

TOPIC I ICU

Respiratory failure

1. Breathing; physiology/pathophysiology
2. Definition, symptoms (clinical, laboratory findings)
3. Classification
4. Oxygen therapy (indications , methods: Venturi masks, rebreathing mask, high flow oxygen therapy)
5. Mechanical lungs ventilation (indications)
6. Noninvasive-ventilation (CPAP mask , modes of non-invasive ventilation)
7. Invasive ventilation (modes of ventilation, basic principles of mechanical ventilation-protective ventilation, parameters to be monitored)
8. Acute spastic conditions of bronchial tree – medication
9. What is ARDS (acute respiratory distress syndrome)

TOPIC II ICU

Hemodynamical monitoring

1. Electrocardiography (
2. Arterial blood pressure monitoring (direct measurement)
3. Central Venous Pressure (meaning, measurement indications)
4. Cardiac function monitoring : Pulmonary artery catheter (PAC), less invasive methods (transpulmonary thermodilution, pulse contour and pulse pressure analysis.) , noninvasive methods
5. Fluid responsiveness
6. Monitoring of gas exchange and ventilation
7. Pulse oximetry and volumetric capnography (principles of operation and clinical application)
8. Monitoring: lung and chest wall mechanics
9. Monitoring of patient-ventilator system
10. Monitoring during lung protective ventilation
11. Intra-abdominal pressure (IAP) (principles of measurements , clinical meaning)
12. Neurological monitoring
13. Sedation monitoring
14. Intracranial pressure monitoring
15. EEG In intensive care
16. Cannulation of central venous vessels (accesses, techniques, indications)
17. Circulatory system supportive drugs (dobutamin, adrenalin, noradrenalin, vasopressin , levosimendan)

TOPIC III ICU

Extracorporeal blood purification and gas exchange

- 1 CRRT – continuous renal replacement therapy
diffusion, convection
 - CVVH - continuous veno-venous hemofiltration
 - CVVHD - continuous veno-venous hemodialysis
 - CVVHDF - continuous veno-venous hemodiafiltration
 - SLE(D)D – slow low efficiency daily dialysis
 - IHD – intermittent hemodialysis

- 2 TPE – therapeutic plasma exchange
- 3 Hemoperfusion
- 4 ECMO – Extracorporeal membrane oxygenation
- 5 ECCOR - Extracorporeal carbon dioxide removal

TOPIC IV ICU

Nutrition in ICU

- ASPEN – guidelines
- ESPEN - guidelines
- Indirect calorimetry

Major bleeding

The European guideline on management of major bleeding and coagulopathy following trauma: fifth edition

Brain trauma

Guidelines for the Management of Severe Traumatic Brain Injury, Fourth Edition

TOPIC I Anesthesia

Airway Management

- 1. Medical devices
- 2. facemask
- 3. nasopharyngeal tube
- 4. oropharyngeal tube
- 5. laryngeal tube (adult female: 7,5; adult male: 8,5) 6.
- laryngeal mask (LMA)
- BURP MANEUVER (back-ward-upward-rightward pressure of the larynx)
- SELLICK MANEUVER (cricoid pressure-reduce the risk of regurgitation)

Intubation

1. Patient should be preoxygenated before intubation! (3 min O2 100%)

- Assessment:
- Cormack-Lehane classification system – classifies views obtained by direct laryngoscopy
- Mallampati score – visual assessment of the distance from the tongue base to the roof of the mouth

Methods:

- direct vision
- with a Bougie introducer
- using Video Laryngoscopy

Step by step:

- patient's head is placed in the "sniff" position, raised by 5 cm with a block/ring pillow
- operator holds the laryngoscope in the left hand and opens patient's mouth with the right hand
- operator displaces the tongue to the left using a laryngoscope blade
- glottic structures should be seen
- operator passes the endotracheal tube through the vocal cords
- a self-inflating resuscitation bag is attached to the distal end of the tube
- to check if everything went good: 1) observe the chest rise 2) auscultation 3) presence of CO2 (capnography) is the best sign of endotracheal intubation

Side effects:

- tachycardia

- rise in blood pressure
- laryngospasm, bronchospasm

RSI

- RSI = Rapid Sequence Intubation
- Purpose: to decrease the likelihood of aspiration of stomach content
- Conditions: pregnancy, obesity, bowel obstruction, decreased airway reflexes, probable / known "full stomachs"
- How? Preoxygenation is important! Avoid bag ventilation! Enlarge the dose of succinylcholine or rocuronium

Difficult Airways

Occult Causes of Difficult Airways

- Inability to extend the neck
- Short neck
- Short jaw
- Receding mandible (overbite)
- Temporomandibular joint dysfunction
- Mallampati score (3 or more)

How to cope with difficult airways?

- Plan A: initial intubation strategy (optimize position, Bougie, alternative laryngoscope)
- Plan B: secondary intubation strategy (LMA device, fiberoptic intubation)
- Plan C: Maintain oxygenation (facemask, LMA device)
- Plan D: Can't intubate + can't ventilate (cricothyroidotomy)
- REMEMBER! Move on if not making progress!

TOPIC II Anesthesia

General Anesthesia

Anaesthetic machine consists of the following components:

1. Metal framework and pipeline circuitry. The frame incorporates pipeline circuitry with both fixed and detachable joints
2. Medical gas pipeline service components (MGPS). The MGPS provides wall gas and vacuum supplies at operating theatres. The MGPS consists of oxygen, nitrous oxide, medical air, medical vacuum, scavenging vacuum
3. Connections for cylinders. Gases are supplied from cylinders in the absence or failure of piped gas supplies. Cylinders possess various markings.
4. Safety mechanisms: oxygen failure warning device, oxygen bypass circuit and etc.
5. Back bar including vaporiser connections
6. Fresh gas flow
7. Vaporisers. Their functions: to produce vaporisation of the volatile anaesthetic, to mix the vapour with the fresh gas, to control the mixture
8. Rotameters
9. Scavenging circuitry
10. Suction circuitry

Breathing system describes the equipment used to deliver fresh gases and volatile agents to a patient:

- open system: nasal, cannulas, plastic oxygen mask
- closed system: this controls the gas mixture delivered to the patient. Closed systems can be classified into rebreathing and non-rebreathing.

- A breathing system may consist of all or some of the following components: face mask, gas hoses and connectors, pressure-limiting expiratory valve, reservoir bag, CO₂-absorber, a valve to switch between spontaneous and controlled ventilation modes, one-way valves to prevent rebreathing.
- Intravenous anaesthetic agents. General features. The ideal agent.
- Barbiturates- thiopental, imidazoles – etomidate, phenols – propofol, benzodiazepines – midazolam, diazepam (chemical structure, receptors, clinical effects, metabolism, complications).
- Analgesic drugs: opioids, NSAIDs, paracetamol, other analgesics. Classification of opioids, clinical effects, side effects.
- Neuromuscular blocking agents: mechanisms of blockade, clinical features, metabolism, monitoring.
- Local anaesthetic agents: structure, mechanism, clinical effects and toxicity.
- Anaesthetic gases and vapours. Mean alveolar concentration (MAC). General features.

TOPIC III Anesthesia

Regional Anesthesia:

1. Anatomy of spine and spinal cord.
2. Anatomy of brachial plexus, lumbar plexus, sciatic nerve.
3. Pharmacology of Local Anesthetics, dose, concentration, volume and using in the intraoperative and postoperative setting .
4. Technique of spinal , epidural, peripheral nerve blocks .
5. Complications in the regional anesthesia. Prophylaxis and treatment of complications.
6. Local Anesthetic Systemic Toxicity.
7. Basic knowledge of Ultrasound Guided in the Regional Anesthesia f. Identification nerves, plexus - Ultrasound, Neurostimulation, Anatomical Landmark