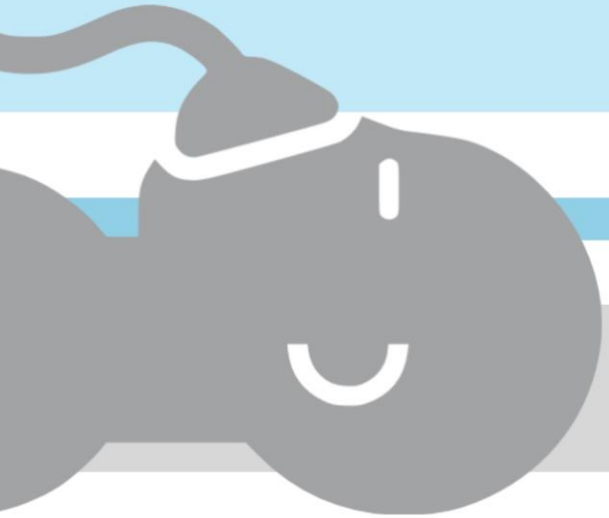


ANESTHESIA

(8) Acute Pain Management

Leader: Mody A. AlMarshad

Done by: Hessah Binjadeed and Maha Alhaidan

Revised by: Shatha Al-Shanqeeti

Doctor's note Team's note Not important Important 431 teamwork

(431 teamwork do not highlight it in yellow, but put it in a yellow "box")

Objectives:
Not given

The management of pain is a multidisciplinary team effort involving <u>physicians</u>, <u>psychologists</u>, <u>nurses</u>, and <u>physical therapists</u>.

Pain Management Goals:

- *Facilitate recovery and return to full function*
- *Ensure quality of care and patient satisfaction.*
- *Reduce morbidity and mortality.*
- *Allow early discharge from hospital.*
- *Cost effectiveness.*

Aldrete score for discharge: When the patient is free of pain

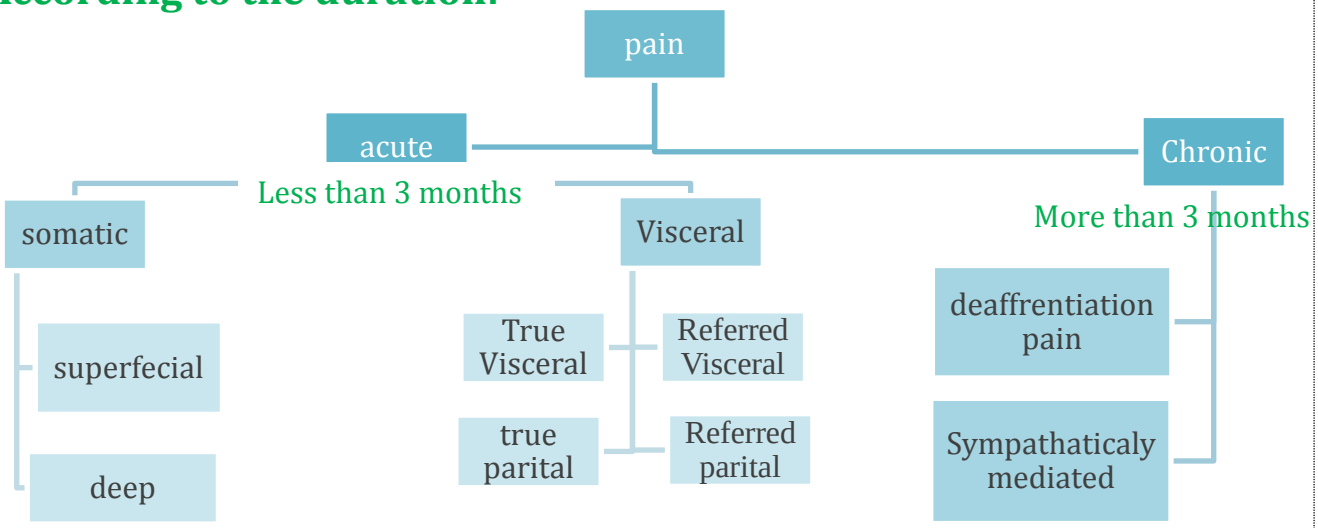
Definition of Pain:

- *'Pain is whatever the experiencing person says it is, existing whenever he/she says it does'. " PAIN IS SUBJECT" even if the pt looks happy but he told you he is in pain believe him*

- *'An unpleasant <u>sensory</u> & <u>emotional</u> experience associated with actual or potential tissue damage or described in terms of such damage' "Pain is a multidimensional experience"*

Classification of Pain:

1- According to the duration:



Acute Pain	Chronic Pain
• Intensity correlates with the triggering stimulus • Can be easily located • Has a distinct warning & protective function • e.g. surgical, trauma, dental, burn pain medical: SCC.	Any pain related to the nervous system (Central neuropathy and peripheral neuropathy) • Intensity is no longer correlated to stimulus • Often, NO nuroendocrine stress response • Sleep & affective (mood) disturbances • Requires multidisciplinary approach to management • e.g. cancer, neuropathic, & neurospinal pain

2-According to Pathophysiology:

- Nociceptive:

Due to activation, sensitization of peripheral nociceptors. Acute pain

- Neuropathic:

Due to injury or acquired abnormalities of peripheral OR central nervous system. Chronic pain

3- According to Etiology:

- Post operative
- Cancer pain

4- According to Type of organ affected

- Toothache
- Earache
- Headache
- Low backache

Acute Pain:

- Caused by noxious stimulation due to injury, a disease process or abnormal function of **muscle or viscera.**
- It is nearly always **nociceptive.**
- Nociceptive pain serves to detect, localize and limit the tissue damage.

Classification of Acute Pain According to Site of Origen			
Somatic		**Visceral**	
Classified to		Due to disease process/abnormal function of internal organs or their coverings; (pleura, pericardium, peritoneum)	
Superficial	**Deep**	**Visceral**	**Parietal**
-Nociceptive input from skin, SC tissue & mucus membranes -Well localized -Sharp, pricking, burning or throbbing	-Arises from muscles, tendons & bones -Less well localized but it is localized not like chronic - Dull/ aching	-Frequently with sympathetic activity e.g. nausea/vomiting sweating, changes in HR & BP -Dull; diffuse/midline	-Either localized to the area around the organ, or referred to a distant site -Sharp/stabbing sensation

Patterns of Referred Pain:

The doctor didn't go through them

Lungs	**T2 – T6**
Heart	**T1 –T4**
Aorta	**T1 –L2**
Esophagus	**T3 – T8**
Pancreas & Spleen	**T5 –T10**
Stomach, liver and gall bladder	**T6 –T9**
Adrenals	**T6 – L1**
Small intestine	**T6 – T9**
Colon	**T10 – L1**
Ureters	**T10 – T12**
Uterus	**T11 – T12**
Bladder and prostate	**S2 – S4**
Urethra & Rectum	**S2 – S4**
Kidneys, Ovaries & Testis	**T10 – L1**

-If a patient had MI he will have shoulder, neck, jaw and epigastric pain.

-It is commonly epigastric

-and the pt can present with chest pain, so the pain can be localized or referred

-land mark of T4: nipple

Medical Complications if not treating the pain:

Efferent pain pathway:

- *Sympathetic nervous system*
- *Endocrine system.*

Systemic Responses to Acute Pain:

- *Cardiovascular*
- *Respiratory*
- *Endocrine/ metabolic*
- *Immune*
- *Gastrointestinal*
- *Urinary*
- *Musculoskeletal*

1-Cardiovascular System:

- *↑ HR (Tachycardia)*
- *↑ BP (Hypertension)*
- *↑ systemic vascular resistance*

So if the patient has an underling disease like HTN and we didn't control his pain post-op he might develop bleeding, stroke. Give the pt pain killers and he will be okay.

2- Respiratory Tract:

As a result of anesthesia> atelectasis, the pt in supine position and can't breathe > more atelectasis.

- *↑ O2 demand & consumption because of pain*
- *↑ minute volume*
- *Splinting → ↓ chest excursion*
- *↓ vital capacity,*
- *Atelectasis →↑ shunting, hypoxemia*
- *Retention of secretions because of sympathetic stimulation → chest infection*

3- G.I.T. & Urinary Tract:

- *↑ sympathetic tone*
- *Ileus and urinary retention*
- *Hypersecretion in the stomach → ↑ chance of aspiration > pneumonia > increased mortality and morbidity post-op*
- *Abdominal distension → ↓ chest excursion*

4- Endocrine System:

- *↑ secretion of Catecholamine, Cortisol & Glucagon. Stress hormone activation*
- *↓ secretion of Insulin & testosterone*

If the pt is diabetic, the blood sugar will be very high the healing process will be delayed, and the risk of infection will increase

5- Hematological Effects:

- *↑ Platelet adhesiveness*
- *↓ Fibrinolysis*
- *Hyper-coagulability state and increased risk of DVT because of immobility.*

6- Immune System:

- *Leukocytosis*
- *Lymphopenia*
- *Depression of RES*

Psycho-emotional Complications:

1- Suffering:

Reaction to the physical or emotional components of pain. ***Feeling of: uncontrollability, helplessness, hopelessness, intolerability …etc.***

2- Pain Behavior:

Verbal/non-verbal actions that indicate pain & suffering. ***e.g.: audible complaints, facial expressions, abnormal gait/postures, avoidance of activities & distress.***

POSITIVE ROLE OF PAIN

Acute pain plays a useful positive physiological role by providing a warning of tissue damage. So if the pt has post-op complications treat the pain before anything else.

Assessment of Pain:

This is not used in post-op

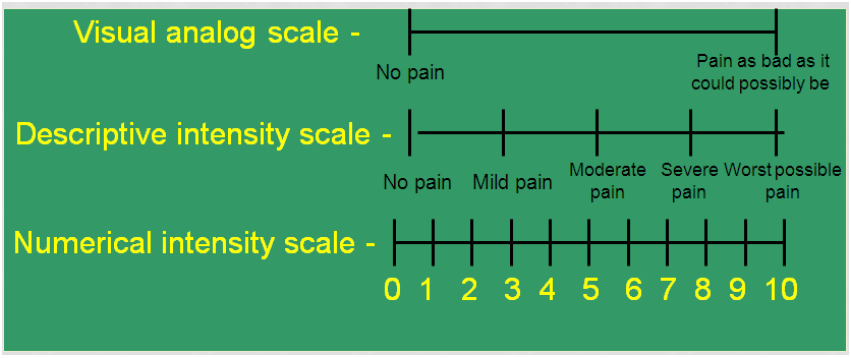
- *Location*
- *Onset*
- *Description (quality)*
- *Intensity (quantity)*
- *Aggravating & relieving factors*
- *Previous treatment*
- *Effect on daily activity*

Pain is the 5th Vital Sign

A. Pain Assessment Tools:

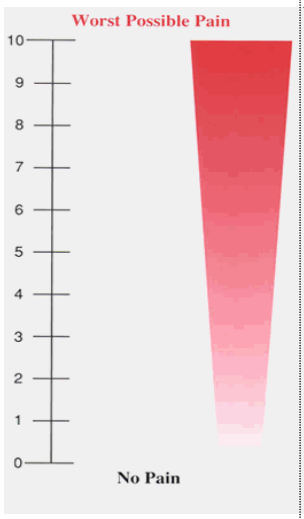
Selection depends upon: *Age & cognitive state/function*

- Verbalizing Pts:
  Adult & Pediatric
- Non-verbalizing Pts:
  - Below 2 yrs
  - Sedated/Unconscious



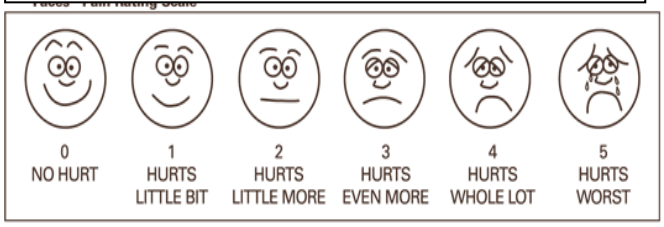
1) Children between 3-8 yrs:

- Usually have a word for pain
- Can articulate details about the presence & location of pain
- Less able to comment on quality or intensity



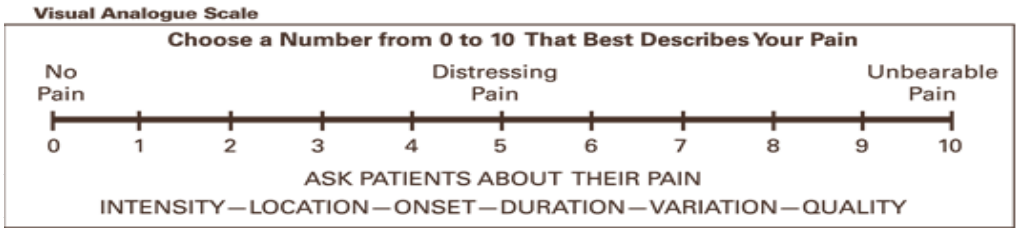
Color Scale

Wong Baker Faces Pain Rating Scale

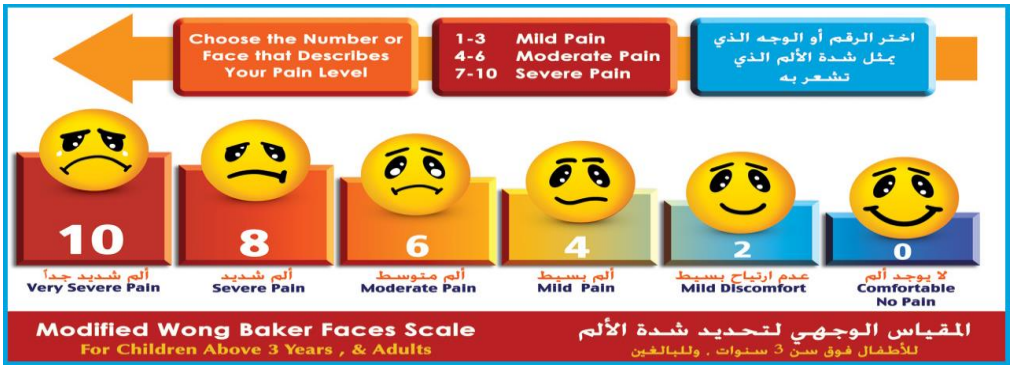


2) Pts older than 8 yrs:

- Visual analog scale
- Descriptive scales



B. KKUH Standardized Pain Assessment Scales:



C. FLACC Scale

Behavioral Observation Scale; **for Children aged 2 months- 7 years**

The doctor didn't go through it "if you worked in pediatric ICU remember it"

CATEGORIES	0	1	2
FACE	NO particular expression or smile	Occasional grimace/ frown, withdrawn, disinterested	Frequent to constant quivering chin, clenched jaw
LEGS	Normal position or relaxed	Uneasy, restless, tense	Kicking, or legs drawn up
ACTIVITY	Lying quietly, normal position, moves easily	Squirming, shifting back & forth, tense	Arched, rigid, or jerking
CRY	No cry (awake/ sleep)	Moans or whimpers, occasional complaints	Cries steadily, screams or sobs, frequent complaints
CONSOLABILITY	Content, relaxed	Reassured by occasional touching, hugging, or being talked to, distractible	Difficulty to console or comfort

Pain Management

- Pain management continues to be a challenge to all physicians.
- PCA & epidural analgesia are advances in analgesia that may assist physician with this challenge
- Pain management can be evaluated in terms of its ability to meet 2 main goals:
  - To relieve postoperative pain.
  - To relieve patient of inhibition of respiratory movement without sedation. Free of pain and fully awake

There are many different techniques, non-pharmacological & pharmacological, both regional and non-regional to provide post op analgesia.

1- Non-pharmacologic Pain Relief Techniques:

(usually used with chronic pain patients)

- *Heat & Cold*
- *Hydrotherapy*
- *Touch & massage*
- *Movement & Positioning*
- *Transcutaneous electric nerve stimulation (TENS)*
- *Acupuncture*
- *Hypnosis*
- *Aromatherapy (herbal therapy)*
- *Audio-analgesia.*

2- Pharmacologic Pain Relief: following the WHO recommendations

'WHO' definition of Health, 1947
A state of complete physical, mental, & social well-being & not merely the absence of infirmity.

{ Concept of quality of living }

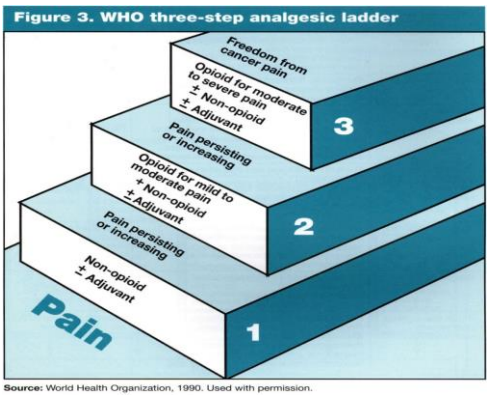
'WHO' & pain:

- Pain management is a 'human right'
- WHO analgesic ladder
- Pain management in cancer pts.

<u>Concepts in Pain Management:</u>

' WHO' recommendations for analgesic use:

- *By the mouth*
- *By the ladder*
- *By the clock*
- *For the individual*
- *With attention to detail*



'WHO Analgesic Ladder' Principle:

Pain management using analgesia should be based on the intensity of pain reported by the pt. rather than its specific etiology'.

WHO- Based Analgesic Ladder:

If the pain is persistent or increasing we move to the next step.

Severe (7-10)

- Morphine
- Hydromorphone
- Fentanyl
- Methadone
- Pethidine
- ± *Adjuvants*

Moderate (4-6)

- Codeine
- Hydrocodone
- Oxycodone
- Tramadol
- ± *Adjuvants*

Mild (1-3)

- Acetaminophen
- NSAIDs
- ± *Adjuvants*

<u>Examples for adjuvants</u>: **anticonvulsants** *(↓ neurotransmitters → less pain)*, **antidepressants** *(improve the pt's sleeping time → less pain)*, **NMDA antagonists**, **local anesthesia**, **clonidine**, and **corticosteroids** *(anti-inflammatory → ↓ the edema → ↓ the pain that is caused by the pressure & inflammation).*

Causes of Post-operative Pain:

- ❑ Surgical Trauma:
  Incisional: skin & subcutaneous tissue
  Deeper: cutting, coagulation, nerve compression/traction.

- ❑ Position & Activities:
  Coughing, deep breathing, urinary retention
  Ambulation, physiotherapy

- ❑ Others:
  IV site: needle trauma, extravasation, venous irritation (can be caused by propofol)
  Tubes: drains, NGT, ETT
  Cast, dressing (too tight)

A) Patient Control Analgesia (PCA)

A technique whereby Pt. is allowed to self administer small doses of an analgesic when pain is present, using a programmable infusion pump that aids titration of analgesia according to the intensity of pain. Simply will instruct the pt. whenever you feel pain just press the button

Why PCA?

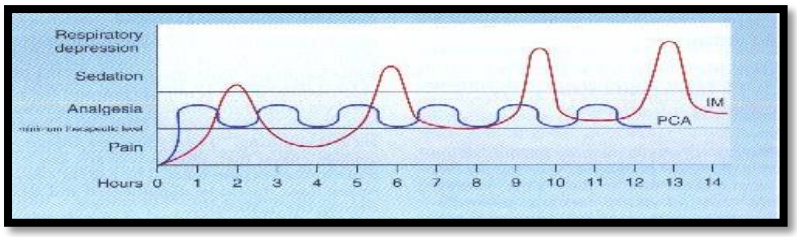
- ⦿ *Pain is subjective*;

- 'Pt. is the best judge of his/her pain'.
- Pt. should be allowed an active role in controlling their pain.

When the pt. takes the drug, for 4 hrs he/she will be sedated.
After 4 hrs, the plasma level of the drug will be reducing "some medication is still in the plasma but it is not enough to relieve the pain > so the pt. will complain again of pain and will receive another dose.
If the pt. has any problem in the kidney or the liver, metabolism will be less > excretion will be less > so there will be an accumulation of the drug in the plasma > will lead to complications like respiratory depression or convulsions.

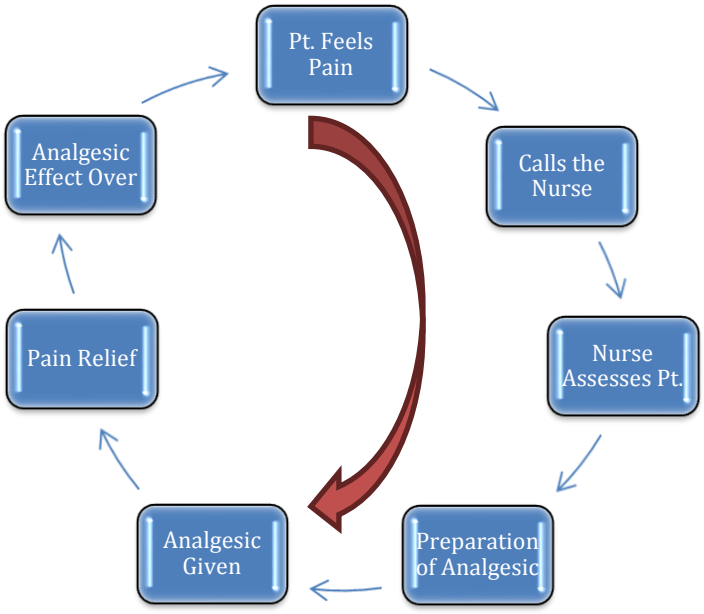
Advantages of PCA- IV:

- ✓ Therapeutic level reached relatively quickly.
- ✓ A steady state plasma level occurs, because plasma drug elimination is balanced by



repeated boluses.

- ✓ Used in a variety of acute medical (e.g. sickle cell crisis) & post-op surgical conditions.
- ✓ Flexibility in programming 'dose & frequency' as per pt's need (usually 1 dose every 6 mins. If the pt press again for additional dose before 6 mins it will not give him another dose and that's for his/her own safety) *the 6 mins interval can be adjusted according to the pt's need.
- ✓ Controlled 'opioid' usage & side effects.
- ✓ Better pain control→ improved pt. functioning & compliance, *e.g. better breathing & coughing, earlier mobilization, ↑ tolerance of physiotherapy, better sleep & less anxiety..etc.*
- ✓ Pt. control over pain → better satisfaction.
- ✓ Elimination of the time lag between pt's pain report & receiving analgesia.



Adverse Effects & Management:

Adverse Effect	Management
Sedation & Resp. depression	IV Narcan
Nausea & Vomiting *(opioids stimulate the chemoreceptor trigger zone)*	We can change the dose or change the drug, & if still nauseated we can give → Primperan (=metoclopramide)
Pruritus	Diphenhydramin (antihistamine) Narcan (low dose)
Urinary retention	Catheterization/ Narcan (low dose)
Hypotension	IV fluids
Slowing of GI motility	

B) Neuraxial Analgesia (NA)

- Epidural Analgesia (EA): can be given at any level
  Administration of medication into epidural space.
- Intrathecal (spinal) Analgesia: should be below L2
  Administration of medication into subarachnoid space.

The doses given in epidural is more than in spinal (1cc spinal is equivalent to 10 cc in epidural)

Baricity affects local anesthetic spread and block height because of gravity. Hyperbaric solution > flow downward in the CSF Hypobaric solutions> rise. Gravity has no effect on the distribution of isobaric solutions.

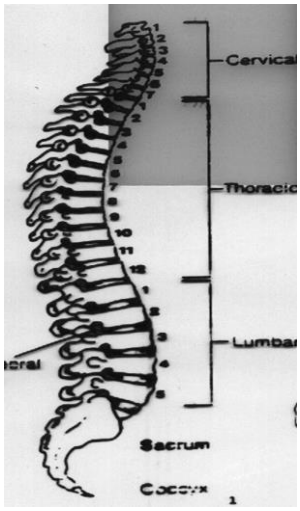
EA:

Advantages	Indications	Contraindications
- Convenient pain control in pts. with medical comorbidities - Improved pulmonary functions - Early ambulation - ↓ incidence of DVT (because EA blocks the sympathetic system → parasympathetic takes over → vasodilation → easier blood flow → ↓ DVT) - Faster return of bowel function.	*EA in pain management:* - Major surgery: abdominal, pelvic, lower limbs..etc. - Trauma: e.g. fractured ribs. - Palliative care: relief of intractable pain (like in cancer pts) - Labor pain analgesia/anesthesia	*ABSOLUTE:* 1- Patient Refusal 2- Sepsis or Infection at injection site 3- Coagulopathy 4- Elevated ICP or Cerebral Edema 5- Local Infection near injection site *RELATIVE:* 1- Hypovolemia 2- CNS Disease 3- Chronic Back Pain 4- Anticoagulation

Spinal cord (SC) anatomy:

Spinal Cord:

- Extends from the foramen magnum to lower border of L1 in adults/ S2 in children.
- Protected & surrounded by meningeal membranes: 'dura, arachnoid & pia mater'



Epidural Space: (closed space)

- Potential space, between the dura-mater & ligamentum flavum
- Made up of fatty tissue, blood vessels, lymphatics & nerves.
- Extends from foramen magnum to the sacro-coccygeal ligament.

Anatomy:
Skin > subcutaneous tissue > supraspinous ligment > interspinous ligament > ligamentum flavum > epidural space

Insertion of Epidural Catheter (EC):

- Positioning of pt.:

Patient assumes a sitting or side-lying position with the back arched toward the physician (to help spread vertebrae apart).

- Site is dependent upon the area to be relieved of pain:

Incision Level	Epidural Block Level
Thoracic	T4-T6
Upper abdomen	T6-T8
Lower abdomen	T8-T10
Pelvis	T8-T10
Lower extremity	L1-L4

Important (MCQ):
T4 is at the level of the nipple.

T6 is at the level of xiphoid process

T10 is at the level of the umbilicus

L1 is at the level of the inguinal

ECs have 'length markings':

√ Dark mark at the tip
√ 1st single mark = 5 cm
√ Double mark = 10 cm
√ Triple mark = 15 cm
√ Fourth mark = 20 cm

- Ideal placement (adult)= *10-12 cm* at the skin
- *A change in depth of EC indicates migration either into/out of the epidural space.*

Potential Problems:

- EC migration into a blood vessel in the epidural space or subarachnoid space;

- *Rapid onset 'loss of consciousness'*
- *Variable loss of sensory/motor functions*
- *Toxicity*
- *Profound hypotension*

- EC migration out of the epidural space:

- *Ineffective analgesia (some of the cath. pores are outside)*
- *Absent analgesia (all of the cath. pores are outside)*
- *Drugs deposited into soft tissue.*

Test Dose: (After insertion of the catheter to make sure it is not migrated)
We give lidocane and epinephrine:
- If the HR ↑ by 15-20 beats >> it means that the cath. is intravascular. *"effect of epinephrine"*
- Ask the patient to move his big toe > if he can't (motor defect) >> it means that the cath. is intrathecal. *"effect of lidocane"*

Epidural Drugs/Analgesics: (not important)

- Opioids:

- Fentanyl, Morphine
- Affect pain transmission at the opioid receptors.

- Local Anesthetic (LA):

- Bupivacaine (marcaine); 0.0625%, 0.125%, 0.25%
- Inhibits pain impulse transmission at the nerves fibers.

- *Methods of Administration:*

- Boluses: Fentanyl/ Duramorph
- Continuous infusion: Marcaine + Fentanyl

Epidural drugs must be preservative free.
Epidural opioids must be diluted with NS prior to intermittent bolus administration.

1) Epidural Opioids: (not important)

Morphine (Duramorph/Astramorph)

- Hydrophilic (H2O) soluble)
- Slow diffusion across dura to SC
- Broad spread
- Duration: + 6hrs
- May cause late respiratory depression
- Monitor respiratory status for 12 hrs after the last dose.

Fentanyl

- Lipophilic (fat soluble)
- Crosses the dura rapidly
- Rapid onset of action
- Segmental spread
- Onset 5-20 mins
- Duration 2-4hrs
- lower risk of late respiratory depression
- Excellent for breakthrough pain

2) Epidural Local Anesthetic:

- LAs act as analgesics at sub-anesthetic doses.
- Sensory fibers are blocked before motor fibers
- Pain fibers are blocked before heat/cold & touch/pressure sensory fibers.
- Onset of action: 10-15 min.
- Duration of action: +4hrs after a bolus or after infusion is stopped
- Extend of spread is influenced by drug volume position of Pt.

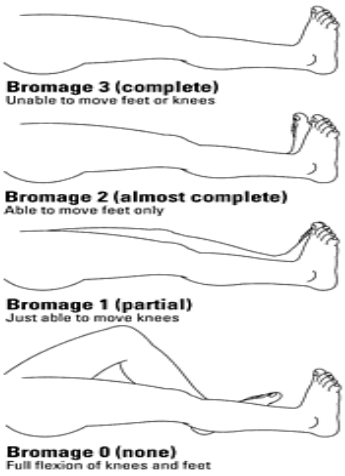
EA: Pt. Assessment:

Sedation Level: **(not important)**

0	None	Alert
1	Mild	Easily aroused
2	Moderate	Difficult to arouse or RR <10 (notify APS)
3	Severe	Unresponsive or RR <8. (notify APS)

Assessment for motor block:

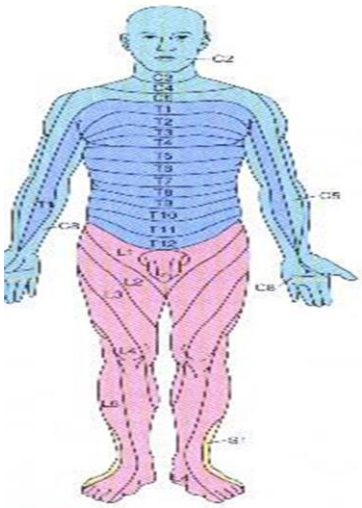
'Bromage Scale'



Assessment for Sensory Block:

'Dermatome Level':

- Use 'ice in glove'
- Start in upper neck & move down thorax bilaterally assessing all potential dermatomes
- Level of block is where intensity of cold changes or the cold sensation is absent



EA:

Adverse Effect	Management
Hypotension	- Assess intravascular volume status - No trendelenberg positioning - Teach Pt. to move slowly from a lying position to sitting to standing position. - IV Fluids.
Urinary retention	Urinary catheter
Temporary LL motor/sensory deficits	↓ the rate of infusion or concentration
LA toxicity (neurotoxicity)	Stop infusion.
Respiratory insufficiency	- Stop infusion - ABC, O2 (100%), & call for help - Assess for spread & height of block - Alternate analgesia
Headache (PDPH) - Caused by CSF leakage → ↓ ICP → throbbing headache - It's relived with sleeping and aggravated with sitting	- Symptomatic trt.: bed rest, fluids, caffeine - Autologous blood patch (viscosity of blood will increase epidural pressure, thus increasing ICP)
Infection	- Take EC out. - Tip for C & S
Hematoma	Intravenous placement of catheter Subdural placement of catheter

Acute toxicity:

- Main concern is CNS and cardiac toxicity
- With most drugs, CNS toxicity proceeds cardiac toxicity, providing a warning of impending disaster.
- Key response: maintain oxygenation and normal CO_2!
- With bupivacaine, CNS toxicity rapidly progresses to cardiovascular collapse.

CNS	Cardiac
Usually the 1st sign is circumoral numbness (important) - Tinnitus, dizziness, lightheadedness are early signs - Anxiety → disorientation → loss of consciousness → seizures → respiratory arrest	- Hypotension *All local anesthetics are negative inotropes* - PVC → wide QRS → Multiform vtach → vfib, or Pattern with bupivacaine - Bradycardia → asystole *Pattern with bupivacaine + lidocaine*

Treatment: first ask for help & start with ABC (MCQ)

- Airway:

100% oxygen

Intubate if necessary to ventilate

- CNS:

Break seizure with propofol, thiopental, or midazolam

- Cardiovascular

Amiodarone has demonstrated efficacy. Use 300 mg

Lidocaine would be a particularly poor choice!

Risk of seizure and/or cardiovascular collapse is increased by:

Cold temperature (slows metabolism)

Metabolic or respiratory acidosis

Hypoxia

Pregnancy (the uterus increases the pressure on the epidura so any medication you give it can go high, so usually we reduce the dose in pregnant women)

Summary

- Pain is subjective
- Pain can be classified according to different aspects.
- Pain classified according to the time into: acute < 3 months and chronic > 3months.
- Acute pain is further devided into somatic and visceral, each have subtypes.
- Pain classified into Nociceptive and Neuropathic according to pathophysiology.
- If the pain is not treated it will affect many system:

Cardiovascular ➢ Respiratory
Endocrine/ metabolic ➢ Immune.
Gastrointestinal ➢ Urinary
Hematological

- There are many ways to assess the pain postoperatively
- Selection depends upon: Age & cognitive state/function

- WHO' recommendations for analgesic use:
  - By the mouth
  - By the ladder
  - By the clock
  - For the individual
  - With attention to detail

- WHO- BASED ANALGESIC LADDER:
  - Mild (1-3) : Acetaminophen- NSAIDs ± Adjuvants
  - Moderate (3-6) : Codeine - Hydrocodone - Oxycodone - Tramadol ± Adjuvants
  - Sever (7-10) : Morphine - Hydromorphone - Fentanyl - Methadone - Pethidine ± Adjuvants

* Epidural Analgesia (EA): Administration of medication into epidural space.
Intrathecal Analgesia: Administration of medication into subarachnoid space.

* Advantage of epidural anesthesia: Improved pulmonary functions - Early ambulation - ↓ incidence of DVT - Faster return of bowel function

- CONTRAINDICATIONS of epidural anesthesia:
- ABSOLUTE:

Patient Refusal - Sepsis or Infection at injection site - Coagulopathy - Elevated ICP or Cerebral Edema - Local Infection near injection site.

- RELATIVE:
- Hypovolemia - CNS Disease - Chronic Back Pain - Anticoagulation

- ADVERSE EFFECTS of epidural anesthesia:

Hypotension - Urinary retention - headache - infection - hematoma - Temporary LL motor/sensory deficits - LA toxicity (neurotoxicity) - Respiratory insufficiency

MCQ's :

Q1: When assessing the intensity of the pain, the nurse should:
A) Ask about what precipitates the pain
B) Question the patient about the location of the pain
C) Offer the patient a pain scale to objectify the information
D) Use open-ended questions to find out about the sensation

Q2: The patient tells the nurse about a burning sensation in the epigastric area. The nurse should describe this type of pain as:
A) Referred
B) Radiating
C) Deep visceral
D) Superficial or cutaneous

Q3: Nurses working with patients in pain need to recognize and avoid common misconceptions and myths about pain. In regards to the pain experience, which of the following is correct?
A) The patient is the best authority on the pain experience.
B) Chronic pain is mostly psychological in nature.
C) Regular use of analgesics leads to drug addition.
D) The amount of tissue damage is accurately reflected in the degree of pain perceived.

Q4: The patient will be going home on medication administered through a PCA (patient-controlled analgesia) system. To assist the family members with an understanding of how this therapy works, the nurse explains that the patient:
A) Has control over the frequency of the IV analgesia
B) Can choose the dosage of the drug received
C) May request the type of medication received
D) Controls the route for administering the medication

For mistakes or feedback

Anesthesiateam432@hotmail.com

Answers:
Q1: C
Q2: C
Q3: A
Q4: A