WHIPLASH ASSOCIATED DISORDER (WAD)

Definition:

Whiplash is an acceleration-deceleration injury to the head and neck in relation to the torso. Numerous conditions can arise after a whiplash injury; therefore it is not appropriate to describe it as an isolated condition. The Quebec Task Force was a task force sponsored by a public insurer in Canada. They submitted recommendations regarding classification and treatment of WAD, which was used to develop a guide for managing whiplash in 1995. An updated report was published in 2001. Each of the grades corresponds to a specific treatment recommendation.

Modified Quebec Task Force Classification:

Proposed classification grade	Physical and psychological impairments present
WAD 0	No complaints about neck pain No physical signs
WAD I	**No complaints of pain, stiffness or tenderness only** No physical signs
WAD IIA	Neck complaint **Motor impairment** ● decreased ROM ● altered muscle recruitment patterns (CCFT) **Sensory Impairment** ● local cervical mechanical hyperalgesia
WAD IIB	Neck complaint Motor impairment ● decreased ROM ● altered muscle recruitment patterns (CCFT) Sensory Impairment ● local cervical mechanical hyperalgesia **Psychological impairmen**t ● elevated psychological distress (GHQ, TAMPA)
WAD IIC	Neck complaint Motor impairment

	• decreased ROM • altered muscle recruitment patterns (CCFT) • **increased JPE** Sensory Impairment • local cervical mechanical hyperalgesia • **generalized sensory hypersensitivity (mechanical, thermal, ULNT)** • **Some may show SNS disturbances** Psychological impairment • elevated psychological distress (GHQ, TAMPA) • **elevated levels of acute posttraumatic stress (IES)**
WAD III	Neck complaint Motor impairment • decreased ROM • altered muscle recruitment patterns (CCFT) • increased JPE Sensory Impairment • local cervical mechanical hyperalgesia • generalized sensory hypersensitivity (mechanical, thermal, ULNT) • Some may show SNS disturbances **Neurological signs of conduction loss including:** • decrease or absent deep tendon reflexes • muscle weakness • sensory deficits Psychological impairment • elevated psychological distress (GHQ, TAMPA) • elevated levels of acute posttraumatic stress (IES)
WAD IV	**Fracture or dislocation**

Etiology:

- The mechanism of injury is variable, usually involving a motor vehicle accident but also including causes such as sports injury, child abuse, blows to the head from a falling object, or similar acceleration-deceleration event.

Factors Affecting Rear Impact WAD

- Head position
    - If head is turned to one side, the cervical spine is less able to hyperextend, causing increased pressure on facet joints
- Seat belts
    - Can contribute to neck injuries in low speed collisions, and contribute to injuries to viscera and bruising under the belt
- Head rest position
    - If head rest is too low it can act as a fulcrum- worsening the injury
- Stature
    - People shorter than 5 feet have a 40 percent lower risk of neck injury than a taller people
- Air bags
    - Provide little impact in a rear end collision

Front Impact

- The torso accelerating backward as the neck hyperflexes then hyperextends
- The victim may be able to see the impending collision and brace for the impact
- Seatbelts, air bags and head rests all help to reduce injuries

Side Impact

- Initial lateral flexion of the neck and torso towards one side of the striking vehicle, then away from it
- There is little protection for the person other than a lap belt anchoring the pelvis

Structures Involved:

- Any of the structures in the neck, upper thorax and head may be injured
- Cervical and thoracic vertebra, intervertebral discs, facets joints, joint capsules and ligaments, temporomandibular joints, anterior and posterior longitudinal ligaments, lymphatics, fascia, blood vessels, cranial cervical and thoracic nerve roots, vagus nerve, phrenic nerve, autonomic nervous system and spinal cord.
- Posterior cervical muscles may be affected including suboccipitals, cervical rotators, multifidi, semispinalis cervicis, longissimus cervicis, supper trapezius and levator scapula
- Anterior cervical muscles may be affected including rectus capitis anterior, longus capitis, longus colli, SCM, mylohyoid, omohyoid, supra and infra hyoids and platysma
- Lateral cervical muscles include rectus capitis lateralis and anterior middle and posterior scalene
- Muscles of mastication and of the thorax may also be affected including intercostals, posterior spinal muscles and diaphragm

Signs and Symptoms:

Acute

- Muscle spasm in neck region
- Facet joint irritation
- Possible hematoma
- Possible loss of consciousness
- Headache
- Apprehension with active or passive movement of the cervical spine
- Usually there is not restricted ROM initially after the accident, stiffness develops gradually
- Heat, edema and spasm can also develop over a period of time
- Tenderness at the injury site
- Muscle strains, possibly up to a grade 3 injury
- Possible neurological involvement, peripheral nerve injury, loss of strength and muscle atrophy can appear within the first 72 hours

Early Sub-Acute

- Edema, heat and inflammation can still be present but might be reduced
- Pain in the injured muscles is diminishing with local areas of point tenderness
- Adhesions, thickening and fibrosis can develop around the injury site
- Protective muscle spasms are generally diminishing
- Range of motion is still frequently reduced
- Ligaments are slower to heal due to their less vascular state
- Neurological signs, such as numbness or tingling in the arms are present with nerve root tractioning or thoracic outlet syndromes

Late Sub-Acute

- Pain, edema and inflammation are usually diminishing
- Pain can be less sharp but achier. May refer into the head or the arms
- Range of motion is generally improving
- Protective spasms are replaced with increased tone in the affected muscles
- Trigger points are developing in affected and compensating muscles
- Adhesions may become problematic around the injury site

Chronic

- Pain can be deep, achy and vague with possible referral patterns
- Headaches may be present
- Larger cervical muscle groups can be shortened and fibrosed
- Longus colli possibly in chronic spasm
- TMJ problems and hypertonicity in muscles of mastication
- Hypertonicity and trigger points can be present in affected muscles and compensating muscles

- ROM may still be reduced or close to normal
- Strength can be reduced due to disuse atrophy
- Risk of developing DDD and OA increase

History:

- Has the client been assessed by an M.D.? In acute and sub-acute stages, the client should be encouraged to obtain a medical assessment. Client may feel fine after the injury but true symptoms may take several days to arise.
- How is the client's general health? Any pathological conditions? Is the client currently being treated for any other condition besides whiplash?
- Is the client on any medication?
- Has the client ever had a neck injury before? When?
- If known, describe the exact MOI. Was the client wearing a seatbelt? Was the client the driver or a passenger? What was the direction of impact? Did the headrest stop the movement of the client's head?
- Were there any other injuries at the time?
- Was there any treatment or first-aid at time of injury? Any current parallel therapies (physiotherapy)? Was a cervical collar prescribed? To what extent was it worn? Any surgery or tractioning?
- Any difficulty swallowing? This could indicate a hematoma anterior to the cervical spine compressing the esophagus. Any difficulty with the gastrointestinal tract (nausea, vomiting, chronic indigestions, gas)? This could indicate tractioning of the vagus nerve (CN X).
- Any difficulty lifting the head from supine position? Indicating muscle weakness.
- Any headaches since the injury? These may indicate referrals from trigger points.

Observation:

Acute

- Possibly little to observe immediately after injury
- Antalgic posture may develop
- Pained look on face
- Possibly edema at injury site
- Some redness may be present at injury site
- Bruising may be visible
- Might have cervical support collar

Early and Late Sub-Acute

- Antalgic posture possible
- Possibly pained look on face
- Edema diminishes and then disappears as healing process continues
- Bruising, if visible, changes colour

Chronic

- Antalgic head posture and possible increase in cervical lordotic curve

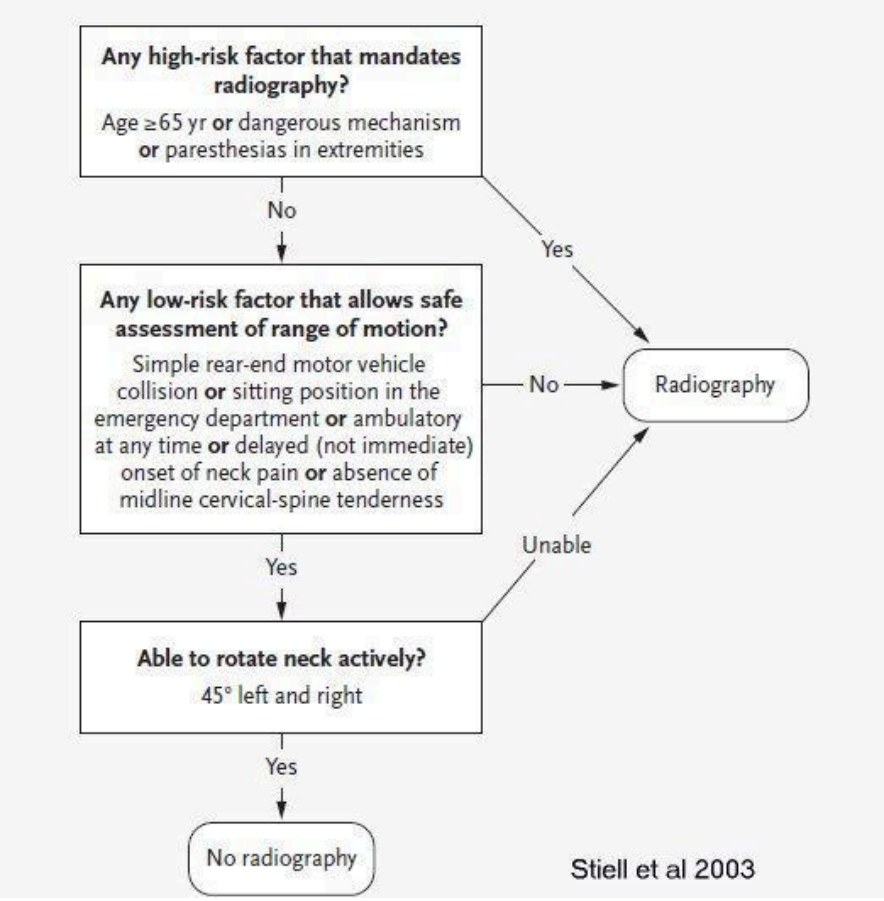
- Scapula may become protracted
- Other postural alterations, TMJ, mandible, A/C joint

Palpation:
Acute
- Heat is frequently present over the injured tissues in the neck, thorax and surrounding tissues
- Tenderness is present local to the lesion site
- Texture of edema is frequently firm
- Possible palpable gap in SCM
- Protective spasm is present in affected muscles both synergists and antagonists

Early and Late Sub-Acute
- Temperature over injury site decreases
- Point tenderness local to the injury site
- Texture of edema may be less firm
- Adhesions may begin at injury site
- Tone of affected muscles and synergists and antagonists change from spasm to tightness and hypertonicity

Chronic
- Injury site may be cool due to ischemia
- Point tenderness local to injury site
- Adhesions are present local to injury site
- Palpable gap in SCM or fascial distortion may be present
- Hypertonicity and trigger points may be present local to injury site and in compensating muscles

Movement:
Acute
- AROM of the neck is reduced due to pain
- Testing other than AROM, deep tendon reflexes and the swallowing test, are contraindicated in a high-risk acute stage
- PROM is done with care. Motions that stretch the affected muscle are done last.
- RROM isometric testing of the affected muscles can be performed on low-risk cases of whiplash



Early and Late Sub-Acute

- AROM may be limited due to pain
- PROM is performed. Ranges that stretches the affected tissue are done last
- RROM isometric testing of the affected muscle is a differential assessment for muscle strain which may be present. The client's contraction is gradually increased to maximum strength

Chronic

- AROM possibly still reduced
- PROM possibly still reduced and painful
- RROM strength testing of the affected muscles may reveal decreased muscles strength with situations of disuse atrophy

Neurological:

- Dermatomes/Myotomes/Reflexes

Referred Pain:

- Assess for latent and active TP's

Special Tests:

- Vertebral artery test – always done before any assessment that extends, side bends and rotates the head as in Spurling's
- Swallowing test – differentiate between SCM trigger points and other cervical pathologies
- Upper limb tension tests
- Spurling's test
- Cervical compression and cervical distraction tests
- First rib mobility test
- Adson's, Wright's, Costoclavicular syndrome test, Halstead's
- Three knuckle test for TMJ

CI's:

- In acute high-risk stage testing other than pain free AROM is contraindicated
- Avoid removing initial protective muscle spasm if functional
- Do not begin by passively stretching a muscle that is in spasm
- Avoid extreme stretching of the neck in acute and sub-acute stages
- Do not mobilize hypermobile joints
- Joint play is applied in a pain-free manner during acute phase
- Aggressive techniques could cause a flare up of acute symptoms
- Do not compress the carotid arteries on the anterior neck, simultaneously
- Do not use frictions if the client is taking anti-inflammatories

Treatment:

Acute

- Decrease SNS firing (diaphragmatic breathing) and reduce pain
- Treat any compensating structures
- Maintain local circulation
- Reduce inflammation, edema (lymphatic drainage proximal to the injury site)
- Reduce but do not remove protective spasm

Early Sub-Acute

- Decrease SNS firing and pain
- Treat compensating structures |(shoulders, arms, upper back, jaw)
- Reduce edema (proximal lymphatic drainage)
- Prevent adhesion formation (MFR, skin rolling, stretching)
- Reduce spasm
- Reduce trigger points with care
- Maintain ROM

Late Sub-Acute

- Decrease SNS firing and pain
- Treat compensating structures
- MFR to shortened structures prior to gentle pain free stretching
- Reduce hypertonicity and trigger points in neck and shoulder muscles
- Reduce adhesions
- Gradually increase ROM (cervical and thoracic joint mobes on hypomobile joints, along with mid to full range PROM of cervical spine)
- Local circulatory treatment

Chronic

- Hydrotherapy- deep moist heat
- Restore limited ROM with MFR, stretching, postural reeducation and petrissage
- Reduce hypertonicity and trigger points in the neck and shoulder muscles
- Increase local circulation

SELF CARE

- Relaxation techniques such as diaphragmatic breathing
- Hydrotherapy is chosen according to the stage of healing
- Self massage to appropriate muscles in the late sub-acute and chronic stages
- Remedial exercise is given depending on the stage of healing: Acute / Early Sub-Acute – AROM of neck and shoulders to the onset of pain, Late Sub-Acute – AROM is gradually increased, and submaximal pain free RROM isometric exercise for posterior cervical muscles, Chronic – gradually progress to isotonic RROM exercise for posterior and lateral neck muscles, rhomboids and middle traps. Anterior neck muscles may require careful progressive isometric strengthening.