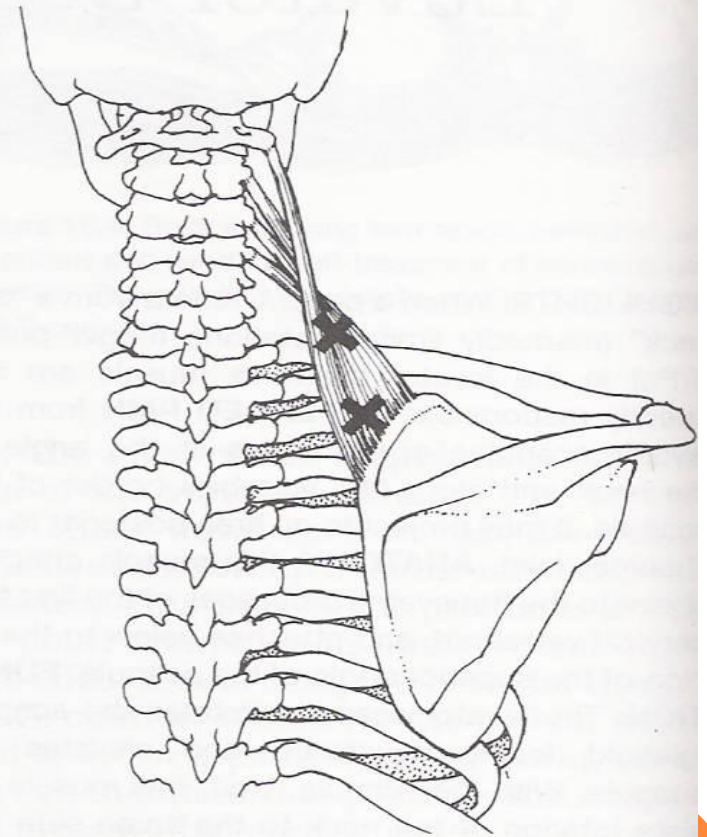
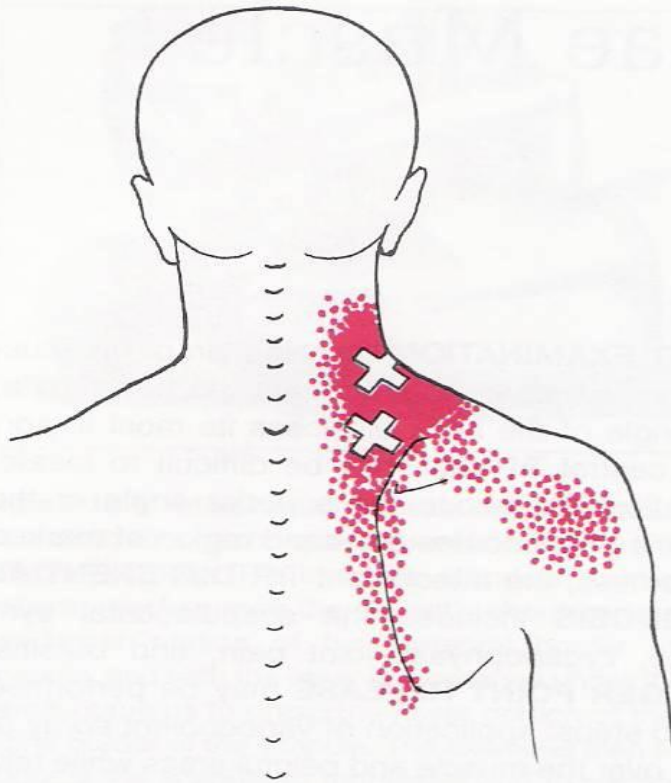


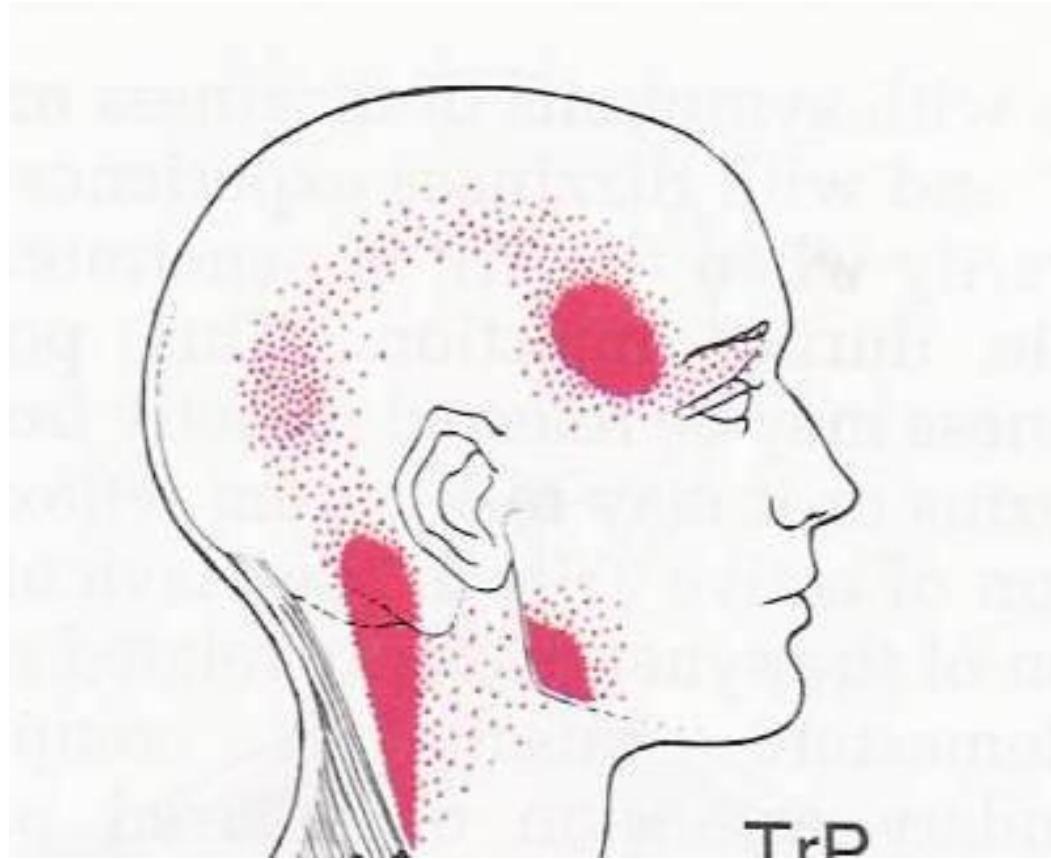
# SCALENES – REFERRAL PATTERNS



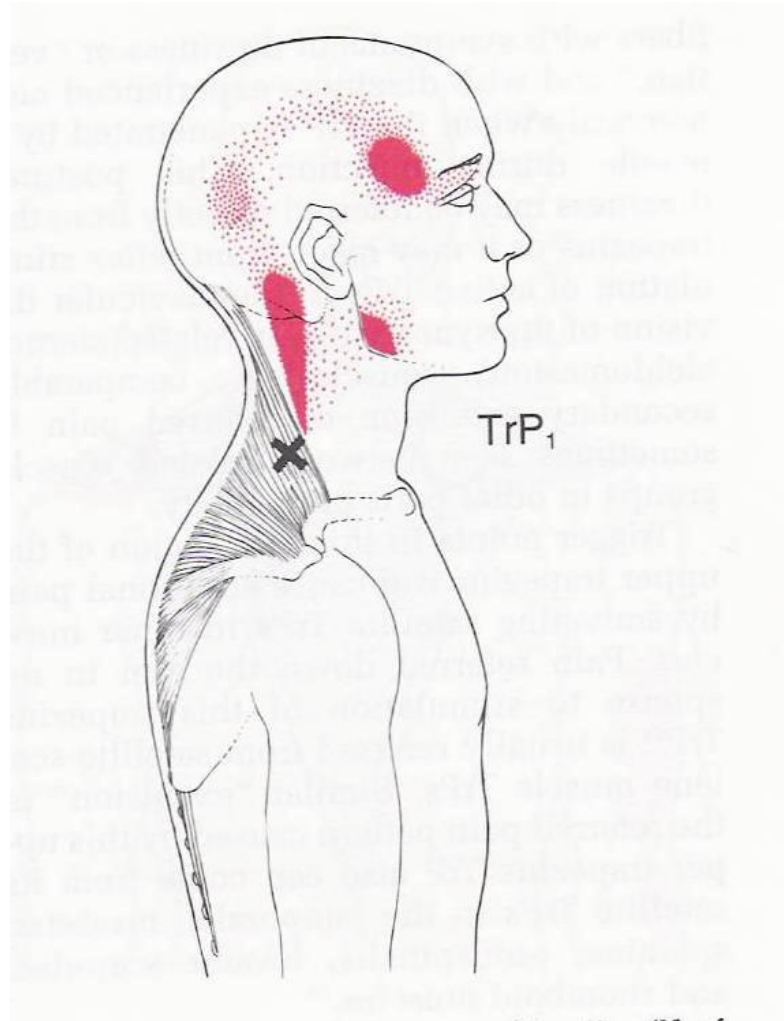


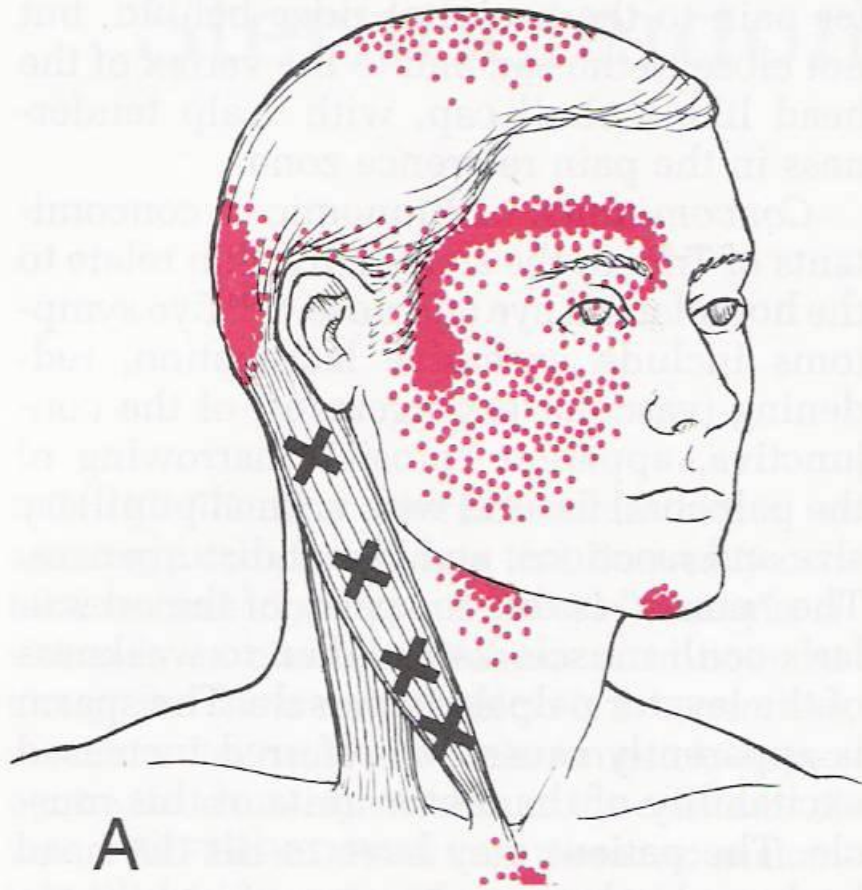
# LEVATOR SCAPULAE- REFERRED PAIN PATTERNS





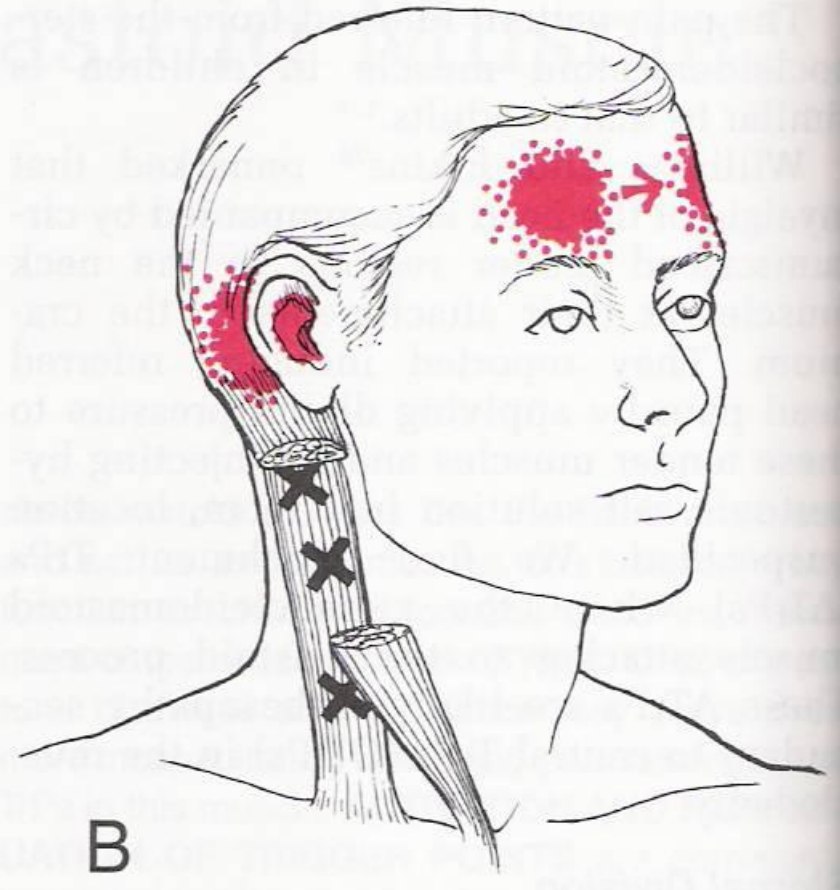
# TRAPEZIUS (UPPER VERTICAL FIBRES) -REFERRAL PATTERN





A

Sternal division



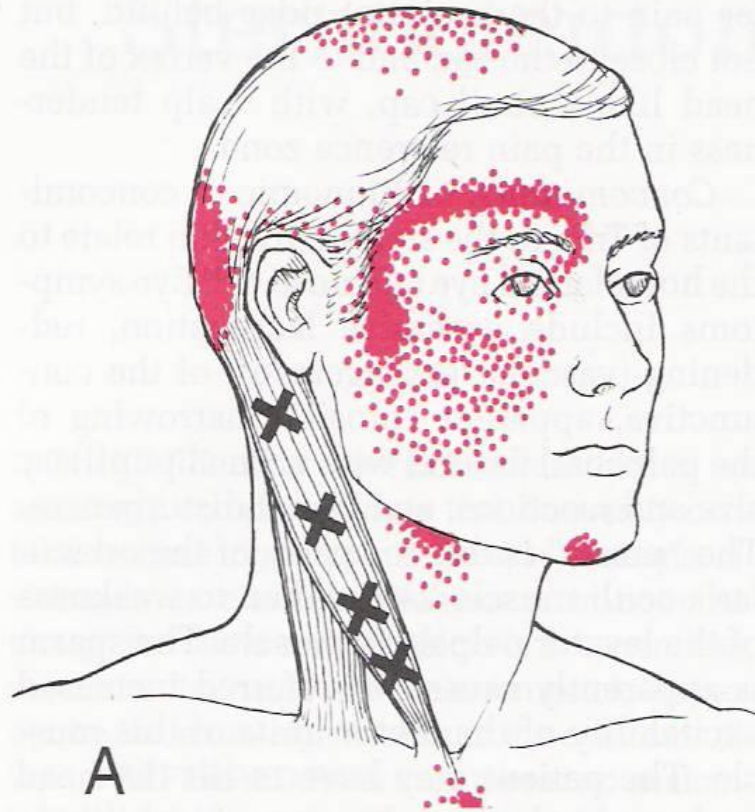
B

Clavicular division

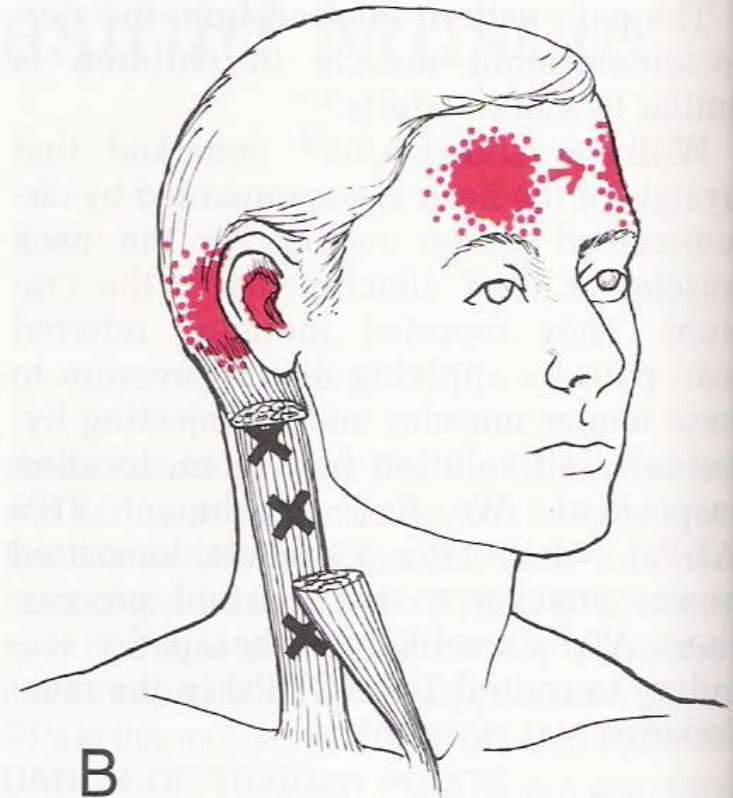




# STERNOCLEIDOMASTOID - REFERRAL PATTERNS



A  
Sternal division



B  
Clavicular division

# BIG 4 MUSCLES

**sternocleidomastoid  
scalene  
trapezius  
levator scapula**

...think 3 things...

**Origins and Insertions  
Referred Pain Patterns  
Examination & Treatment**

