



## Post-op pain management

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### Objectives:

- DEFINE THE ACUTE PAIN AND CLASSIFICATION
- DISCUSS THE ASSESSMENT OF ACUTE PAIN
- DESCRIBE THE MANAGEMENT OF ACUTE PAIN

### Color index:

- Red: important /
- Black: content slides
- Gray: extra
- Green: dr. Notes

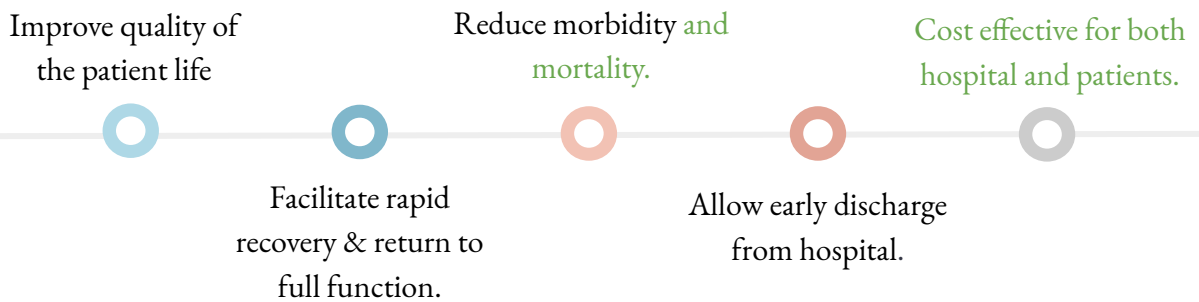


# Introduction to acute pain

## Pain

- Definition: It's an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage."INTERNATIONAL ASSOCIATION OF STUDY OF PAIN 19793"
- Pain is subjective and difficult to quantify.
- The management of pain is a multidisciplinary team effort involving physicians, psychologists, nurses, and physical therapists.

### Goal of pain treatment:

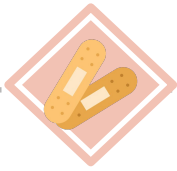


### Classification of pain

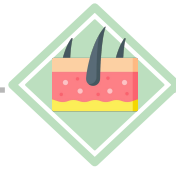
According to <b>pathophysiology</b>	<ul style="list-style-type: none"> <li>• Nociceptive: Due to activation and sensitization of peripheral nociceptors</li> </ul>		<ul style="list-style-type: none"> <li>• Neuropathic: Due to injury or acquired abnormalities of peripheral OR central nervous system</li> </ul>	
According to <b>etiology</b>	Post operative pain		Cancer pain.	
According to <b>duration</b>	Acute		Chronic	
According to <b>type of organ affected</b>	Toothache	earache	Headache	low backache

# Acute pain

## 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.

## Types of acute pain:

Type	Somatic		Visceral	
Subtypes	Superficial	Deep	Visceral: True localized or Referred	Parietal: Localized or Referred
Origin	Nociceptive input from skin, subcutaneous tissue and mucous membranes	Arise from <b>deep tissue like:</b> Muscles, Tendons and Bones	Due to disease process, abnormal function of internal organ or its covering, e.g. Parietal pleura, Pericardium or Peritoneum.	
Nature of pain	<ul style="list-style-type: none"> <li>• Well localized</li> <li>• Described as sharp, pricking, burning and throbbing</li> </ul>	<ul style="list-style-type: none"> <li>• Dull aching and is less well localized <sup>1</sup></li> <li>• Intensity and Duration of stimulus affects the degree of localization</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Start</b> Dull, diffuse and in midline <b>then localize to the area affected.</b></li> <li>• Frequently associated with abnormal sympathetic activity causing nausea, vomiting, sweating and changes in HR (<b>tachycardia</b>) and <b>high BP.</b></li> </ul>	<ul style="list-style-type: none"> <li>• Sharp, often described as stabbing sensation (<b>Usually with breathing</b>) either localized to the area around the organ or referred to a distant site</li> </ul>

1- It's well localized but when we compare it with the superficial pain it's less localized

# Acute pain

## Systemic responses to acute pain:

Efferent limb of the pain pathway is: **sympathetic nervous system, and endocrine system.**



### Cardiovascular <sup>1</sup>

- Tachycardia.
- Hypertension.
- Increased systemic vascular resistance.



### Respiratory

- Increased oxygen demand and consumption.
- Increased minute volume.
- Splinting and decreased chest excursion.
- Atelectasis, increased shunting, hypoxemia.
- Reduced vital capacity, retention of secretions and chest infection.



### GI and urinary

- Increased sympathetic tone.
- Decreased motility, ileus and urinary retention.
- Hypersecretion of stomach.
- Increased chance of aspiration.<sup>2</sup>
- Abdominal distension leads to decreased chest excursion.



### Endocrine

- Increase secretion of **all stress hormones**: Catecholamine, Cortisol and Glucagon.
- Decreased secretion of Insulin and testosterone.<sup>3</sup>



### Hematological <sup>4</sup>

- Increased platelet adhesiveness.
- Reduced fibrinolysis
- Hypercoagulability



### Immune

- Leukocytosis.
- Lymphopenia.
- Depression of reticuloendothelial system.

1- If the pt is ASA I then he will tolerate these changes but if he's ASA II or III then he may develop **complications postoperatively due to tachycardia, HTN and high systemic vascular resistance which are:** MI, ischemia, stroke and hemorrhage (hematoma)

2- Increase the chance of pneumonia

3- If a patient is having diabetes this will lead to hyperglycemia, reduced immunity, prolonged healing period, higher infections rate & septicemia leading to prolonged hospital stay.

4- A patient in pain who can't be mobilized out of his bed will have increased chance of getting DVT which in turn may get complicated with PE

# Acute & chronic pain

## Systemic responses to acute pain: cont...



### General sense of well-being

- Anxiety, Sleep disturbances.
- Depression.

## Pattern of referred pain:

Lungs	T2 – T6
Heart <sup>1</sup>	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

- Acute pain plays a useful positive physiological role by providing a warning of tissue damage. So post op when you ask where the pain is the patient will point to it (pin-point it), Postoperative pain is a type of “Acute Pain”.

## Chronic pain:

Chronic pain is defined as that which persists beyond the usual course of an acute disease or after a reasonable time for healing to occur.

Period varies between 6 or > months in most definitions.<sup>2</sup>



Chronic pain may be nociceptive, neuropathic, or a combination of both.

Patients with chronic pain often have an absent neuroendocrine stress response.

Usually HR, BP and blood sugar will all be normal in chronic pain patient while the patient is feeling severe pain. Neural and endocrine systems will not give us a protective sign that the pain is present. That's why they label most of chronic pain patients as addictive while they're not.

They have prominent sleep and mood disturbances.<sup>3</sup>

1- In case of heart attack referred pain can be felt in epigastric, left arm, left jaw, left shoulder or the back. And this is because of convergence of the nerves at the spinal cord level

2- Mainly we give time for persistent postoperative pain 1-2 months, if it exceeds 3-6 months this will be considered as a chronic pain

3- Need psychiatric intervention

# Acute & chronic pain

Acute pain	Chronic pain
Caused by external or internal injury or damage.	Uncoupled from the causative event
Can be easily located	Lasts longer than expected Becomes a disease in its own right
Its intensity correlates with the triggering stimulus	It's intensity no longer correlates with a causal stimulus
Has a distinct warning and protective function	Has lost its warning and protective function
	Is a special therapeutic challenge that requires interdisciplinary procedures

## Pain assessment

- Ask your patients about their pain;<sup>1</sup>



<sup>1</sup>- The postoperative patient might be a little bit sedated after the anesthesia and maybe in a severe pain so he will not tolerate to answer these questions

# Measurement tools

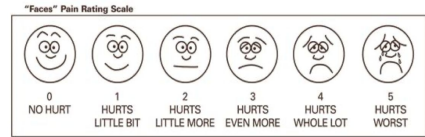
- provide a valuable means of overcoming this problem.



## Color scales & Faces scales

Children between 3-8 (age range is IMP)

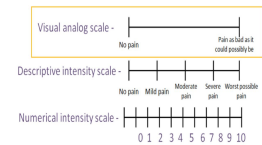
- Usually have a word for pain
- Can articulate more detail about the presence and location of pain; less able to comment on quality or intensity



## Visual analogue scale & Descriptive and Numerical intensity scale <sup>1</sup>

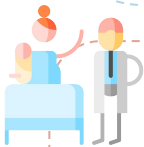
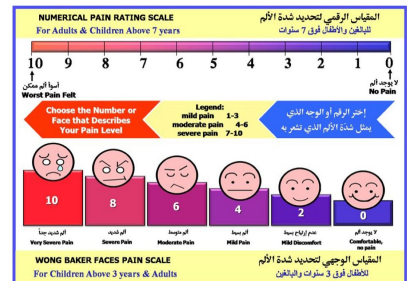
Children older than 8 and Adults

- Use the standard visual analog scale



## The WONG BAKER FACES scale <sup>2</sup>

- Ask patient to point to the faces that matches their feelings.
- The number used to record the score.
- Used in patients with language barriers or with kids.
- 0-No pain and 10-Severe pain.
- User friendly.
- Easy to explain to patient.
- Compact to carry
- Could be used as three scales because it combines:
  - Facial expression.
  - Numbers.
  - Words.



## FLACC scale (for neonates)

Behavioral Observation Pain Rating Scale

Categories	Scoring		
	0	1	2
Face	No particular expression or smile; disinterested	Occasional grimace or frown, withdrawn	Frequent to constant frown, clenched jaw, quivering chin
Legs	No position or relaxed	Uneasy, restless, tense	Kicking, or legs drawn up
Activity	Lying quietly, normal position, moves easily	Squirming, shifting back and forth, tense	Arched, rigid, or jerking
Cry	No crying (awake or asleep)	Moans or whimpers, occasional complaint	Crying steadily, screams or sobs, frequent complaints
Consolability	Content, relaxed	Reassured by occasional touching, hugging, or talking to. Distractable	Difficult to console or comfort

Each of the five categories (F) Face; (L) Legs; (A) Activity; (C) Cry; (C) Consolability is scored from 0-2, which results in a total score between 0 and 10.

1- Numerical intensity scale is the most commonly used, 0= no pain at all, 1-3= mild pain, 4-6= moderate pain, 7-9= severe pain, 10= worst pain ever  
 2- Used in pediatric and when there is a language barrier, this card is used here at KKUH. We let the Pt choose which face represents his/her feeling.

# Pain management

- Pain management continues to be a challenge.
- PCA (patient-controlled analgesia) & epidural analgesia are advances in analgesia that may assist nurse with this challenge.
- Pain management can be evaluated in terms of its ability to meet 2 main goals:



To relieve postoperative pain.

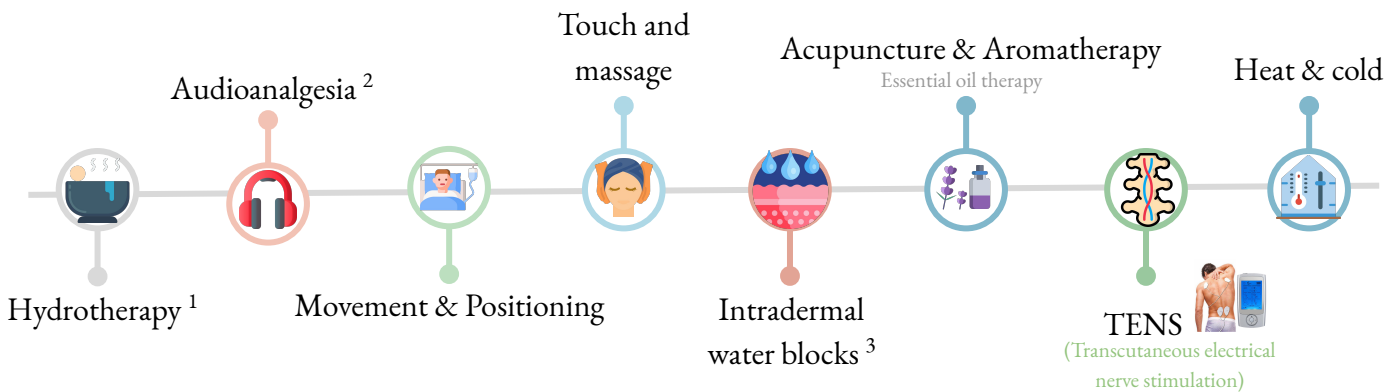


To relieve patient of inhibition of respiratory movement without sedation.

## Pharmacology of pain management:

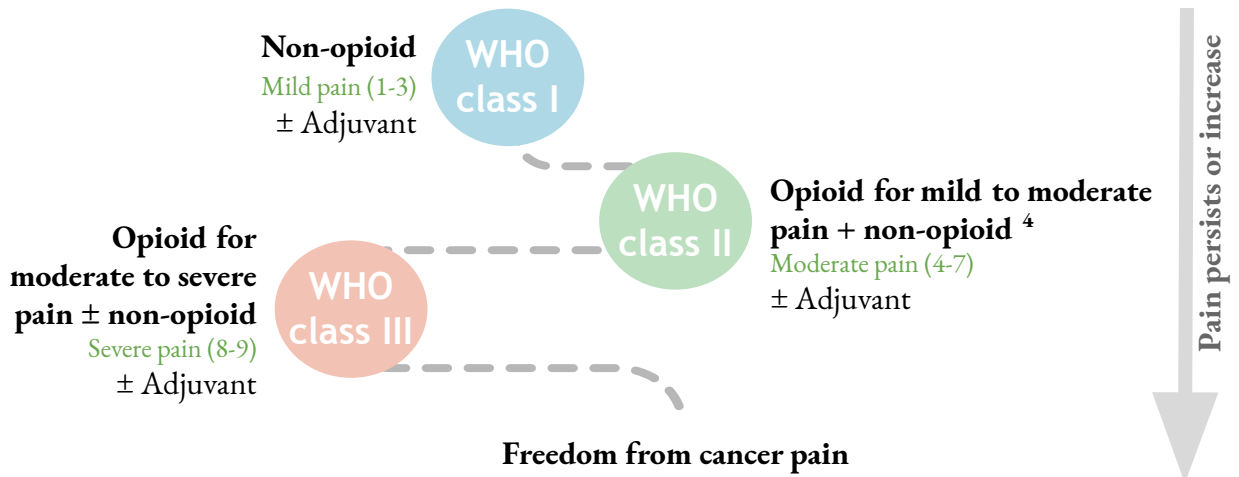
There are many different techniques, non-pharmacological & pharmacological, both **regional** and **non-regional** to provide **post op analgesia**.

### 1- Non Pharmacological approaches to relieve pain and prevent suffering:



### 2- Pharmacological:

**WHO Ladder:** an essential principle in using medications to manage pain and to individualize the regimen to the patient.



1- Involves carrying out active and passive movements in warm water to increase circulation, which helps ease pain and loosens up stiff muscles and joints. Help to relieve back, neck pain & arthritis

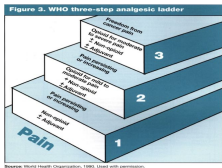
2- Relief of pain using white noise or music while doing painful medical procedures such as dental treatments

3- 4 Intradermal injections with sterile water it's been found that it is effective in decreasing severe low back pain in most laboring women within minutes. Pain relief lasted 45 to 120 minutes.

4- To potentiate the action

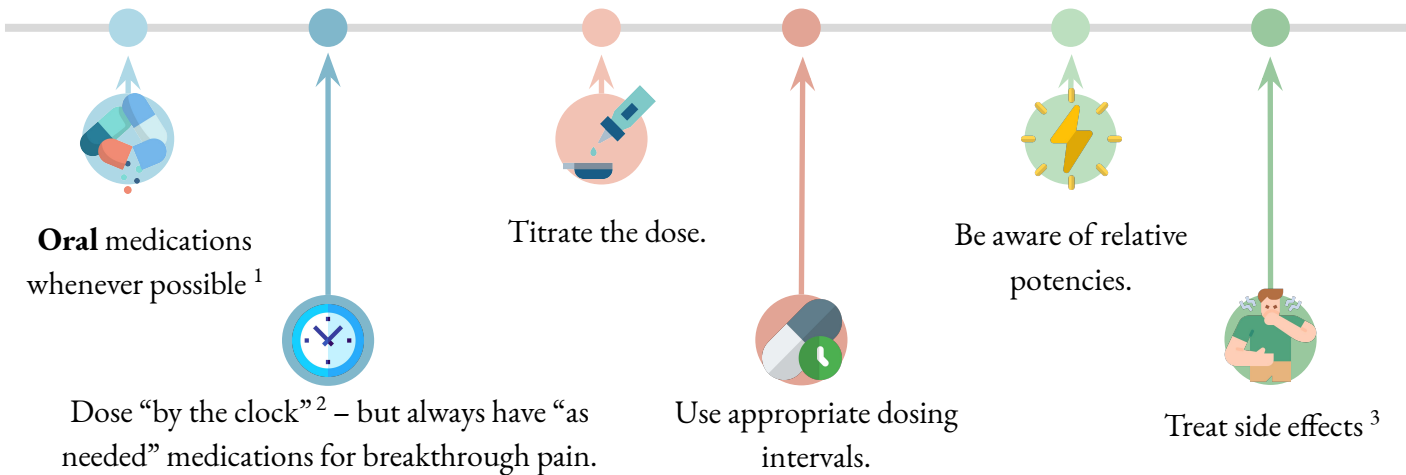


# Pain management



	NON OPIOID	Weak Opioid	Strong Opioids
WHO classification	WHO Ladder I	WHO Ladder II	WHO Ladder III
Degree of pain	for mild pain	for moderate pain	for severe pain
Drugs	ASA Acetaminophen NSAIDs Paracetamol	<b>Codeine</b> , Hydrocodone, Oxycodone, Dihydrocodeine, Tramadol (Tramal).	Morphine Hydromorphone Methadone Pethidine Fentanyl Oxycodone
Adjuvant therapy	± Adjuvant	± Adjuvant	± Adjuvant

## WHO Analgesic Guidelines



## Pharmacological approach

### → Non-opioid:

Acetaminophen, NSAIDs.

### → Opioid:

Weak opioid: Tramal

Strong opioid: Morphine

### → Adjuvants therapy:

Anticonvulsant, Antidepressants, NMDA antagonists, Corticosteroids, Clonidine, Muscle relaxants, Local Anesthetics and Sedatives.

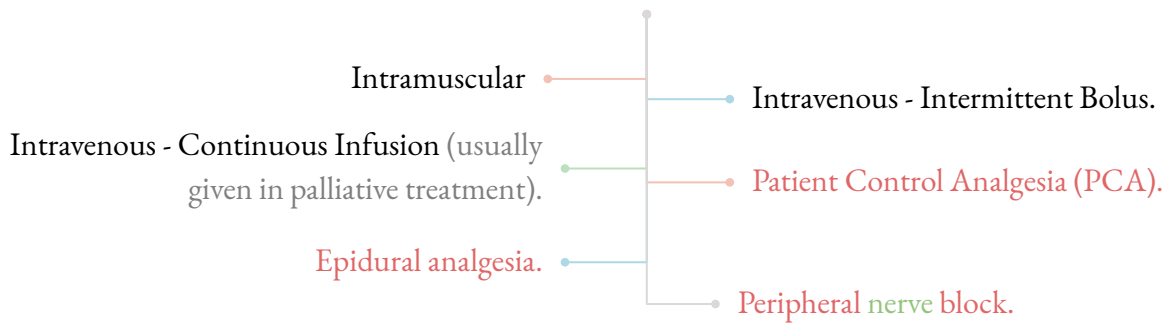
1- After operation patient continues NPO, but whenever patient can tolerate oral intake, we will start him on oral medications

2- e.g., paracetamol is given every 6 or 8 hrs depending on the liver function tests, NSAIDs every 12 hrs

3- Common side effects of opioids: nausea and vomiting, constipation, respiratory depression, allergy from histamine release, hallucinations and over sedation

# Pain management

## Methods of acute post-op pain relief:

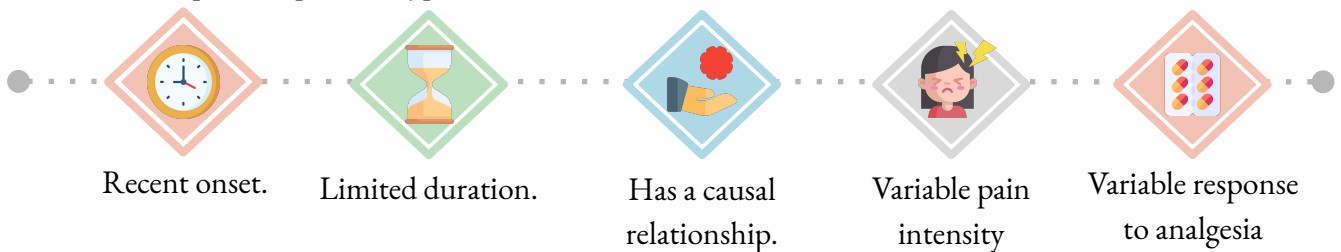


## Infusion devices:

### 1. PCA (Patient Control Analgesia)



Post-operative pain is a type of “Acute Pain”:



PCA are modified infusion pumps (machine) that allow patients to **self administer** a small dose of **opioid** when pain is present, thus allowing patients to titrate their level of analgesia against the amount of pain they are experiencing. Each time the patient presses it releases a small amount of morphine or fentanyl etc.. to control that pain. It could also be given as a continuous infusion.

- PCA is based on the belief that patients are the best judges of their pain.
  - They should be allowed an active role in controlling their pain.
- That pain relief should be secured as quickly as possible.
- Patient selection:

- Patient should not be denied access to this modality simply because of age .
- Screen for cognitive and physical ability to manage their pain by using the PCA.
- Should have the understanding of pain relief , using the demand button and when to use the demand button.
- PCA not offered to confused patient, and those who become confused should have PCA discontinued.
- The same patient selection guidelines and consideration for the use of PCA apply to children.
- Important to remind parents and caregivers not to press the demand button..

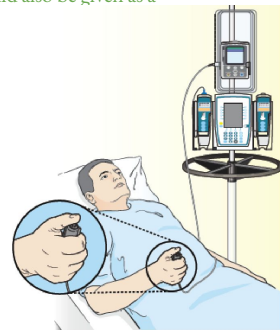


Figure 1. Using the PCA

# Patient control analgesia

- PCA is well tolerated.
- Offer flexibility in dose size and dose interval in individual patients <sup>1</sup>.
- Therapeutic serum level can be reached relatively quickly because the drug is administered into the vascular system directly <sup>2</sup>.
- Patient can secure an early therapeutic serum level with loading doses titrated to individual pain needs.
- A steady state plasma level occurs because the elimination of the drug from the plasma is balanced by the patients self administered drug injection.
- PCA also eliminates the lag time between pain sensation and administration of analgesia.
- The pump documents:
  - The total number of mg of drug delivered.
  - The number of times the patient requests a bolus.
  - Number of times medication is delivered in response to demands.



The total number of mg of drug delivered.



The number of times the patient requests a bolus.

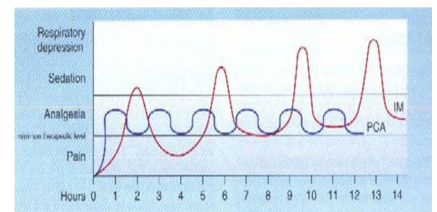


Number of times medication is delivered in response to demands.

- This information is helpful when assessing whether the established PCA parameters are appropriate to patient's need.

## ● IM vs. IV PCA: Relationship of mode of delivery of analgesia to serum analgesic level

Explanation: At 2h we will have a peak with little sedation, at 4h there is still some level but not enough to cover the pain so the patient will ask for another dose by this time. At 6h the patient will be given the same dose as he was given the first time (50mg or 100mg) with the previous accumulation the peak becomes higher. We have to consider patients with liver and kidney disease, they will have more accumulations and may develop adverse effects much sooner like respiratory depression. With PCA, There is usually a steady (balanced) plasma level due to the patients self admission of medication, so the patient will be free of pain but not sedated "fully awake". This will allow the patient for early mobilization out of bed. What usually happens?



Patient feels pain > calls the nurse > the nurse receives the order and screens > prepares the medications > given IM > drug is absorbed > patient is sedated but after 4h he will complain of pain once again and ask for the nurse (the cycle repeats) but with PCA the patient can just simply press the button

## Benefits of PCA:

- |  |    |    |   |
|--|----|----|---|
| Decreased nursing time   | ●● | ●● | Earlier ambulation.                                 |
| Increased patient satisfaction, as PCA allows patient control over their pain. | ●● | ●● | Decreased overall pain scores reported by patients. |
| Used in a variety of medical and post-op surgical conditions.                  | ●● | ●● | Increased compliance to post op care.               |
| Decreased narcotic usage.  | ●● | ●● | Less anxiety & More autonomy regarding pain control |
| Decreased level of sedation.   | ●● | ●● | Improved rest and sleep pattern.                    |

1- Usually we are using a standard parameter: 1 mg or 10 micro fentanyl in 6 minutes then we have to review our patient, if he is still in pain we can increase the dose or reduce the interval so the total amount per minute will be more. If the patient is over sedated or nauseated or complain of other adverse effects we can reduce the dose or prolong the interval.

2- If it's administered intravenously it will reach the therapeutic serum level within 5 minutes while if it's administered intramuscularly, it will take (30 min -1 hr) while if it's administered orally, it will reach the therapeutic serum level after at least 1 hour

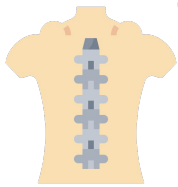
# Infusion devices:

## 2. Epidural Anesthesia:

- EPIDURAL = administration of medication into epidural space.
- INTRATHECAL (spinal) = administration of medication into subarachnoid space.

### OVERVIEW OF THE SPINAL ANATOMY:<sup>1</sup>

- **Spinal cord:**



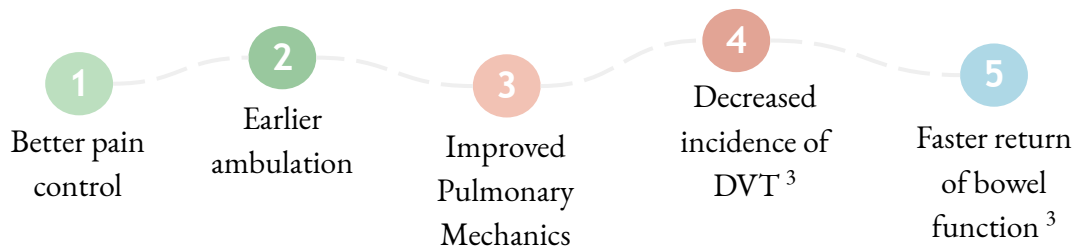
- Located and protected within vertebral column
- Extends from the foramen magnum to lower border of L1 (adult) S2 (kids)
- SC taper to a fibrous band (conus medullaris)<sup>2</sup>
- Nerve root continue beyond the conus (cauda equina)<sup>2</sup>
- Surrounded by the meninges (dura, arachnoid & pia mater.)<sup>2</sup>



- **Epidural space:**



- Potential space between the dura mater and ligamentum flavum
- Made up of vasculature, nerves, fat and lymphatic
- Extends from foramen magnum to the sacrococcygeal ligament

### Benefits of epidural anesthesia:



Indications 	Contraindications 
<p><b>The objective of epidural analgesia is to relieve pain.</b> -Major surgery</p> <ul style="list-style-type: none"> <li>-Trauma (#fractured ribs),</li> <li>-Palliative care (intractable pain),</li> <li>-Labour and Delivery<sup>4</sup>.</li> <li>- If patient can't tolerate GA</li> </ul>	<p><b>Absolute:</b></p> <ul style="list-style-type: none"> <li>- Patient refusal</li> <li>- Infection/abscess near the injection site</li> <li>- Coagulation disorder</li> <li>- Spinal deformity<sup>5</sup></li> <li>- increased ICP</li> <li>- Sepsis, severe Hypovolemia and hypotension</li> <li>- Known allergy to opioid or local anesthetic</li> </ul>

1- Spinal anesthesia is anesthetic only, but epidural is anesthetic and analgesic according to the concentration and dosage of the medication that we used.

2- Dr said it's not that important

3- Because of the sympathetic block and parasympathetic stimulation.

4- For analgesia & anesthesia in case of C-section

5- Considered as a relative C.I. as it depends on the anesthetic expertise as well

# Epidural anesthesia

## Insertion of epidural catheter <sup>1</sup>:

### Step 1

#### Positioning of patient:

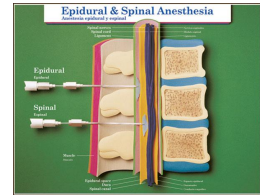
Patient assume a sitting or side-lying position with the back arched toward the physician.

- This helps to spread the vertebrae apart

### Step 2

#### The site is dependent upon the area of pain.

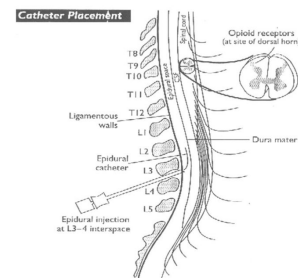
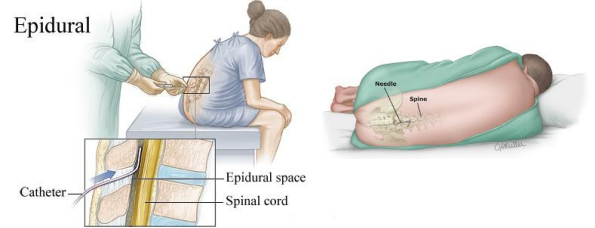
Height of sensory block: **Lumbar-T4, Thoracic-T2**



### Step 3

#### Fixing the catheter:<sup>2</sup>

Incision:	Level:
Thoracic	T4-T6
Upper abdo	T6-T8
Lower abdo	T8-T10
Pelvic	T8-T10
Lower extremity	L1-L4

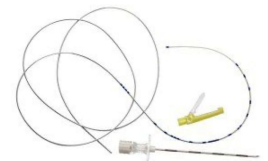


Hanging drop technique

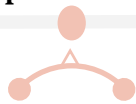
During spinal anesthesia the landmark is to see the CSF running through freely, while in epidural we will use negative pressure or loss of resistance technique (using air or normal saline) to determine when we reach the epidural space. Another technique can be used called the technique of hanging drop during this technique the dr will keep one drop at the end of the tuohy needle then he will insert it and because of the negative pressure inside the epidural space this hanging drop will be sucked in once he enter the epidural space

**Epidural catheters:** usually 18 gauge marked needles whereas spinal is 27-29 gauge, we use thinner needles in spinal to avoid CSF leakage

- Ideal Placement (adult) **10-12 cm** at the skin
- Epidural catheters have markings that indicate their length.



There is a mark at the **tip** of the catheter,



The 1st single markup the catheter is **5cm.**



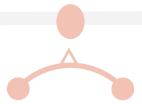
Double mark up the catheter is **10 cm.**



Triple mark on the catheter is **15 cm.**



Four marks together indicate **20cm.**



1- The layers passed during inserting epidural needle: skin, subcutaneous tissue, supraspinous ligament, interspinous ligament, ligamentum flavum.  
2- We can use epidural anywhere not only under the umbilicus unlike spinal anesthesia

# Epidural anesthesia

→ A change in depth of the catheter indicates migration either into or out of the epidural space:



Catheter migration into a blood vessel in the epidural space or subarachnoid space

- Rapid onset LOC
- Decrease/loss of sensory or motor loss (marcain)
- Toxicity (LAST)
- Profound hypotension



Catheter migration out of the epidural space

- ineffective analgesia
- no analgesia
- drugs deposited into soft tissue.

## Commonly used medications:



### Opioids:

**Fentanyl + Morphine:** affect the pain transmission at the opioid receptors.



### Local anesthesia (L.A.):

**Bupivacaine (marcaine):** inhibits the pain impulse transmission in the nerves with which it comes in contact.

## Methods Of Administration:

- **Bolus** (Fentanyl, Duramorph).
- **Continuous Infusion** (Marcaine+Fentanyl).

All drugs administered epidural should be preservative free.

All epidural opioids should be diluted with normal saline prior to intermittent bolus administration.

## Assessment of the block (FYI):

### Motor Assessment

- Bromage Score



**Bromage 3 (complete)**  
Unable to move feet or knees



**Bromage 2 (almost complete)**  
Able to move feet only



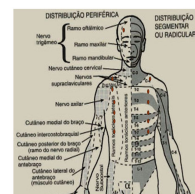
**Bromage 1 (partial)**  
Just able to move knees










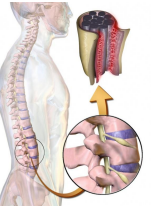
**Bromage 0 (none)**  
Full flexion of knees and feet

### Sensory assessment:

- Use **ice** in the tip of a glove
- Start in **upper neck** and move **down** the **thorax** bilaterally, assessing all potential dermatomes
- Level of block is where intensity of cold changes or the cold sensation is absent
- assess the dermatomes **below the pelvis**

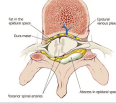

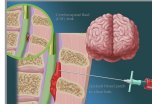



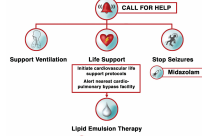


# Complications of epidural anesthesia

Complication	Overview	Treatment
 <b>Bradycardia</b>	Incidence: 10%	IV atropine
 <b>Hypotension</b>	<ul style="list-style-type: none"> <li>• Most common complication</li> <li>• Due to sympathetic blockade</li> </ul>	Head low position ( 15 degree ) <ul style="list-style-type: none"> <li>A. Fluids</li> <li>B. Ephedrine ( vasopressor )</li> <li>C. Oxygen inhalation</li> </ul> <b>Prophylactic</b> : preloading with 1-1.5 of crystalloid
 <b>Nausea &amp; vomiting</b>	Due to hypotension causing central hypoxia	<ul style="list-style-type: none"> <li>• Treat hypotension</li> <li>• Oxygenation</li> <li>• Antiemetic</li> </ul>
 <b>Respiratory paralysis ( apnea )</b>	Usually because of severe hypotension leading to medullary ischemia or due to high or total spinal	Immediate Intermittent positive pressure ventilation ( IPPV ) is a technique used to provide short term ventilation via mouthpiece for the purpose of augmenting lung expansion 
 <b>Urinary retention</b>	<ul style="list-style-type: none"> <li>• Most common postoperative complications</li> <li>• Due to blockade os S2,3,4</li> </ul>	Catheterization
<b>Epidural hematoma <sup>2</sup></b> <b>( traumatic spinal )</b>	Can result in <ul style="list-style-type: none"> <li>• Spinal cord ischemia</li> <li>• Paraplegia</li> <li>• Anterior spinal artery syndrome <sup>1</sup></li> </ul>	
<b>High spinal or total spinal <sup>3</sup></b> 	<ul style="list-style-type: none"> <li>• <b>High spinal</b>: spinal above the desired level causing problems to the patient</li> <li>• <b>Total or very high spinal</b>: too high spinal ( above cervical )</li> </ul>	Depend on the level of block
<b>Chronic adhesive arachnoiditis</b>	Inflammatory insult to the arachnoid layer of the meninges that leads to fibrosis. As a sequel, the arachnoid becomes abnormally thick and adherent to the surrounding layers of pia and dura mater	

1- Is an incomplete cord syndrome that predominantly affects the anterior 2/3 of the spinal cord, characteristically resulting in motor paralysis below the level of the lesion as well as the loss of pain and temperature at and below the level of the lesion  
 2- Before we get the Pt into anesthesia we first check if he/she is in an anticoagulant drugs or has coagulopathy to decrease the risk of hematoma  
 3- Happens when the epidural needle accidentally puncture the dura and enter the intrathecal space, treated as an ABC approach

# Complications of epidural anesthesia

Complication	Overview	Treatment
<p>Inadequate (patchy) block</p>	<ul style="list-style-type: none"> <li>Numerous fibrous bands in epidural space, so drug may not be equally distributed</li> <li>When we use the air to perform loss of resistance technique, sometimes it will enter the epidural space and form bubble inside which will block the anesthetic from reaching everywhere</li> <li>L5 &amp; S1 segment are the most difficult to be blocked because of their large space</li> </ul>	
<p>Epidural abscess</p>	<p>When the patient is immunocompromised or the doctor who performed the procedure was unsterile</p> 	<p>Neurosurgical intervention</p>
<p>Post Dural spinal headache</p> 	<ul style="list-style-type: none"> <li>Low pressure due to seepage of CSF from hole created by spinal needle change hemodynamic of CSF</li> <li>Incidence decreased due to use of smaller gauge needle</li> <li><b>Clinical features:</b> <ul style="list-style-type: none"> <li>present after 12-24 hrs</li> <li>occipital but can be frontal</li> <li>Maybe associated with neck stiffness</li> <li>Pain increase on sitting, relieved on lying down</li> </ul> </li> </ul>	<p>-<b>Conservative:</b> by giving fluids, caffeine, lying supine, paracetamol or ibuprofen, abdominal strap.</p> <p>-<b>Epidural blood patch</b></p> 
<p>Bloody tap</p> 	<p>Usually occurs due to puncture of the epidural vein</p>	<p>Withdrawn and retained</p>
<p>Cauda equina syndrome</p>  <p>In latin means horse tail</p>	<ul style="list-style-type: none"> <li>Due to direct injury to nerve fibers by trauma or by LA</li> <li>Usually seen with continuous spinal with small bore catheters</li> <li><b>Clinical features:</b> <ul style="list-style-type: none"> <li>Retention of urine</li> <li>Incontinence of urine</li> <li>Loss of sexual function</li> <li>Loss of sensation of perineal region</li> </ul> </li> </ul>	
<p>Cardiac arrest</p> 	<p><b>Causes:</b></p> <ul style="list-style-type: none"> <li>Severe hypotension</li> <li>Total spinal/ very high spinal</li> <li>Local LA toxicity/ anaphylaxis</li> </ul>	<p>Immediate start CPR</p>
<p>Local anesthetic systemic toxicity LAST</p>	<p>Causes: intravascular injection and exceeding maximum safe dose</p> <p>Sx:</p> <ul style="list-style-type: none"> <li>Tachycardia &amp; HTN</li> <li>Wide QRS</li> <li>Tonic clonic seizure</li> <li>VF &amp; cardiac arrest</li> </ul>	<p>Stop the infusion</p> 





**Question 1:** At what time frame following the postsurgical period does persistent postsurgical pain become defined as being “chronic pain”?

- A. 1 to 2 weeks
- B. 3 to 4 weeks
- C. 1 to 2 months
- D. 6 to 12 months

Because it's persistent post-op, we don't have to wait 6 months, 2 month persistent is enough to diagnose

**Question 2:** Regarding the treatment of neuropathic pain, the correct statement is:

- A. Narcotics are the most effective and “FIRST-LINE” treatment option.
- B. It is optimally treated with multimodals therapy.
- C. Sympathetic blockade will eliminate all neuropathic pain.
- D. Spinal cord stimulator is not an effective therapy.

**Question 3:** End result of the surgical stress response include all of the following, except:

- A. Hyperglycemia.
- B. Poor wound healing.
- C. Positive nitrogen balance.
- D. Impaired immunocompetence.

**Question 4:** The circulating levels of which of the following hormones is not increased post operatively?

- A. Insulin.
- B. Glucagon.
- C. Antidiuretic hormone.
- D. Growth hormone.
- E. Cortisol.

**Question 5:** Which of the following is the earliest sign of Lidocaine toxicity from a high blood level ?

- A. Shivering.
- B. Nystagmus.
- C. Lightheadedness and dizziness.
- D. Tonic-clonic seizures.

First stage is numbness then lightheadedness, final stage ia tonic- clonic seizure



**Question 6:** Which of the following concentrations of epinephrine corresponds to a 1:200,000 mixture?

- A. 0.5 MG/ML
- B. 5 MG/ML
- C. 50MG/ML
- D. 0.5 MG/ML

**Explanation of answer for question 6=** 1:200,000 MEANS 1 G/200,000 ML = 1000 MG/200,000 ML = 1 MG/200 ML = 1000 MG/200 ML = 10 MG/2 ML = 5 MG/ML

**Question 7:** The “snap” felt just before entering the epidural space represents passage through which ligament?

- A. Posterior longitudinal ligament.
- B. Ligamentum flavum.
- C. Supraspinous ligament.
- D. Intraspinous ligament.

**Question 8: Neuropathic pain:**

- A. Pain of central origin can be because of direct insult to nociceptive pathways.
- B. Complete lesion of dorsal roots causes severe neuropathic pain.
- C. Neuropathic pain due to injury to pns is more well characterised than due to central cause.
- D. Inflammatory pain is not associated with tactile allodynia, heat/cold hyperalgesia and spontaneous pain unlike neuropathic pain.

**Question 9: Visual analogue scale (VAS):**

- A. Consists of a 10 cm horizontal or vertical line with end points as “no pain” or “worst ever pain”.
- B. Has no major advantage over NRS (numerical rating scale) and VRS (verbal rating scale).
- C. Was developed to measure pain in pediatric age group patient.
- D. Standard VAS has no limitations.

**Question 10: Pain in children?**

- A. Vas can be reliably used in children >3 years of age.
- B. Wong\_bakerface scale is designed to measure pain intensity in children aged 3–10 years.
- C. Girls >8 are more likely to complete pain diaries than boys for similar age group.
- D. Touching the affected area of painful stimulus can be seen as early as 2 years of age.



**Question 11: Complications of opioids:**

- A. Pruritus is seen more via oral route
- B. Pruritus is because of histamine release.
- C. Fentanyl does not have active metabolites so it causes more sedation.
- D. Respiratory depression may be delayed for as much as 48 h after neuraxial administration.

**Question 12: During epidural placement using a midline approach, the epidural needle penetrate all the following anatomical layer, except:**

- A. Ligamentum flavum
- B. Subarachnoid membrane
- C. Supraspinous ligament
- D. Intraspinous ligament

**Question 13: The correct statement for human neuraxial anatomy is:**

- A. Adult spinal cord ends at L2
- B. Spinal cord in children ends at L3
- C. The dural sac and subarachnoid space in adults end at S1
- D. The dural sac and subarachnoid space in children end at S2

**Question 14: The principal site of action of local anesthesia placed into the epidural space is the:**

- A. Spinal cord
- B. Nerve roots
- C. Epidural space
- D. Subarachnoid space



### Definition of pain:

The current International Association for the Study of Pain (IASP) defined pain as "An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage"

### Components of pain:

1. Sensory: involvement of sensory nerve by trauma/injury
2. Emotional: emotional factors lead to underestimation (e.g. stress induced analgesia) or overestimation of pain
3. Actual tissue damage
4. Potential tissue damage: pathophysiological changes causing pain (e.g. migraine, spasms)

### Classifications of pain:

1. According to duration
  - Acute (post-operative pain): pain of recent onset (few days or few hours) for limited duration proportional to the duration of injury ( mild injury = few hours, moderate injury = few days, severe injury= one week to one month) not associated with nausea or vomiting.
  - Subacute: pain persisting for few days to few weeks after subsiding of procedure (e.g. c section pain)
  - Chronic pain: pain that persists after complete tissue healing.
2. According to pathophysiology
  - Musculoskeletal (AKA somatic, nociceptive): pain due to damage of soft tissue or bone or muscles. Pain is: sharp well localized, not referred, not associated with nausea or vomiting or haemodynamic changes and no sensory changes.
  - Visceral pain (e.g. MI, pelvic pain, liver, appendicitis): pain is colicky, poorly localized, referred, associated with nausea, vomiting and haemodynamic changes, but not sensory changes.
  - Neuropathic pain (of peripheral or central nervous system origin): the only pain associated with sensory change (e.g. diabetic neuropathy, trigeminal neuralgia)
  - Pain can also be mixed (2 or all 3 types together)

### Assessment of pain:

- Unidimensional: numerical (mild: 1-3, moderate: 4-6, severe: 7-10), visual (face expression - used for pediatric patients and patients with language barrier),
- Multidimensional.



## Management of pain (pharmacological or regional):

Using analgesic ladder system:

- **Mild pain:** simple analgesia:
  - Paracetamol: has antipyretic properties
  - NSAIDs (e.g. voltaren): have anti-inflammatory properties. Side effects: Gastric, renal, coagulopathy ( all due to inhibition of prostaglandins). NSAIDs contraindications: gastric, renal, bleeding tendencies (or procedures with major blood loss such as total hip replacement)
  - Don't give 2 NSAIDs together or by 2 different routes because they have ceiling effect (but you can give NSAID with paracetamol), and don't increase the dose if the initial dose is ineffective due to the ceiling effect -increasing the dose will increase the side effects without increasing the efficacy- (just go for a stronger analgesic).
- **Moderate pain:** simple analgesia + weak opioids (e.g. propoxyphene, tramadol, codeine)
  - propoxyphene - not used anymore due to cardiac side effects
  - Codeine is the best but it only comes oral and with paracetamol because it is a pro-drug.
- **Severe pain:** strong opioid, all administered in IV route:
  - Fentanyl
  - Morphine: pure agonist
  - Oxycodone
  - Pethidine: lowest incidence of respiratory depression but highest incidence of addiction, if you give it for 4-5 days and the patient becomes addicted, so it is better to avoid them (it has been removed from all international pain management guidelines).
- **All the steps are +/- adjuvant, examples of adjuvants :**
  - Anxiolytic if patient is anxious
  - Sedative/hypnotic if the patient has a strong emotional factor, unable to sleep.
  - Antispasmodic if the patient has visceral pain.
- **Addiction:** happens ONLY with strong opioids and has four components:
  - physical or psychological dependence
  - Drug seeking behavior
  - Pain relief with agonists
  - Pain aggravated with antagonist

Any dependence on other pain medications is only physical (stopping the drug causes physical symptoms such as tachycardia, hypertension or sleep disturbances) or psychological, not actual addiction.

**Question 1:** Patients vary greatly in their requirement for postoperative analgesia. What is the best way to assess adequacy of pain relief?

- A. Measure the degree of tachycardia.
- B. Ask the patient to measure the pain.
- C. Assess the level of hypertension.
- D. Look for tachypnoea.
- E. Examine for wound splinting.

**Question 2:** Which of the following is associated with too much analgesia?

- A. Hypocarbica
- B. Agitation
- C. Depression of conscious level
- D. Deep vein thrombosis
- E. Small tidal volumes.

**Question 3:** Nonsteroidal anti-inflammatory drugs (NSAIDs) are often used as part of “multimodal” analgesic therapy; some of the potential advantages include all of the following, except:

- A. Decreases opioid requirements
- B. Can decrease postoperative pain intensity
- C. Indirect effect of decreasing opioid-related side effects
- D. Can improve wound healing

**Question 4:** A 67-year-old patient has had a total knee replacement. He is on morphine PCA for the management of postoperative pain. He has received a total of 40mg morphine in the recovery area and you are worried that he may develop an opioid overdose. Which of the following is the earliest sign of opioid overdose?

- A. Respiratory rate less than 8 per minute
- B. A fall in oxygen saturation
- C. Rapid shallow breathing
- D. Progressive rise in sedation level
- E. Uncontrolled vomiting

**Question 5:** A 62-year-old female patient is scheduled for right hip hemi-arthroplasty. She has a history of angina, hypertension, and chronic obstructive airway disease. She has been on home oxygen 2L/minute, 4-6 hours per day, for the last 6 months. Which one of the following conditions would be an absolute contraindication to spinal anaesthesia in this patient?

- A. Presence of urinary tract infection
- B. History of spina bifida occulta
- C. Previous spinal decompression at the L5-S1 level
- D. History of multiple sclerosis
- E. Patient refusal

 **Good Luck**



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Quiz



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