

Local and general anaesthesia

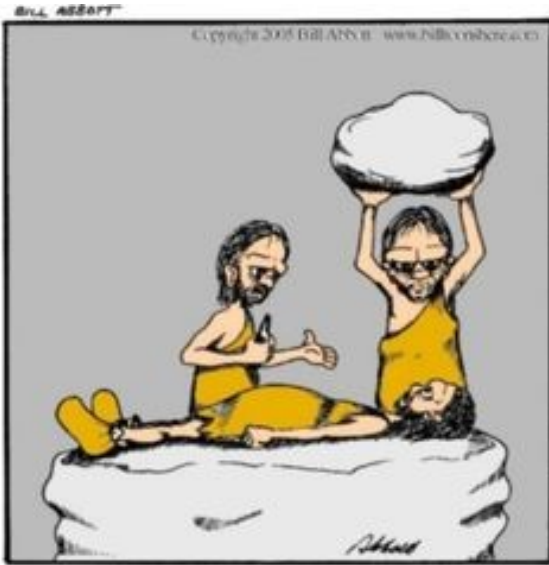
1st Dpt. of Surgery

University hospital of Saint Anne

Medical Faculty of Masaryk University,
Brno

Goals

- Understand the:
 - definition
 - difference
 - indications
 - advantages
 - disadvantages



"...and this is Ralph, your anesthesiologist."

History

- Ancient Egypt and Mezopotamy, Greece and Rome, Mid-Age (opium, mandrake, alcohol...)
- 1846 - Aether
inhalatory anesthesia
William Morton (removal of mandibular tumour)
- 30th of 20.century - artificial ventilation
- BOOOM!!!.....



General anesthesia

Definition :

targeted loss of perception of all sensations (touch, pain, heat, cold) -
farmacologically induced coma (unconsciousness) – targeted intoxication

Goal:

Assure non-painful surgery for patient and secure desired conditions for surgery - neurovegetative stability of patient during operation (trauma, stress reaction)

Parts:

- Loss of consciousness (hypnotic phase)
- Analgesia - opioids, NSAIDs, local anaesthesia
- Muscle relaxation - central (BZD, inhalatory anesthetics) v.s. peripheral
- Vegetative stability - decreases stress reaction of organism

Types of anesthesia

- **Balanced**- iv, inhalatory drugs, analgetics, transquillizers, myorelaxans
- **Combined** – general + local
- **Sedation** - shallow loss of consciousness
- **Analgo sedation** – analgesia + shallow loss of consciousness
- **Neuroleptanalgesia** – sedation, analgesia, vegetative stabilisation
- **Local anesthesia** – loss of pain perception

Types of general anesthesia

- Inhalatory
- Intravenous (TIVA) (TIVA – Total intravenous anesthesia)
- Combination (start iv. + inhalatory) – mostly used

Depth of GA - stages (Guedel)

Used only for clear inhalatory anesthesia

- I. – falling asleep
- II. – excitation - motoric response, instability of circulation , high risk of vomiting
- III. – tolerance
- IV. intoxication



Monitoring of patient

- Saturation – oxygenation of patient
- ECG – beats per minut (tachycardia, bradykardia), arrhythmias (atrial / ventricular fibrilation, extrasystoly, asystoly), ST denivelation
- Blood pressure – non – invasive or invasive
- Conciousness
- Deep of relaxation
- Temperatur
- Inhale and exhale gas concentration – O₂, CO₂, N₂O, inhalatory anesthetics

What do you need before you start anesthesia

- Intravenous approach
- Anesthetics machine – control before every use
- Devices for secure airways - laryngoskope
- Drugs
- Nurse



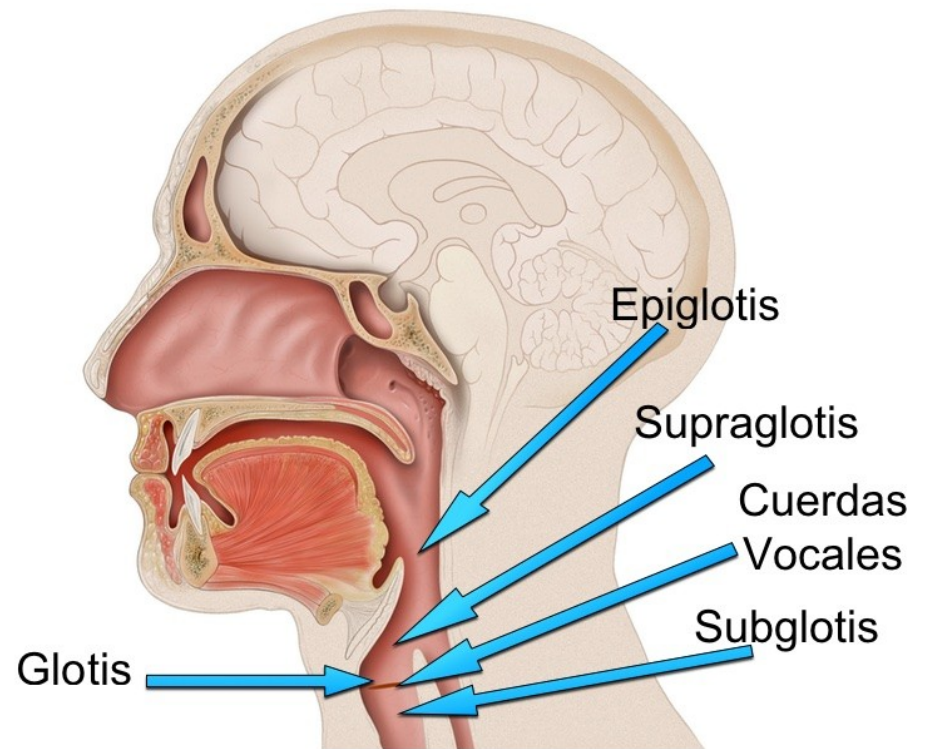
Step by step



- i.v. approach
- Preoxygenation with facemask - 100% O₂ for 5 minut
- Anesthetic drugs – anesthetics + analgetics + myorelaxans
- Manual ventilation with face mask
- Intubation
- Arteficial ventilation – inhalatory anesthetics
- Start of surgery

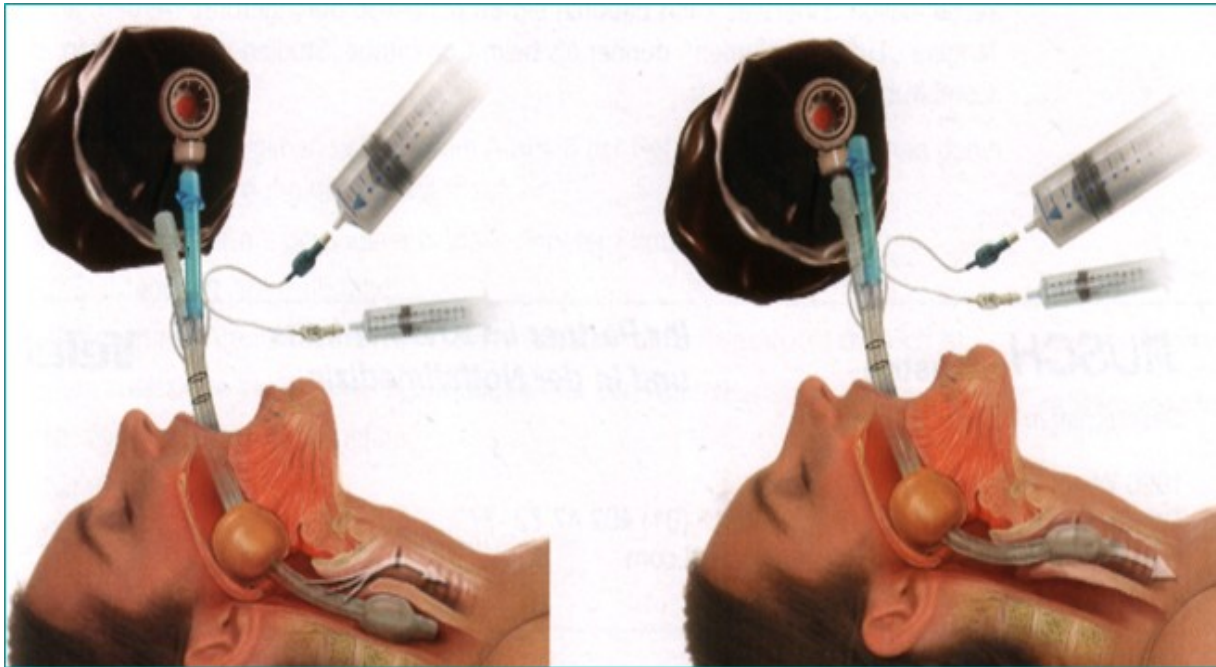
Airway secure

- Face mask
- Supraglottic devices
- Infraglottic devices
- Cricothyrotomy
- Tracheotomy



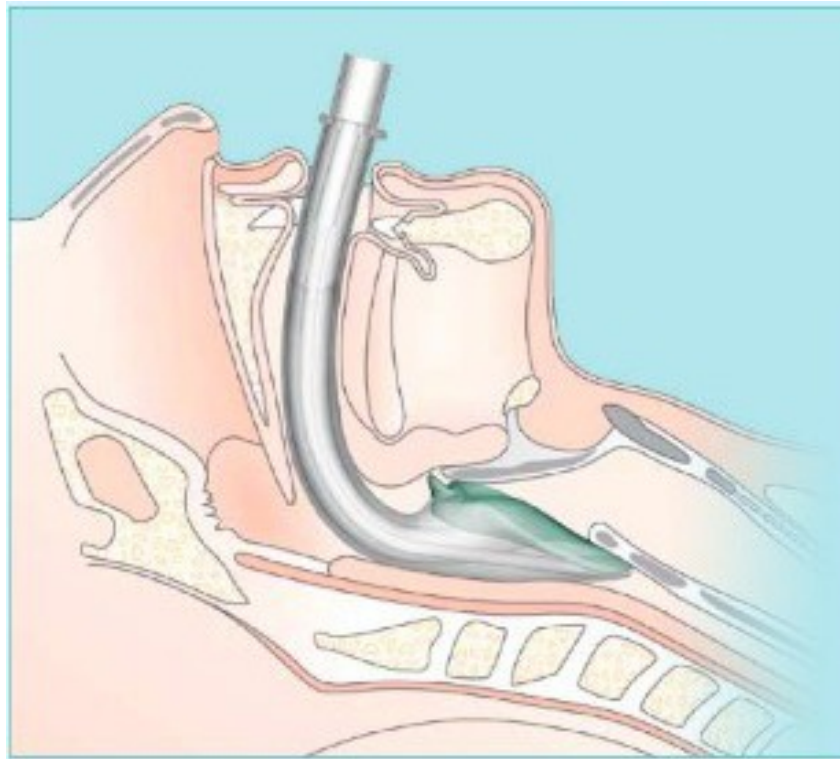
Supraglottic devices

- Combitube – obsolete, two orifices – between balloons and in the end

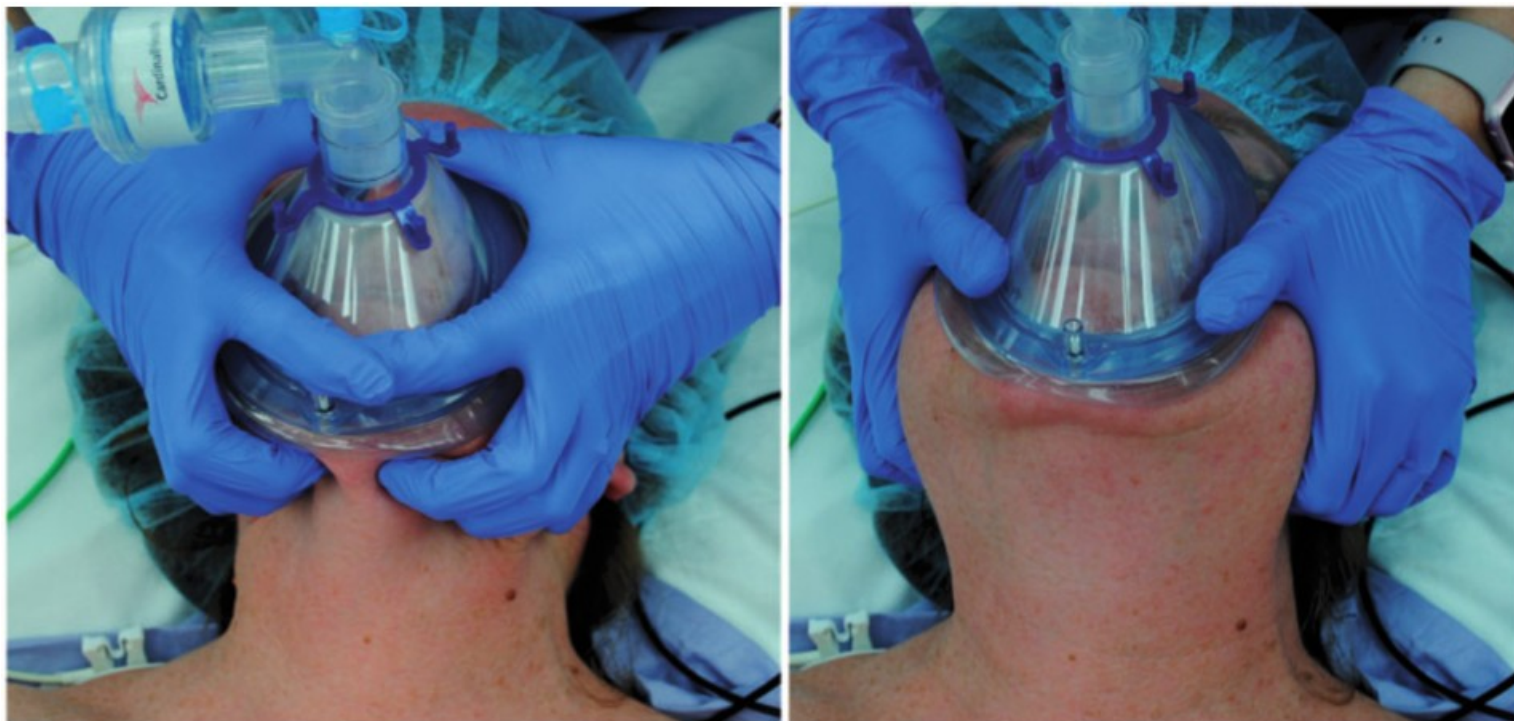


Laryngeal mask

- + easy to use
- Not 100% safety for airway



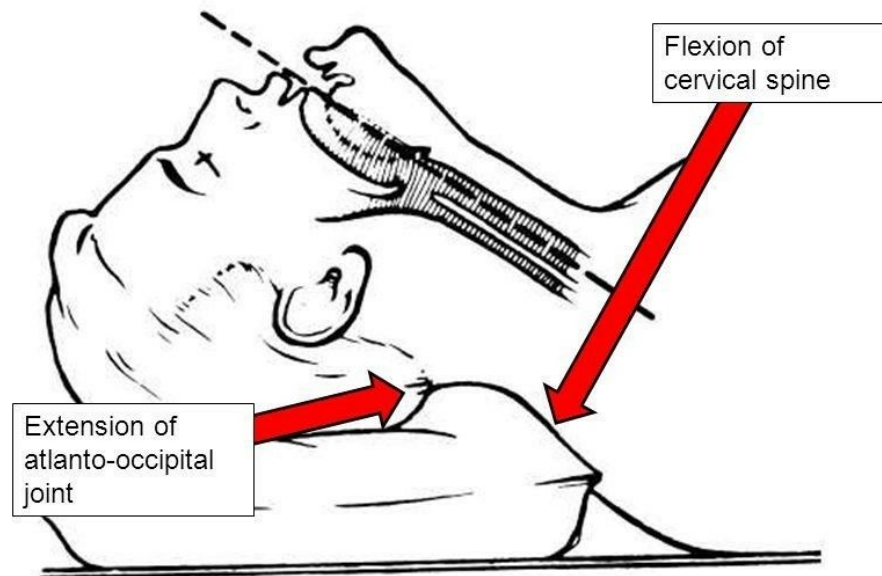
Face mask ventilation



If it doesn't work?

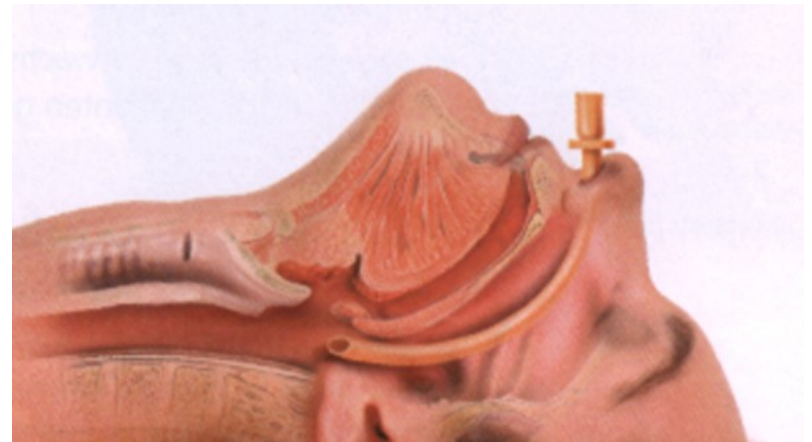
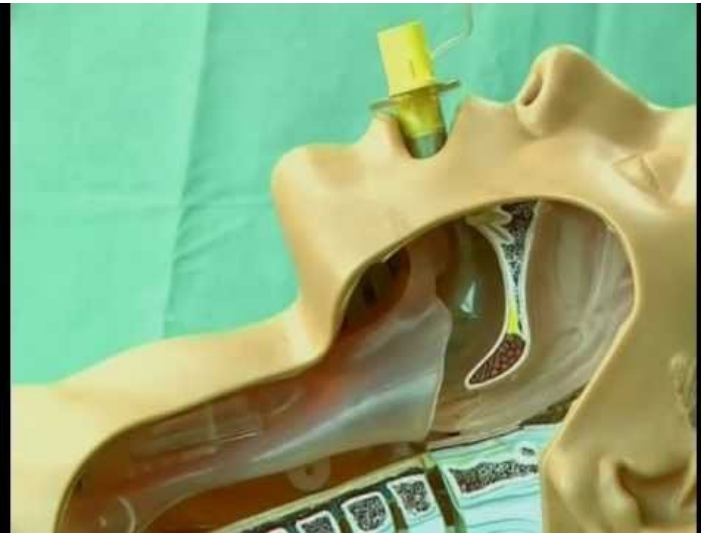
- Optimize head position – sniffing position

Sniffing Position



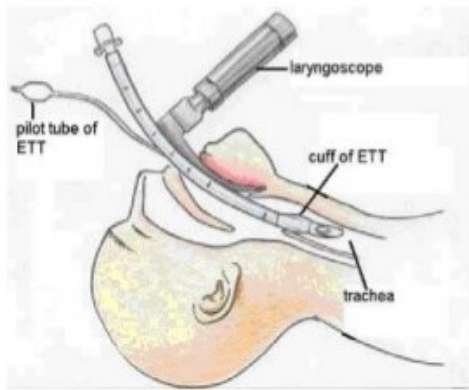
Still it doesn't work?

- Use Guedel's oral or Wendel's nasal airduct (size from mouth/nose to ear)



Then intubate

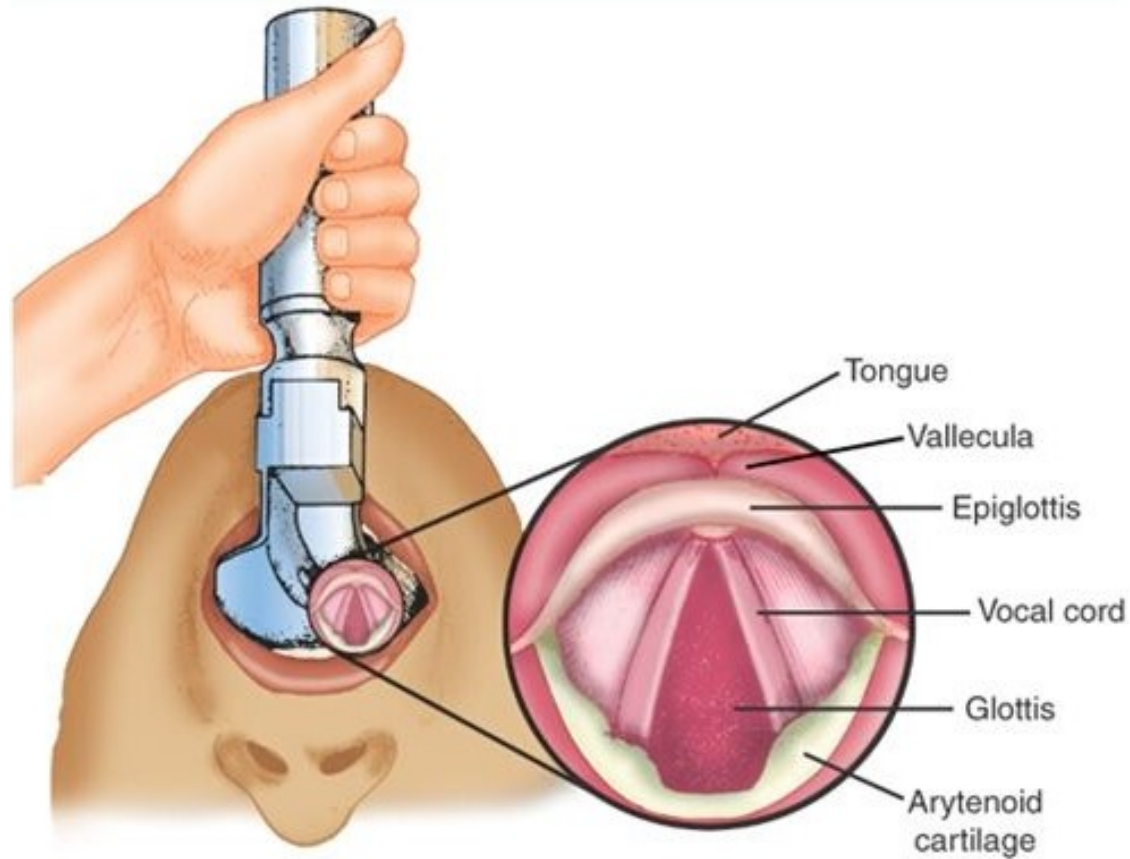
What is endotracheal intubation?



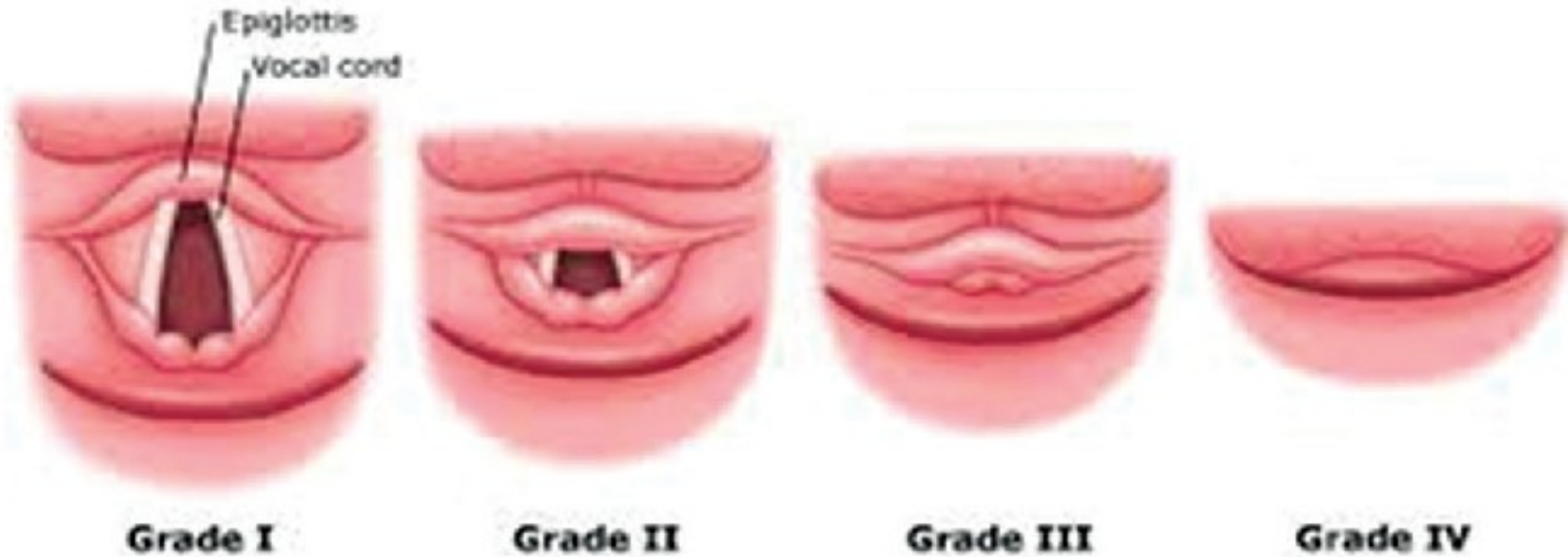
- ▶ Endotracheal intubation is the placement of a special tube in trachea



What should you see



What else can you see

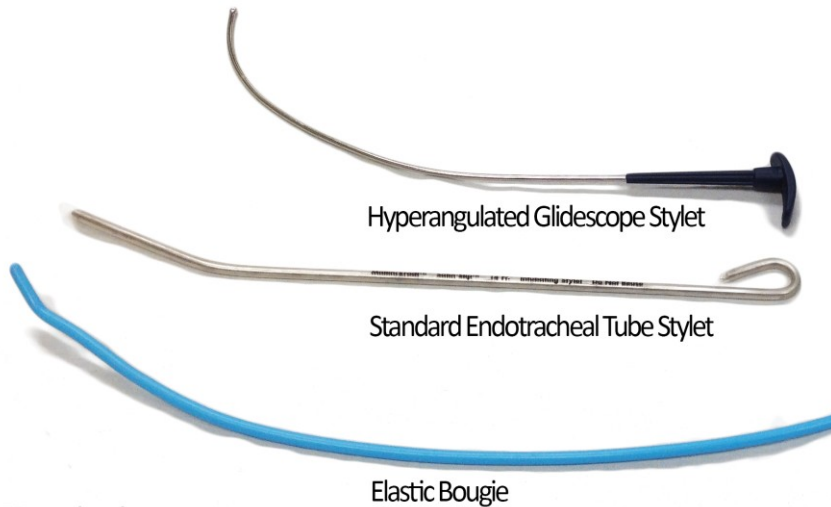


Grade III a IV predict difficult airway management

Devices that can you help

- Videolaryngoscope

Endotracheal Tube Stylets

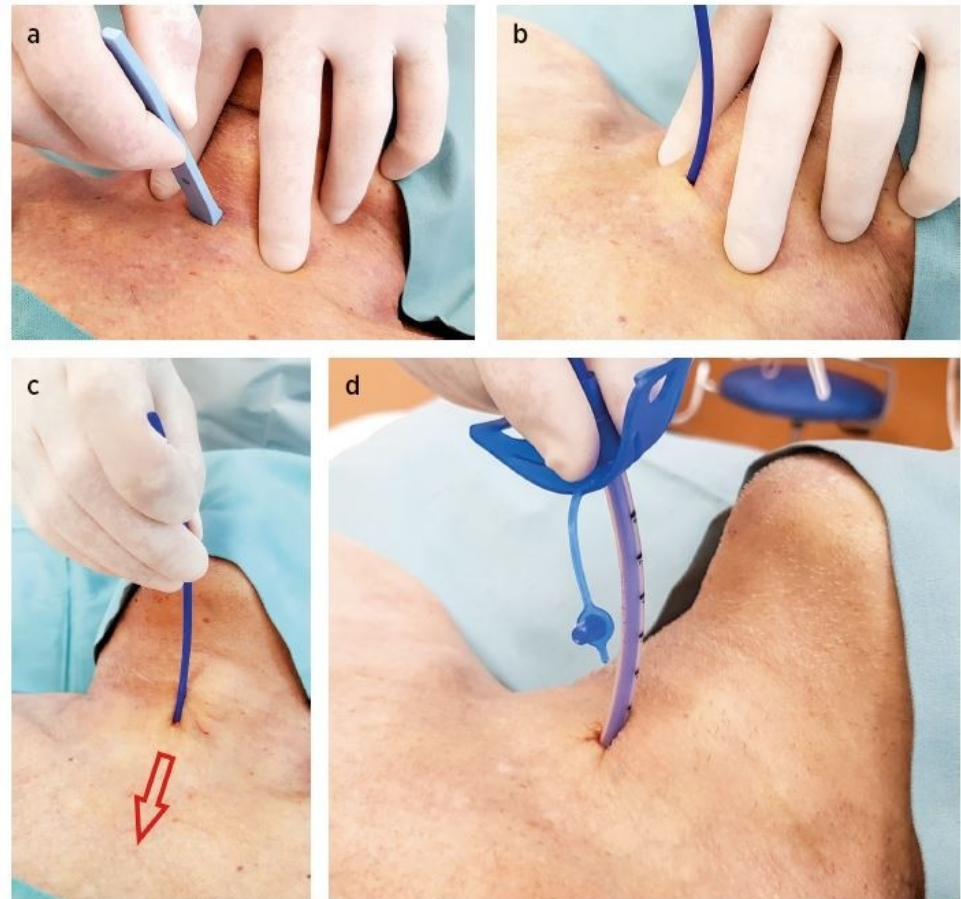
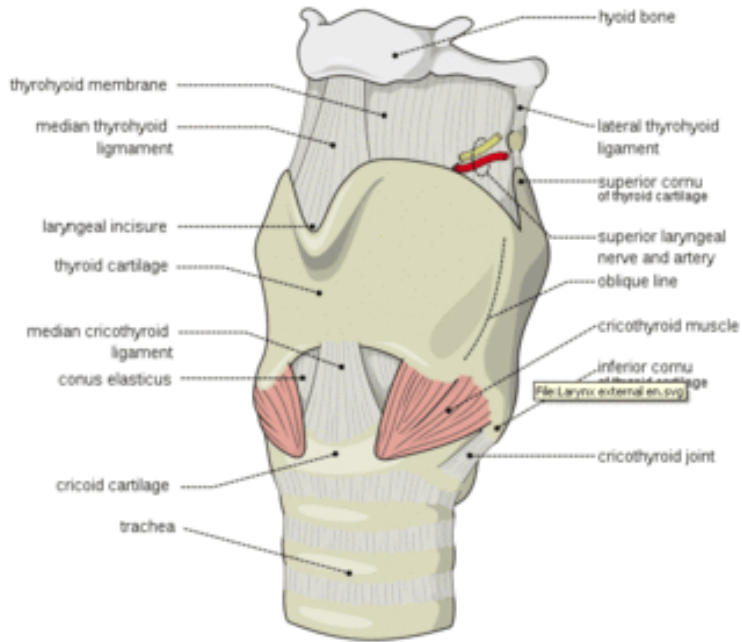


FPnotebook.com



If you can't intubate

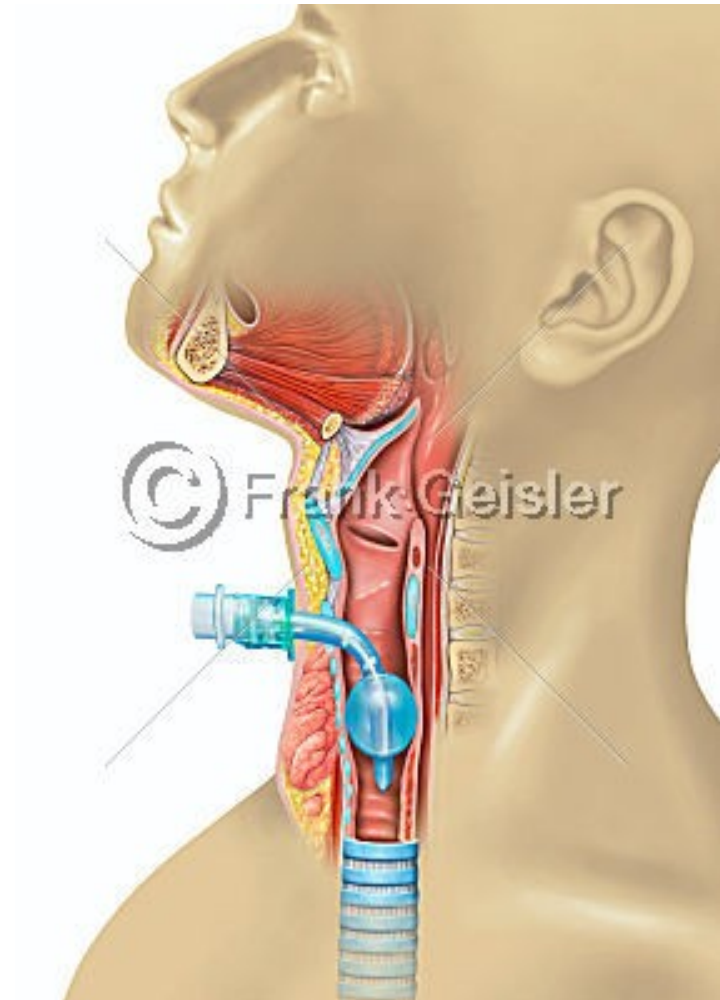
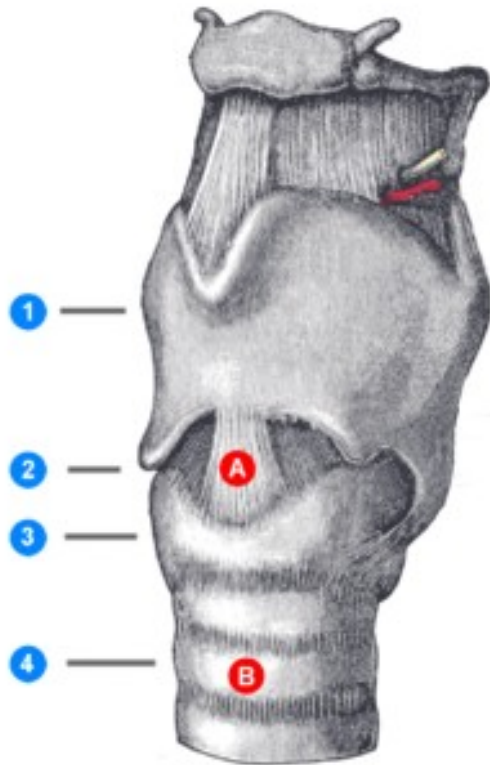
- Cricothyrotomy - rescue procedure



Or tracheotomy – you need more time

A: cricothyrotomy

B: tracheotomy



RISKS and COMPLICATIONS

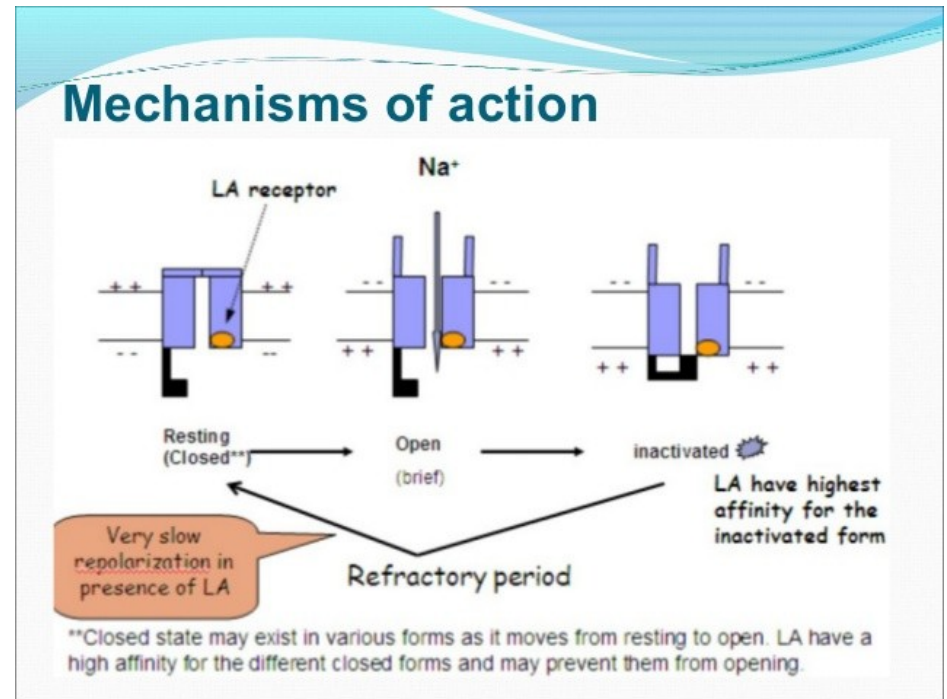
- Airways: obstruction, dislocation of cannula, bronchospasm, aspiration...
- Failing to secure airways
- Shallow anesthesia
- Hypotension, hypertension, arrhythmia
- HYPOTHERMIA!!! - lethal triade!
- Malignant hyperthermia
- Allergic reaction

Postoperative care - next time



Local Anesthaesia

- Inhibition of nerve stimulus conduction by sensitive neurons
- Physiology - interaction with Na⁺ canals on cellular level
- **Loss of pain perception**
- **Motoric function remains intact**



HISTORY

- Congelation - Ice
- 1860 – Cocaine
- 1884 – 1st medical use (psychiatry - S. Freud)
- 1905- 1st synthetic local anesthetic - procain
- 70th 20th century – next generations of synthetic LA

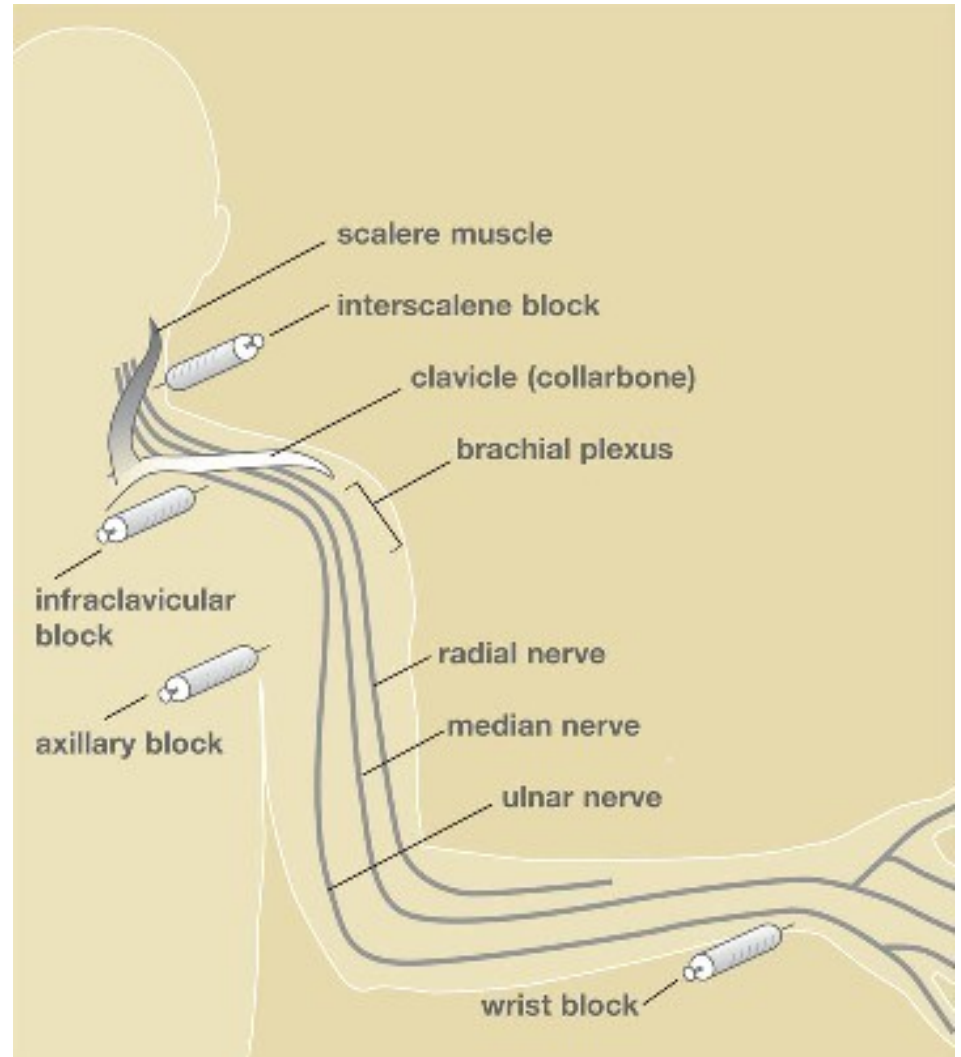
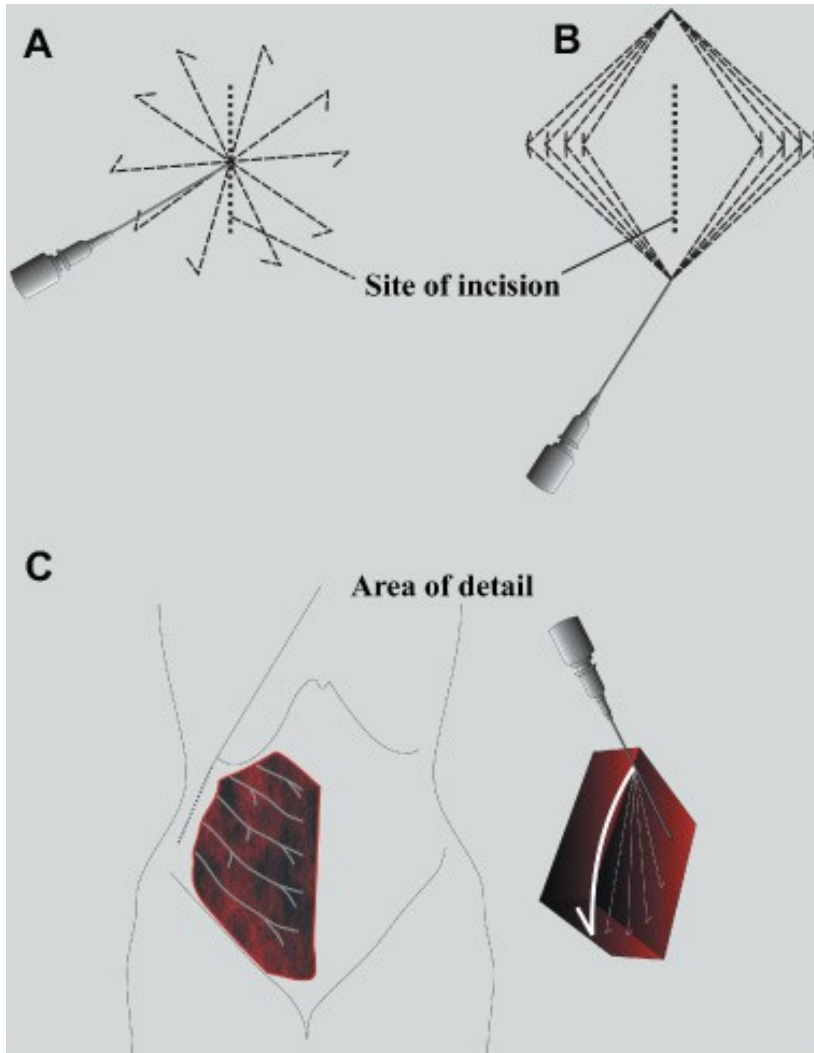


Types

- **Superficial** (surfaces - skin, mucous membrane)
- **Infiltration**
- **Field blocking**
- **Epidural**
- **Spinal**
(subarachnoideal)
- **Intravenous regional**
(obsolet, risk of system effects – cardiotoxicity, neurotoxicity...)



Infiltration vs. Field/nerve block



Source: Hadzic A: *The New York School of Regional Anesthesia Textbook of Regional Anesthesia and Acute Pain Management*: <http://www.accessanesthesiology.com>

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Infiltration vs. Field/nerve block

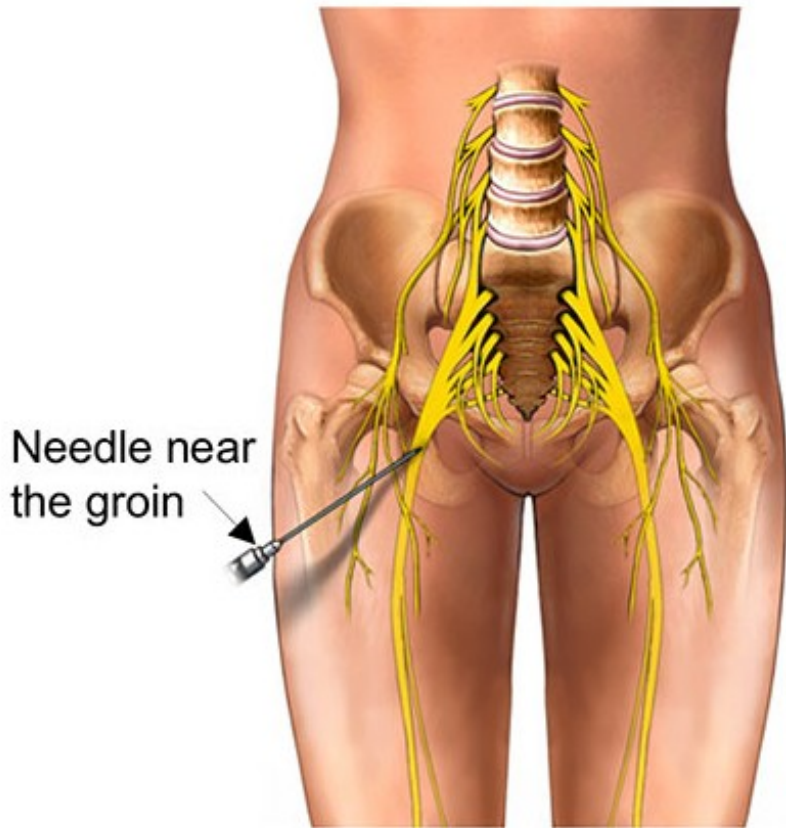
- INFILTRATION

- Just near of injection/application
- It affects free nerve endings

- FIELD/NERVE BLOCK

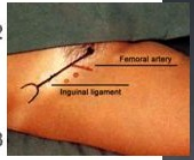
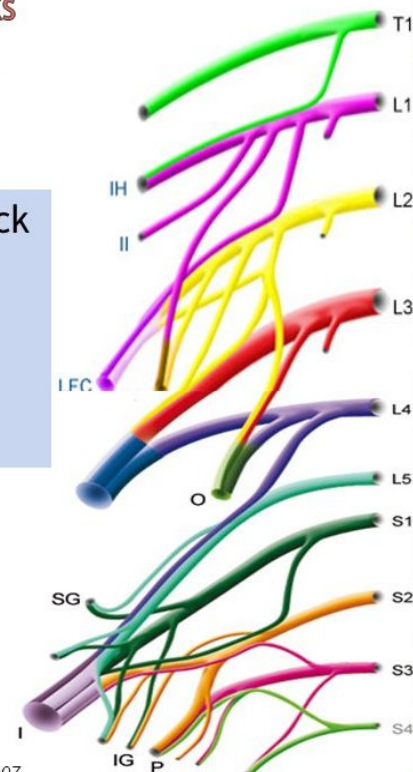
- Application near nerve bundle – effect on nerve endings – area which is innervated by this nerve

Examples of Blocks



PERIPHERAL NERVE BLOCKS LOWER LIMB BLOCKS

- Lumbar plexus block
- Iliofascial block
- Obturator block
- Sciatic blocks
- Ankle blocks



Handbook of Regional Anesthesia (ESRA) 2007

France - with the contribution of Denis Jochum, M.D - Colmar - France

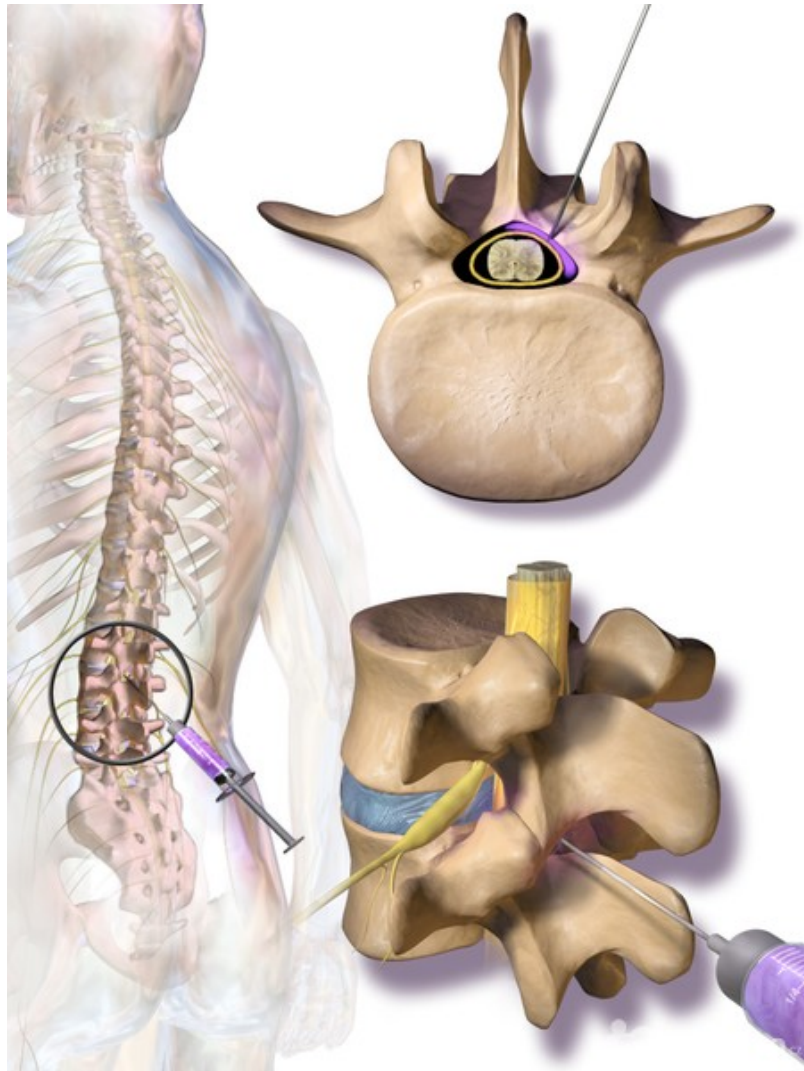
Effect of LA depends on:

- Amount of LA used
- Type of LA /Mesocain v.s. Marcain.../
- Blood supply of tissues
- pH of tissues
- Additive drug - adrenalin /max. dose 1mg/

TABLE 2. Local anesthetics

AMIDE GROUP	ESTER GROUP
Lidocaine	Cocaine
Mepivacaine	Procaine
Bupivacaine	Chloroprocaine
Etidocaine	Tetracaine
Prilocaine	

Epidural anesthesia



- Cervical, thoracical, lumbar
- No effect on motoric
- Loss of pain and sense
- Block of vegetative nerv system

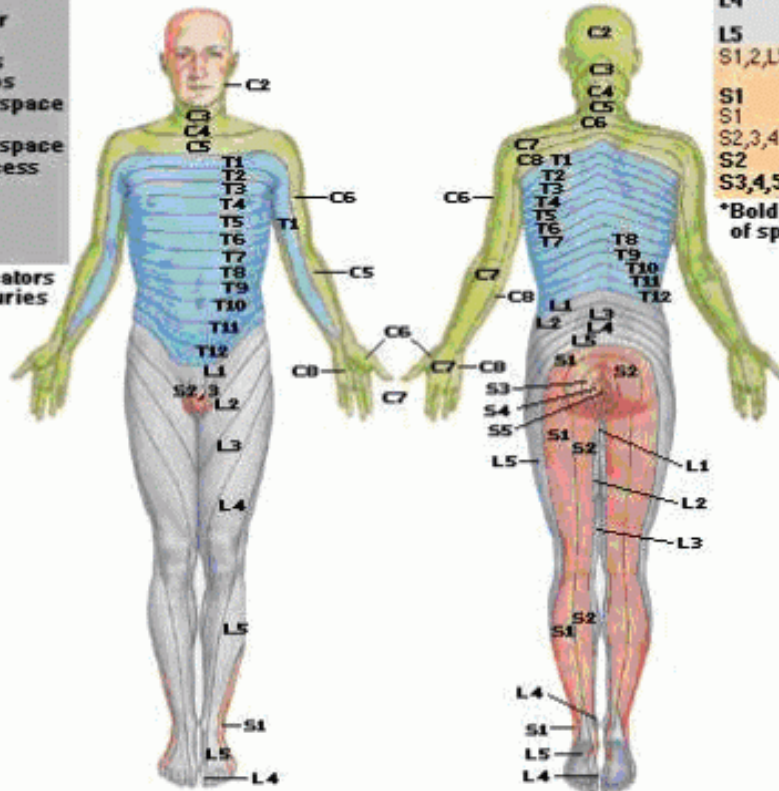
Dermatomes determine the height of the injection

Structures within dermatomes

- C5,6,7 Lateral parts of upper limbs
- C5 Clavicles
- C5 Anterolateral shoulder**
- C6,7,8 Hand
- C6 Thumb**
- C7 Middle finger**
- C8 Little finger**
- C8,T1 Medial sides of upper limbs**
- T3 3rd,4th interspace**
- T4 Nipple line, 4th,5th interspace**
- T6 Xiphoid process**
- T10 Umbilicus**
- T12 Inguinal or groin regions
- T12 Pubis**

*Bold are key indicators of spinal cord injuries

Dermatomes



Structures within dermatomes

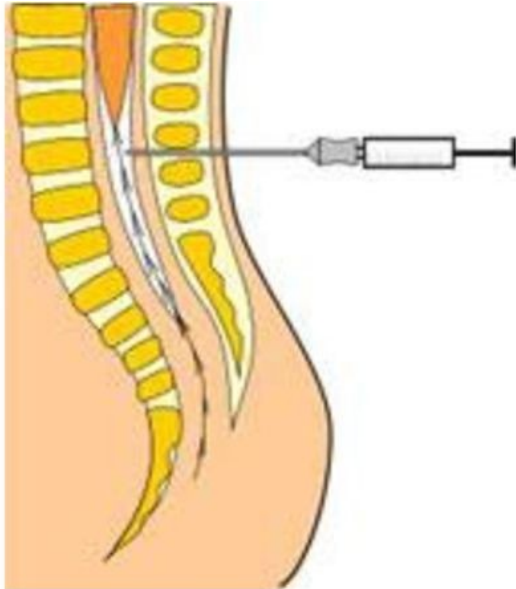
- L1,2,3,4 Anterior and inner surfaces of lower limbs
- L2 Medial thigh**
- L3 Medial knee**
- L4 Medial ankle**
- L4,5,S1 Foot
- L4 Medial side of Great toe**
- L5 Dorsum of foot**
- S1,2,L5 Posterior and outer surfaces of lower limbs**
- S1 Lateral margin of foot**
- S1 Little toe
- S2,3,4 Perineum
- S2 Posteromedial thigh**
- S3,4,5 Perianal area**

*Bold are key indicators of spinal cord injuries



Schematic demarcation of dermatomes shown as distinct segments. There is actually considerable overlap between any two adjacent dermatomes

Subarachnoideal anesthesia



- Loss of motoric too
- Only for lower limbs and pelvis
- Risk of total spinal anesthesia (loss of function of breathing muscles)
- Risk of injury of the spinal root



Contraindications

- Infection in site of application
- Allergic reaction in anamnesis
- Hypokoagulation (Epidural, Subarachnoideal)
- Non-compliance of patient
- Non-agreement of patient

Risk factors and complications

- **CNS toxicity:**

Paradoxical stimulation, confusion, tremor, cramps, inhibition of breathing center

- **Cardiovascular toxicity:**

Dysrhythmia, arrhythmia, vasodilatation + hypotension

- **Hypersensitivity/allergic reaction**

- **Bleeding, infection, needle breakage...**

TAKE HOME MESSAGE

- General anesthesia is not deep slumber
targeted loss of perception of all sensations (touch, pain, heat, cold) - pharmacologically induced coma (unconsciousness)
- I.V., gas, combined
- Depth of anesthesia
- Maintaining vital signs
- Local anesthesia – types, indications
- Combinations
- Safety rules!