<table>
<tr><td>Anatomy of spine</td><td>The cervical vertebrae :
C1:articulates with the occiput cranially and the axis , see “atlanto-occipital joint” which responsible of flexion and extension of the neck .
“atlanto-axial joint” between C1 and C2 which responsible for rotation of neck</td><td>The thoracic vertebrae :
Thoracic spine is one responsible for rotation</td><td>The lumbar vertebrae:
Lumbar spine for flexion and extension
In case of painful extension, which part is having the load? Pars interarticularis
In case of painful flexion, which part is having the load? The disc
In case of painful flexion and extension which part is having the load? Spine motion segment</td></tr>
<tr><td>Mechanism of injury:</td><td colspan="3">High energy trauma
Low energy trauma in a high-risk patient
Penetrating trauma from gunshot or knives</td></tr>
<tr><td>The three columns :(stability)</td><td colspan="3"><table><tr><td>Anterior column</td><td>Middle l column</td><td>Posterior column</td></tr><tr><td>Include the anterior longitudinal ligament (ALL) ⅔ of the vertebral body and disc</td><td>includes the ⅓ of the vertebral body and , up to, and including the posterior longitudinal ligament</td><td>includes the pedicles, spinal cord/thecal sac, lamina, transverse processes, facet joints, spinous process, and the posterior ligaments</td></tr></table>
(= one column or less) - it is considered a “stable injury” and it is managed conservatively if more managed surgery .</td></tr>
<tr><td>Assessment</td><td colspan="3">1- immobilization :every trauma patient that presents in the emergency needs to be immobilized with cervical collar and spinal board
2-history 3-physical examination which include American Spinal Injury Association</td></tr>
<tr><td>Spinal cord syndrome:</td><td colspan="3"><table><tr><th>Complete cord transection :</th></tr><tr><td>Flaccid paralysis below the level of injury+then transfere to spastic paralysis</td></tr></table></td></tr>
</table>

- May involve diaphragm if injury above C5
- Sympathetic tone loss if fracture above T6 (need vasopressor)

Incomplete cord transection :

	Affected spinal tracts	Etiology	Clinical features
Central cord syndrome (most common)	• Bilateral **central corticospinal tracts** and **lateral spinothalamic tracts**	• Hyperextension injury (e.g., car crash) associated with chronic cervical spondylosis • Spinal cord compression	• **Bilateral paresis: upper** > lower extremities
Anterior cord syndrome	• Corticospinal and spinothalamic tracts	• Trauma (e.g., penetrating injury, burst fracture of vertebra) • Occlusion of **anterior spinal artery**	• Bilateral motor paralysis, loss of pain and temperature sensation, and autonomic dysfunction below the level of the lesion
Posterior cord syndrome	• Posterior columns	• Trauma (e.g., penetrating injury) • Occlusion of the posterior spinal artery	• Ipsilateral loss of proprioception, vibration, and touch sensation below the level of the lesion

Brown-Séquard syndrome (hemisection syndrome)	• Hemisection of the cord	• Trauma (e.g., penetrating injury)
		• Spinal cord compression
			• Ipsilateral
			  ◦ **Loss of proprioception, vibration, and tactile** discrimination below the level of the lesion
			  ◦ Segmental flaccid paresis at the level of the lesion, spastic paralysis below the level of the lesion , and ipsilateral Babinski sign
			• Contralateral: **loss of pain and temperature sensation** one or two levels below lesion

	Etiology	Onset	Pain	Motor symptoms	Sensory symptoms

Conus medullaris syndrome	• Damage to the spinal cord segments **S3–S5** (conus medullaris), which are situated at the level of L1 vertebra
	  ◦ Spinal tumors
	  ◦ Trauma (e.g., vertebral fracture, spondylolisthesis)
		• **Sudden bilateral onset**	• Lower back pain
			• Less severe radicular pain
				• **Symmetric, hyperreflexic** distal paresis of lower limbs, possibly fasciculations
				• Achilles reflex may be absent
					• Symmetric, bilateral perianal numbness (saddle anesthesia)
					• **Sensory dissociation**

Cauda equina syndrome	• Damage to or compression of the cauda equina with nerve fibers of L3–S5 **(below L2)** ◦ Large posteromedial disc herniation, trauma, or tumors	• **Gradual unilateral onset**	• **Severe radicular pain**	• **Asymmetric, areflexic**, flaccid paresis of the legs • Muscle atrophy	• **Saddle anesthesia** (may be asymmetric) • Asymmetric, unilateral numbness and/or paresthesia in lower limb dermatomes

Specific injures :

Cervical spine fracture :	Thoracolumbar fractures:
Depend on mechanism of injury High fracture result in quadriplegia Low fracture result in paraplegia	Wedge fracture : • loss of height of the ; due to trauma or Progressive thoracic • deformity if multiple vertebral are affected • Usually stable Burst fracture: • Result of compression trauma with severe axial loading • Possible displacement of bone fragments into the spinal canal (unstable) Chance fracture : **Chance fracture** is a type of vertebral **fracture** that results from excessive flexion of the spine. Symptoms may include abdominal bruising (seat belt sign), or less commonly paralysis of the legs. May result in bowel rupture. Fracture dislocation: (unstable)

Pathological fracture :

- Usually due to infection or tumor
- Osteoporosis is common
- Low energy fracture
- X RAY : show winking owl sign (absent of pedicles sign)

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