

Neck Injuries in Workers

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Musculoskeletal Injuries

Musculoskeletal disorders are associated with high costs to employers such as absenteeism/ lost **productivity**, increased healthcare , **disability**, and worker's compensation **costs**.

CDC

Musculoskeletal Injuries

Skeletal Injuries involve a median of **8 days** away from work

Age groups (**25–54**) accounted for 79% of cases

male >female

White non-Hispanic worker common

Manufacturing and **services industry** 57% all cases

1 million people took time away from work to treat work-related MSK injuries (yr2001)

Approximately 54 billion annually (compensation costs, lost wages, and lost productivity)

Liberty Mutual: Overexertion injuries—lifting, pushing, pulling, holding, carrying or throwing an object—cost employers \$13.4 billion every year

Spine Injuries

372,683 back injury cases involving days away from work

Age 25–54 (79%)

Male (64%)

White, non-Hispanic (70%)

Operators, fabricators, and laborers (38%);
precision production, craft, and repair (17%)

Bureau of Labor Statistics 2014 2001

Musculoskeletal Injuries

C-spine

Common Mechanism

Mechanical Fall

MVA (drivers)

Lifting /Pulling/ pushing Injuries

Struck by an object

Types

C-spine Only

Neck and Head Injury (combined)

Neck and Shoulder Injury (combined)

Musculoskeletal Injuries :C-spine

Common Diagnosis

Soft Tissue Pain

Whiplash Associated Syndrome

Muscle Strain

Facet Joint

Fractures

Discogenic Pain

Cervicogenic Headache

Musculoskeletal Injuries :C-spine

Common Treatments

Education (Patient-Employer-Policy Makers)

Rest

Medications

Manual therapy

Acupuncture

Physical Therapy

Spine/Pain Interventions

Surgery

Musculoskeletal Injuries : C-spine

Soft Tissue Pain/ Neck Strain

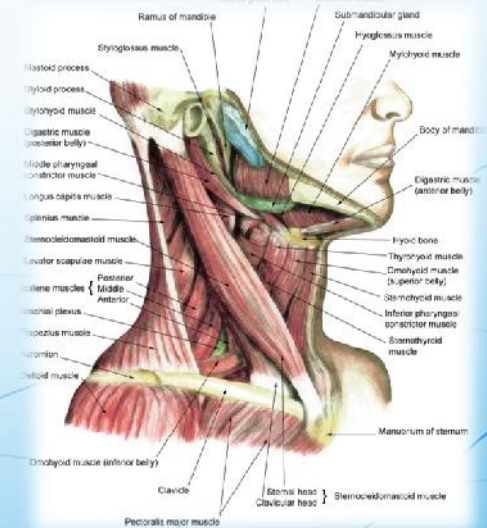
Traumatic injuries to the muscles, ligaments, tendons, and/or connective tissue

Common in minor mechanical fall, low speed MVA or over exertion

The most common mechanism:

- Hyper-extension / Hyper-flexion
- Acceleration/Deceleration on the lateral plane

- Imaging: C-spine X-rays Flexion/Extension
- Medications: NSAIDS, Muscle relaxants
- Rehabilitations: PT/OT /HEP/ Therapeutic massage
- Manipulations: If no co-existing structural trauma or instability
- Procedures: Trigger point injections, acupuncture
- Surgical: No Indications
- Expected OOW: Few days
- Prognosis: Excellent



Musculoskeletal Injuries : C-spine

Whiplash Associated Syndrome

- High-speed injury mechanisms
- Combined Traumatic stress and injuries to the facet capsule, discs, ligaments and muscles
- Acute vs Chronic (high rate of transition to chronicity)
- 50% of people who experience a whiplash injury will never fully recover and up to 30% will remain moderately to severely disabled by their condition ¹

Quebec Task Force classification

WAS Grade 1 : Neck Pain or stiffness

WAS Grade 1 : Neck Pain, Musculoskeletal complain (decrease ROM, local tenderness)

WAS Grade 3 : Neck Pain, Neurologic signs (sensory change, motor weakness, abnormal reflex)

WAS Grade 4 : Neck Pain, suspected fracture or dislocation

1. .Rebbeck T, Sindhusake Et Al. Inj Prev. 2006 Apr; 12(2):93-8.

Musculoskeletal Injuries : C-spine

Whiplash Associated Syndrome

- Neck pain, Shoulder girdle pain, Head aches and Scapular pain.



- Disturbed nociceptive processing¹ as well as psychological factors in both acute and chronic whiplash-associated disorders.
- Some of these factors seem to be associated with the transition from acute to chronic pain and have demonstrated prognostic capacity
 - Central nervous system sensitization
 - Decreased pain thresholds to mechanical pressure, thermal stimulation, electrical stimulation, and vibration
 - Sensory hypersensitivity locally over the neck as well as at distal or **remote** sites
 - The psychological presentation in Acute whiplash : Pain catastrophization, fear of movement, depression
 - The psychological presentation in Chronic whiplash: Fear of movement , PTSD

Musculoskeletal Injuries : C-spine

Whiplash Associated Syndrome

- Imaging:

WAS Grade 1 : Not likely necessary

WAS Grade 2 : X-rays Flexion/Extension, Open mouth, Oblique

WAS Grade 3 : MR

WAS Grade 4 : CT, MR, Dynamic X-rays

- Medications:

Non selective NSAIDS or Cox II inhibitors

Tylenol,

Antidepressants

TCA's

SNRIs

Antiepileptic Drugs

Opioids

Oral Steroids

Topical Treatments

Musculoskeletal Injuries : C-spine

Whiplash Associated Syndrome

- **Bracing::** Strong evidence to suggest soft collar is ineffective and may impede recovery. ¹
- **Rehabilitations :** The most effective non-invasive treatment for patients with chronic WAD ²
Exercise programs are effective in relieving whiplash-related pain with or without behavioral treatment ³

At 6 months 39% - 44% of the patients treated by PT reported <50% pain reduction
 - ✓ Deep tissue massage
 - ✓ Hot and cold therapy
 - ✓ Ultrasound
 - ✓ Active mobilization
 - ✓ mobility of the neck through small-range and small-amplitude neck exercises
 - ✓ Strengthening exercises
 - ✓ Stretching
 - ✓ Endurance exercises
 - ✓ Advice to act as usual

1. Pain Med. 2016 Mar 27. pii: pnw036

2. Pain Research & Management. 2010 Sep-Oct;15(5):313-22.

3. Clin J Pain. 2015 Apr;31(4):294-303.

4. **A research synthesis of therapeutic interventions for whiplash-associated disorder.** Pain Res Manag. 2010 Sep-Oct; 15(5): 287–294

Musculoskeletal Injuries : C-spine

Whiplash Associated Syndrome

- Psychological and Behavioral Treatment ¹ :

These are important adjunctive treatments in the comprehensive management of pain disorders including chronic whiplash. Examples of such treatment are:

- Biofeedback,
- Relaxation techniques
- Cognitive-behavioral therapy

- **Manipulations:** Passive manual manipulation or adjustment of the joints of the neck
If no instability

- limited evidence that manual joint manipulation provide long lasting benefit
- One study (n=28) found 93% of pts with chronic WAS had less pain
- European study : MT was not cost-effective in comparison with PT in patients with sub-acute and chronic non-specific neck pain for perceived recovery, functional status, quality-adjusted life-years ².
- Patients with cervicogenic headache may also benefit from a course of manual therapy.

1. Clin J Pain. 1993;9(1):41-48, Roberts AH, Sternbach RA, Polich J. Behavioral management of chronic pain and excess disability: long-term follow-up of an outpatient program. 2. Injury. 1996 Nov;27(9):643-5. 1996 Nov;27(9):643
2. **Chiropractic treatment of chronic 'whiplash' injuries**
3. Eur Spine J. 2016 Feb 6., **An update of the Bone and Joint Decade Task Force on Neck Pain and Its Associated Disorders**

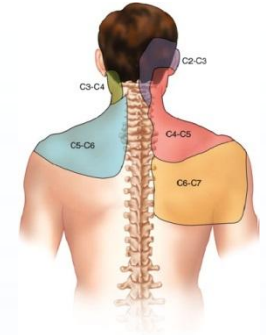
Musculoskeletal Injuries : C-spine

Whiplash Associated Syndrome

- Procedures: **Therapeutic facet injection**
Diagnostic Medial Branch Injection
Radiofrequency ablation
Acupuncture
TPI
- Surgical: No Indications
- Expected OOW: Acute: 2weeks
Chronic 3-6 Months (30% become chronic)
- Prognosis: Good

Musculoskeletal Injuries : C-spine

Therapeutic Facet Injection

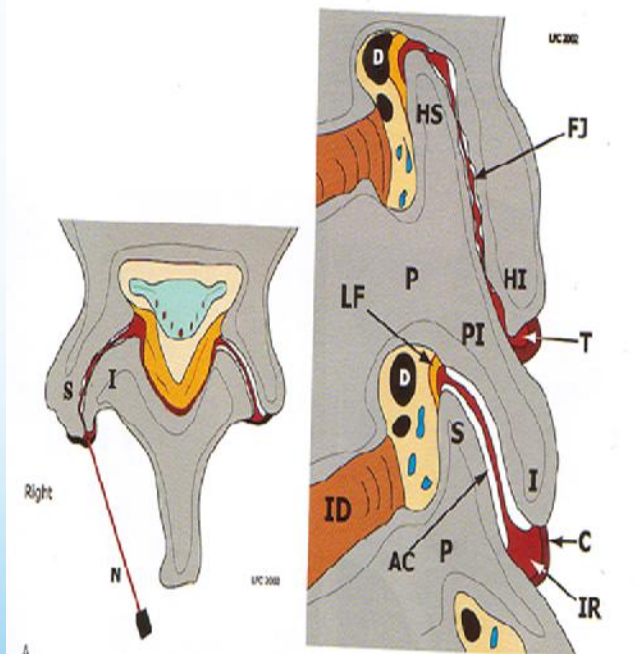
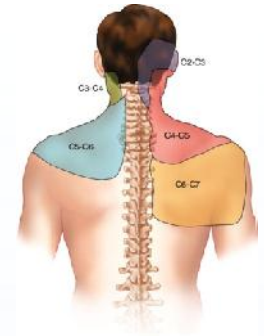


Goals:

1. Pain relief (12 weeks)
2. Improve participation in PT
3. Improvement in functional status, and psychological status
4. Reduction in Medication intake (including opioid)
5. Return to work
6. Resume normal lifestyle

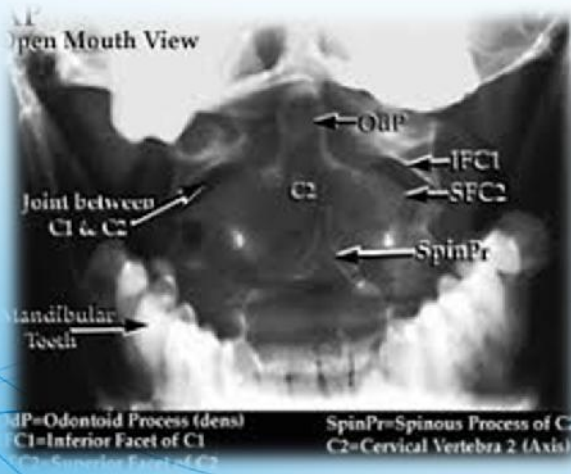
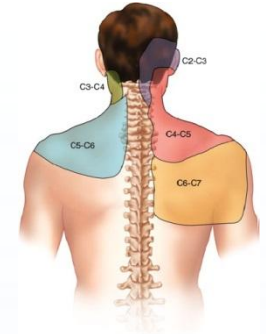
Musculoskeletal Injuries : C-spine

Therapeutic Facet Injection



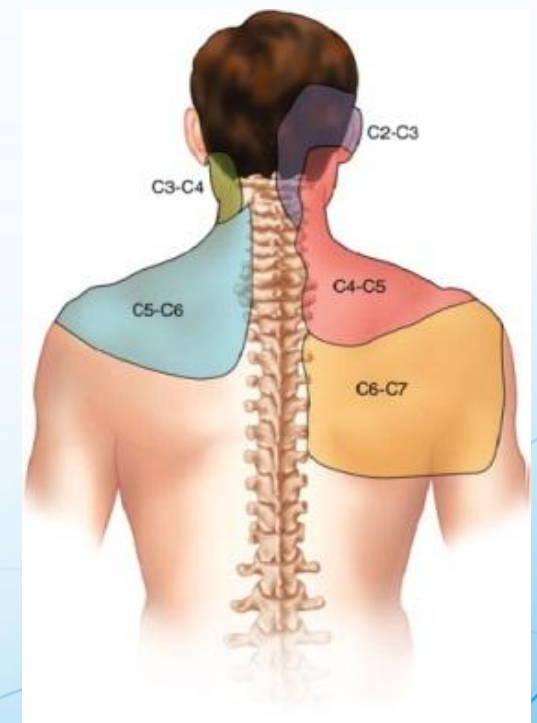
Musculoskeletal Injuries : C-spine

Therapeutic C1/2 Injection



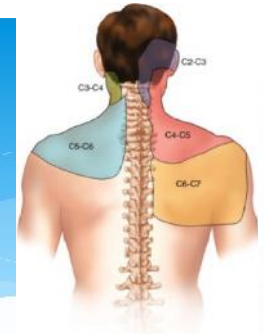
Diagnostic Medial Branch Block to diagnose “Facet Generated” neck pain

- Dual innervation of each facet
- Facet joints tested based on pain pattern
- The accuracy of facet joint nerve blocks (MBB) is strong in the diagnosis of lumbar and cervical facet joint pain, whereas, it is moderate in the diagnosis of thoracic facet joint pain ¹



1. Pain Physician. 2007 Jan;10(1):7-111. **Interventional techniques: evidence-based practice guidelines in the management of chronic spinal pain**

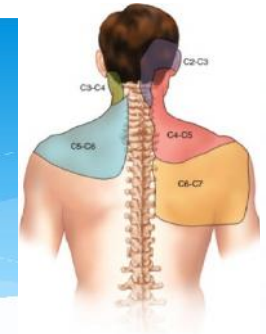
Diagnostic Medial Branch Block



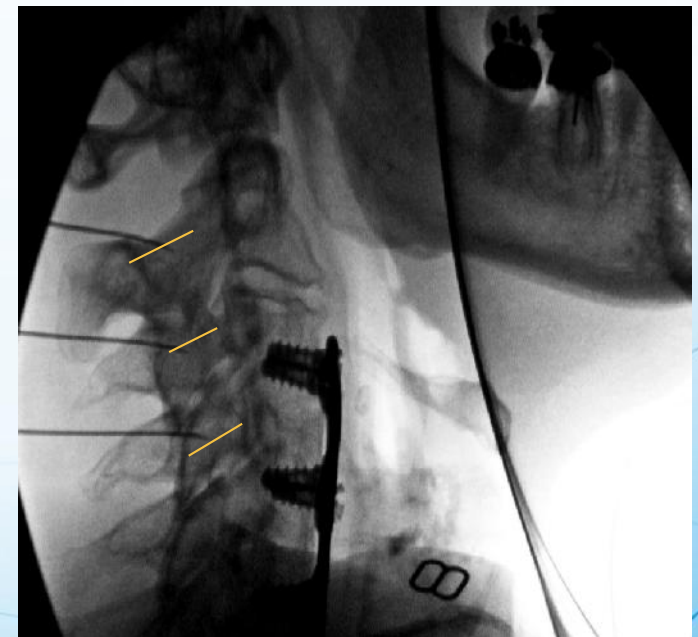
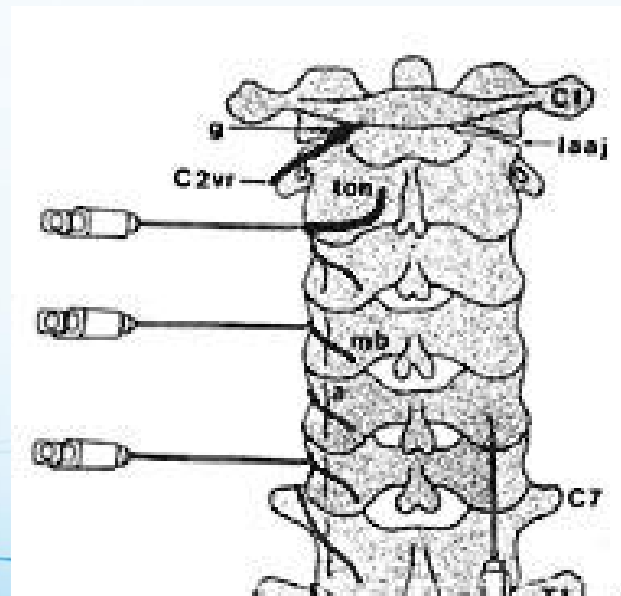
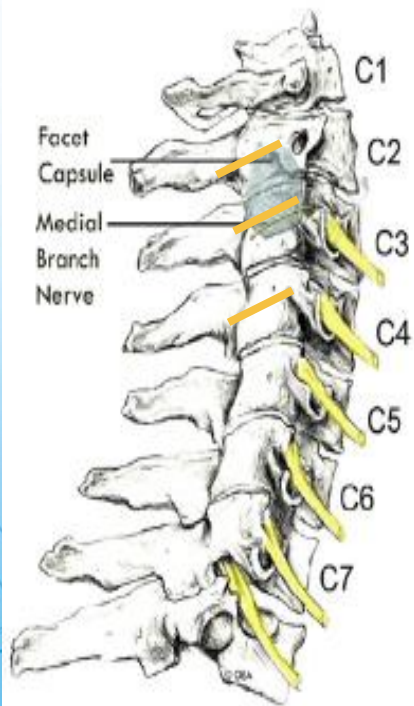
Diagnostic algorithm:

- Identify which facet or facets contribute to symptoms
- Diagnostic Medial Branch :
 - Performed twice
 - Two different anesthetic used (pt is unaware what is injected)
 - Looking for changes in in:
 - ROM
 - VAS scale pain
 - Increase function during anesthetic phase
 - Reduced Headache
- If both MBB trials results in $> 50\%$ improvement can proceed to RFL (Radiofrequency ablation)
- If single MBB results in 80-100% relief , may proceed to RFL

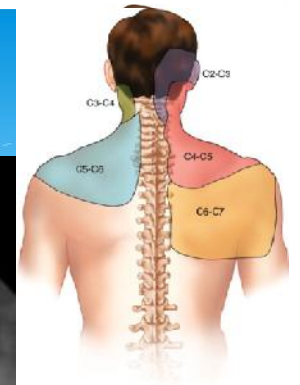
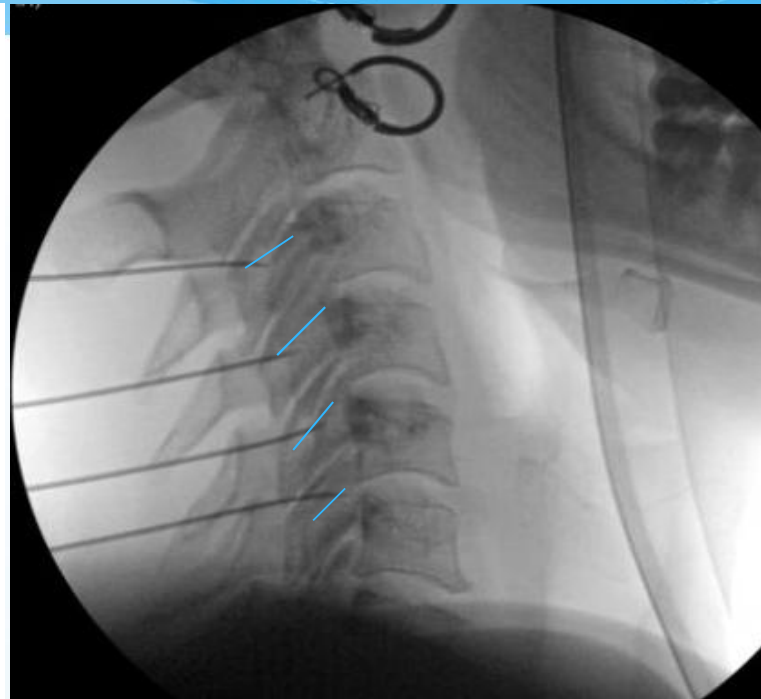
Diagnostic Medial Branch Block



- Unilateral procedure
- 2 nerves per facet .
- 0.3 cc anesthetic per level
- Maximum 3 facets to be worked on
- Try to avoid bilateral blocks



Radiofrequency Ablation of Medial Branches



80 degrees temperature
90 seconds duration

6-24 month or relief
Reproducible outcome
Low risk Complications
No steroid used

Facet Steroid Injection VS Radiofrequency ablation

Face Injection

Technical limitation entering facet

2-4 x /year treatment

Increase accumulative risk

Steroid used

Contrast used

60% specific test

Elevated sugar levels

Increased Anticoag hold frequency

More treatment=more cost

More time in medical care

RFL

More reliable needle placement

1-2 x/year treatment (6-24month relief)

Reduced accumulative risk

No steroid used

No contrast used

80% specific diagnostic step (MBB)

No sugar level elevation

Less frequent med hold needed

less treatment = less costly

less time in medical care

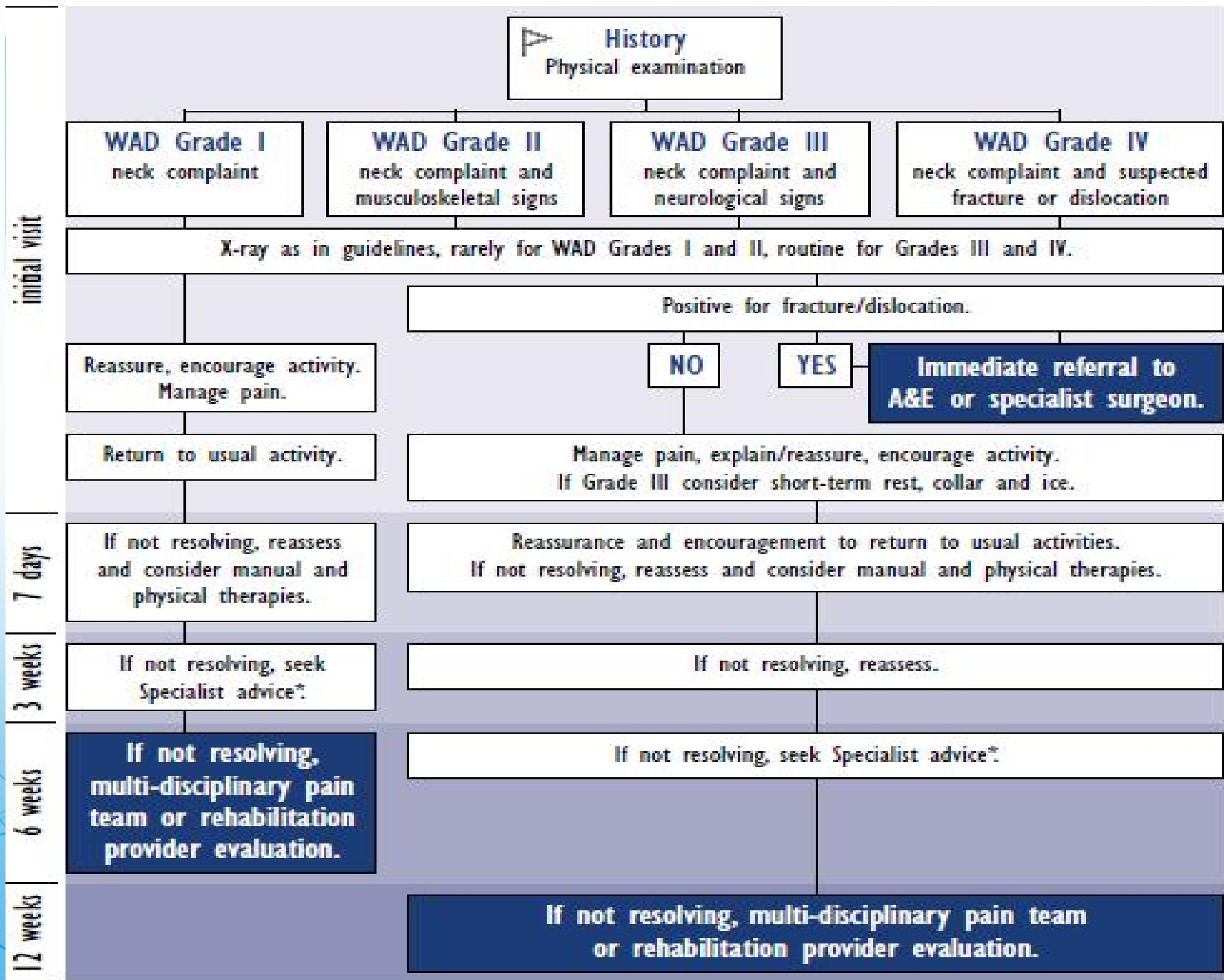
Evidence based Medicine

- The evidence for the diagnosis of cervical facet pain based on MBB is Level I or II-1.
- The evidence for therapeutic cervical medial branch blocks is Level II-1.
- The evidence for RFL in the cervical spine is Level II-1 or II-2
- The evidence is lacking for intra-articular facet injections

LEVEL OF EVIDENCE:

The level of evidence was defined as Level I, II, or III based on the quality of evidence developed by the U.S. Preventive Services Task Force (USPSTF). Level I (conclusive), Level II (strong), Level III (moderate), Level IV (limited), to Level V (indeterminate).

Systematic review of diagnostic utility and therapeutic effectiveness of cervical facet joint interventions. Pain Physician. 2009 Mar-Apr;12(2):323-44.



Cervical Fractures

- Spinal fractures represent 3% to 6% of all skeletal injuries
- Vehicle collisions, High impact sports, and falls are common causes
- The most common fracture mechanism in cervical injuries is hyperflexion.
- A severe, sudden twist to the neck or a severe blow to the head or neck area can cause a cervical fracture.
- more common in men approximately 30 years of age

Cervical Fractures

High Cervical

1. Fractures of the occipital condyle
2. C1 Ring Fracture
3. C1-C2 combined fracture
4. C2 body/lateral mass fracture
5. Fractures of the odontoid process Types I-III
6. Hangman's fractures in the C2
7. Atlanto-occipital dislocation (transverse atlantal ligament Inj)

Lower Cervical

- fractures follow the same pattern as in other segments of the spine
- prognosis of an injury based on morphology, the integrity of the disc-ligamentous complex, and the patient's neurological status

Flexion vs extension injuries

Stable vs Unstable

Non surgical vs non surgical treatments

Cervical Fractures

Traumatic ligamentous injuries of the atlanto-occipital joint and transverse atlantal ligament are relatively uncommon, have a poor prognosis for healing, and often respond best to surgical stabilization.

Bony injuries, including occipital condyle fractures, atlas fractures, most odontoid fractures, and traumatic spondylolisthesis of the axis, generally respond well to nonsurgical management.

Controversy in management remains, however, especially with type II odontoid fractures.

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J Am Acad Orthop Surg. 2002 Jul-Aug;10(4):271-80.

Flexion Injuries



**Hyperflexion sprain
(anterior subluxation)**



**Simple wedge #
(stable)**



Unstable wedge #



**Unilateral Interfacetal
Dislocation (UID)**

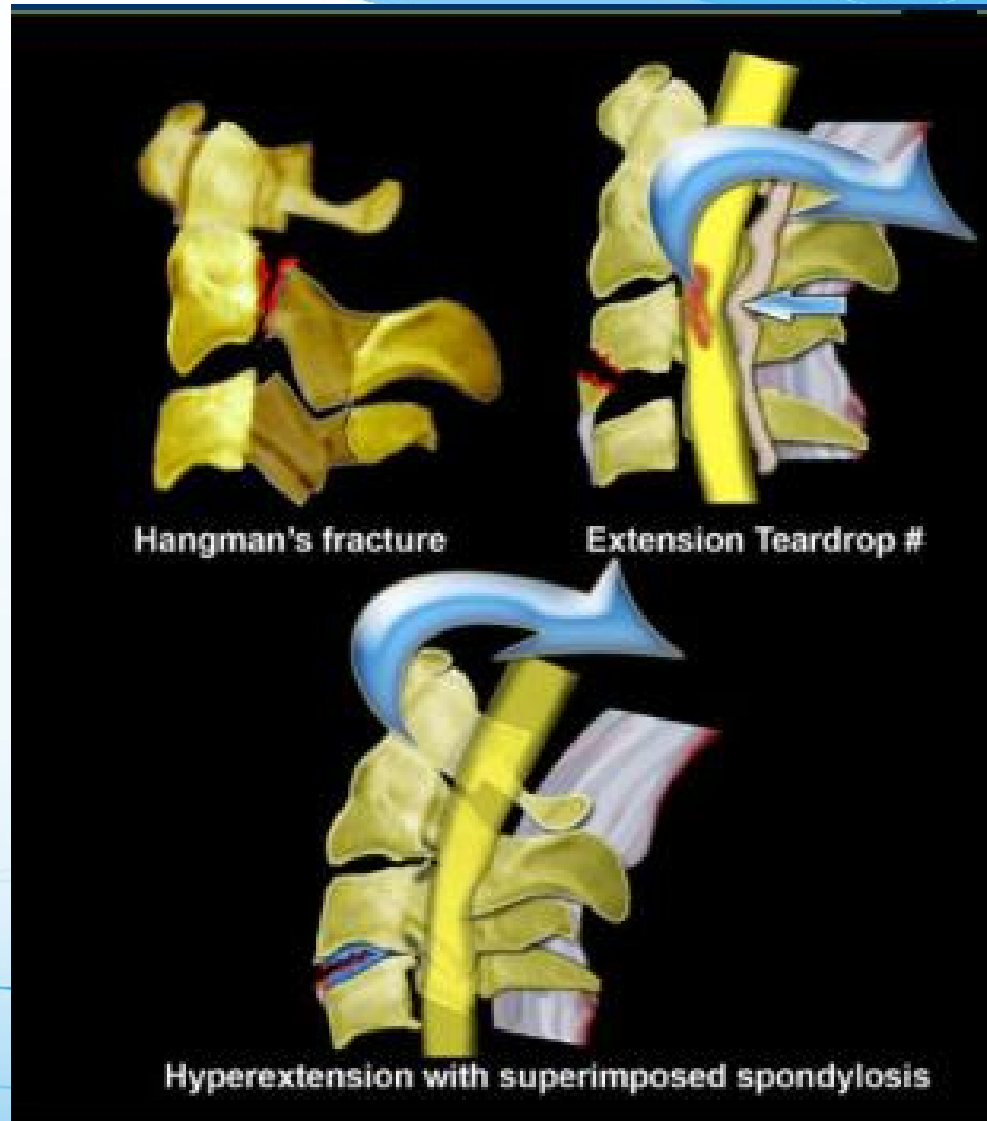


**Bilateral Interfacetal
Dislocation (BID)**



Flexion Teardrop #

Extension Injuries



Cervical Fractures

Imaging:

Multiple imaging modalities can be applied to imaging of the cervical spine after trauma

Plain film

CT

MRI

CT : clarifies uncertain radiological findings, identifies subtle fractures in patients with neck pain or with neurological deficits but with normal radiographs, determines details of injury, and assists in operative planning.

CT has replaced plain film as the primary modality for evaluation of spinal trauma

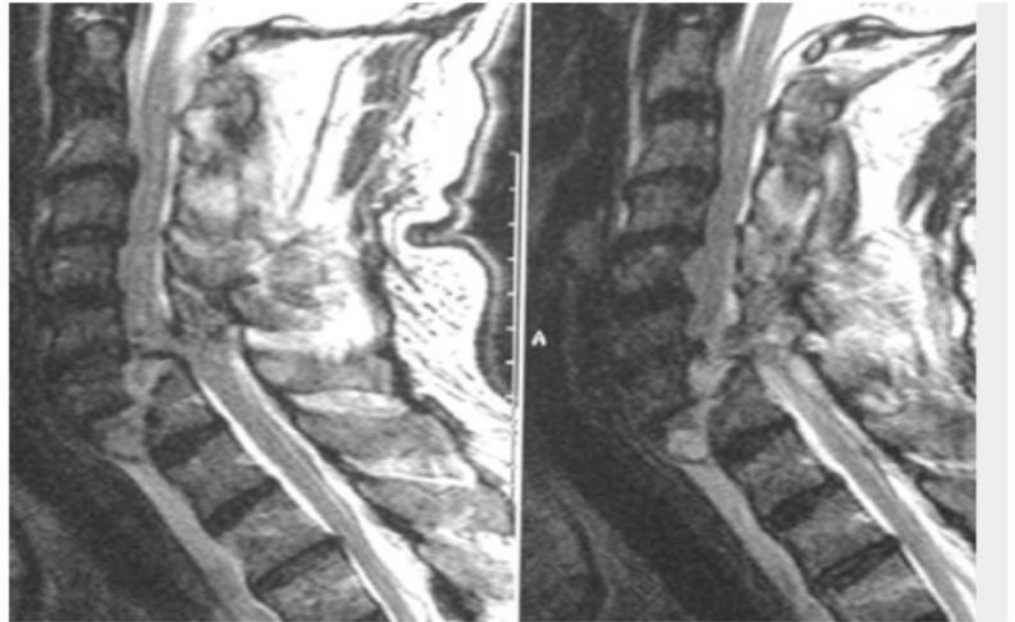
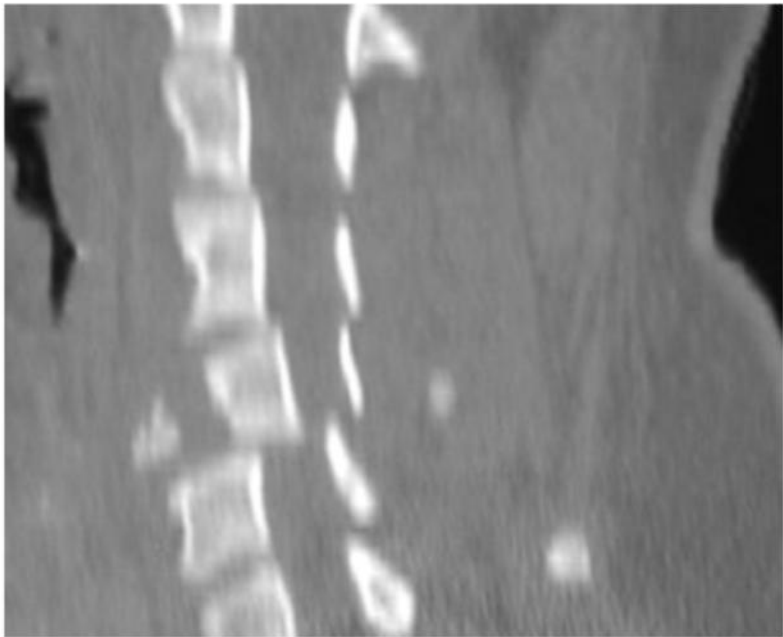
MRI: More accurate than CT with intrathecal contrast in delineating epidural pathology, ligament injury, soft-tissue edema, and cord parenchymal injury.

Cervical Fractures

Stabilization:

- Rigid collars (Aspen, Malibu, Miami J, and Philadelphia collars)
- Halo
- Minerva or SOMI (Sterno-Occipital Mandibular Immobilization Device)
- Surgical stabilization





Thank You for your attention

