Pain management

→ Pain is an unpleasant sensory & Emotional Experience associated with actual or potential tissue damaged or prescribed in terms of such damage.

Etiology: Etiology of Pain may not always be identifiable.

1) Muscoskeleton causes. eg: osteoArthritis, R.A.
2) Neurologic causes.
3) Causes of Headache.

Pathophysiology of Pain:

→ A complex allay of neural networks in the Brain that are acted on by affelent stimuli to produce the Experience we know as pain.

1) Nociceptive pain.
2) Pathophysiologic Pain.
   Neuropathic & functional Pain.

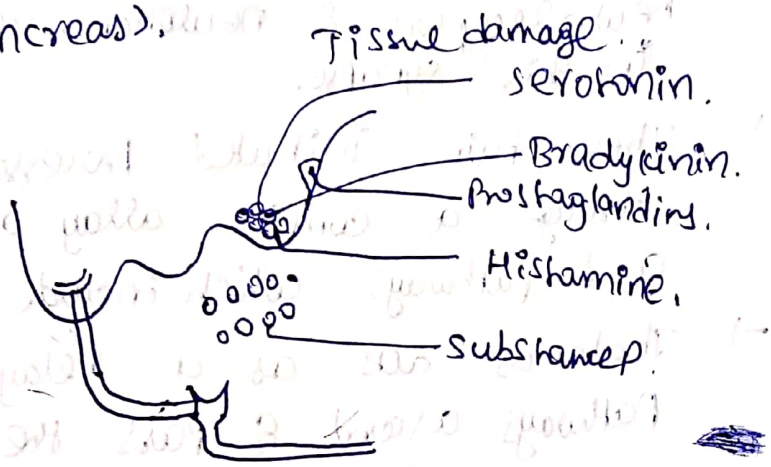
→ Nocicephon in terms of

1) Transduction
2) Transmission
3) Perception
4) Modulation.

Nociceptive pain is considered as Protective & the Physiologic typically classified as either from.

Somatic (arising from skin, Bone, Joint, muscle)
Visceral (Internal Organs such as large intestine (&) Pancreas).

1) Transduction:



Stimulation of free nerve Endings (Nociceptors).

found in both somatic & visceral structures

Nociceptors activated & sensitized by mechanical, thermal & chemical impulses.

activation of Bradykinins, Nervegrowth Substance P, serotonin.

leads to action Potential (change in Electrical Potential associated with the Passage of an impulse along the membrane of a muscle fibre)

Transmitted through (&) along afferent nerve fibres to the spinal cord.

2) Transmission:

Nociceptive transmission takes Place in the A-δ & C-afferent nerve fibres.

send impulses very fast

myelinated A-δ fibres. Evokes sharp localized pain.

unmyelinated fibres - aching, Poorly localized pain.

1° Afferent Nociceptive pain fibres synapse in various layers of the spinal cord, dorsal horn, Releasing a variety of Neurotransmitters including, glutamate, Aspartate & substance

→ Complex array of events that influence pain can be explained in part by the interactions b/w neuroReceptors & neurotransmitters that take place in this synapse.

→ These pain initiated processes reach the brain through a complex array of ascending spinal cord pathways which include spinothalamic tract.

→ Thalamus acts as a relay station as these pathways ascend & pass the impulses to cerebral structures where pain can be processed further.

Perception:

At this point in transmission pain is thought to become a conscious experience that take place in higher cortical structures.

Cognitive & behavioural functions can modify pain.

↓

Relaxation, distraction, meditation & guided mental imagery may strongly influence pain perception.

→ In contrast change in our neurobiochemical make up that results in states such as depression or anxiety may worsen pain.

Modulation: Body modulates pain through a number of complex processes.

Endogenous opiate system: consists of neurotransmitters.
Eg: Encephalins, dynorphins & β-Endorphins.

Receptors Eg: (μ, δ, ε, k) found throughout the CNS & Peripheral nervous system.

Enkephalins - Bind to opiate receptors & Release controlled levels of pain.
↳ Regulating nociception in the body.

Dynorphins - members of opioid peptide family & Predominantly / Preferentially bind to kappa receptors.
↳ Used levels - Block the release of glutamate.
Blocking - Enhance dopamine signaling.

β-Endorphins - ↗ transmits electrical signals within the nervous system ↓ Reduce of depressive symptoms. associated ∈ stress
Utilized in the body to reduce Stress & maintain Homeostasis.
↳ interact with the opiate receptors in the brain to reduce our perception of pain & act similarly to drugs such as morphine & Codeine.

→ activation of the opiate receptors by the body's Endorphins does not lead to addiction(&) dependence.

→ Stress & Pain are the two most common factors leading to the release of Endorphins.

→ CNS also contains a highly organised descending system for the control of pain transmission.
Important neurotransmitters here include.

→ Endogenous opioids.
→ Serotonin [Regulate ↗ Bowel movements in GI tract anxiety, Happiness & mood in Brain]
→ N or Epinephrine ↗ acts as neurotransmitter & hormone ↳ Emotions, sleeping, dreaming, learning] ↳ from the sympathetic Nervous system.
→ γ-GABA - inhibitory neurotransmitters. ↳ Released as a hormone into the blood, while it cause blood vessels to contract & heart rate to increase.
↳ when GABA release it supresses the activity of the neurons, motor control, vision & many cortical functions

Inhibitory Neurotransmitters	Excitatory neurotransmitters
→ GABA. (major).	L-glutamate. (major)
Glycine.	Serotonin.
	Epinephrine.
	NorEpinephrine.
	~~Acetylcholine~~.
	Nitric oxide.

Dopamine acts as a both inhibitory & excitatory neurotransmitter.

Acetylcholine same as dopamine can be both excitatory & inhibitory neurotransmitters.

NorEpinephrine

Adaptive inflammation:

→ Inflammation Pain can be thought of as the bodys shifting from preventing tissue damage to the promotion of Healing. (Eg: Surgical wounds, traumatic injury)

→ Inflammatory Pain is also associated with an increase in the excitability or responsiveness of neurons with in the CNS.

Neuropathic & Functional Pain:

→ Disengaged from noxious stimuli (&) Healing. & often is described in terms of Chronic Pain.

→ Neuropathic Pain – result of nerve damage. Eg: diabetic neuropathy

Functional Pain – Abnormal operation of the nervous system Eg: fibromyalgia, irritable bowel syndrome

mechanism responsible for neuropathic & functional pain may be the nervous systems Endogenous dynamic nature.

→ Nerve damage (&) certain disease states may evoke changes seen in inflammatory Pain.

- → Ectopic excitability (in an abnormal Place (&) Position.
- → Enhanced sensory transmission
- → nerve structure & reorganisation.
- → loss of modulatory pain inhibition.

Classification of Pain:

1) Acute Pain:

Acute pain can be a useful physiologic process.

→ Acute pain is usually nociceptive in nature. with common causes including acute illness, trauma, labour & medical Procedure.

2) Chronic Pain:

- → Pain persists for months (&) years leading to a Chronic pain.
- → This type of Pain can be nociceptive/ neuropathic/ functional./ mixed.
- → Chronic pain can be classified either being associated with cancer or from non cancer Etiologies

3) Cancer pain: Pain associated with life threatning condition often called malignant pain (&) simply Cancer pain. This is caused by the disease itself Treatment (&) diagnostic Procedure.

Charcterishics of Acute & Chronic Pain:

Charcterishics.	Acute Pain	Chronic Pain.
1) Relief of Pain	Highly desirable	Highly desirable
2) Dependance & Tolerance of medication	unusual	Common.
3) Psychological component	usually not present	Affect a major problem.
4) Environmental/Family issues.	Small	Significant.
5) Insomnia.	unusual	Common.
6) Depression	Uncommon.	Common.

Clinical Presentation:

Signs & symptoms

acute Pain		Chronic pain
Obvious distress.	anger	Hypertension
Tingling	fear.	Tachycaldia
anxiety ~~Pain~~.	Hypotension.	Shock
depression	Tachycardia	Pallor
Fatigue.	Pallor.	Tingling.
Radiating Pain.		P

Laboratory test:

→ Pain is always Subjective.

→ There is no specific lab test for pain.

→ Based on Pt-history and patient description.

Management of Pain:

Non Pharmacological:

- Application of heat (&) cold, manage & Excercise.
- Cognitive & Behaviour and social aspects of pain are well Established.

Pharmacological:

Non opiod agents: