Anesthesia and Pain Management

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My goal:

- understand basic concepts of general and regional anesthesia
- learn basic skills of airway management

- anatomy of regional anesthesia (SA, EPI)
- anesthesia of children

.. and if you would like, more …

How to get credit??

Lectures
Literature : Larsen, Miller, Barash
Anesthesia

Short test
Simulation (Airway management drill)

OR – voluntary intership

Oral Exam

Anesthesia&Pain Management; pondělí 13:30 (knihovna ARK)

3	Mon 1 Oct 18	Introduction, investigation, premedication	Dadák
4	Mon 8 Oct 18	Anesthesia Machine, Monitoring	Dadák
5	Mon 15 Oct 18	Pharmacology of Anaesthetic	Vach
6	Mon 22 Oct 18	Airway Management	Dadák
7	Mon 29 Oct 18	Regional Anesthesia	Vach
8	Mon 5 Nov 18	Acute and chronic pain	doc.Štourač
9	Mon 12 Nov 18	Children and anesthesia	doc.Štourač
10	Mon 19 Nov 18	Simulation	
11	Mon 26 Nov 18	Simulation	
12	Mon 3 Dec 18	Simulation	
13	Mon 10 Dec 18	Simulation	
14	Mon 17 Dec 18	Simulation	
15	Mon 24 Dec 18	Simulation	

Topics for oral exam

- Anatomy of airways + physiology of breathing
- Physiology of circulation (cardiac output)
- Monitoring
- Pharmacology
- ASA I patient and GA, premedication;
- Airway management
  - Rapid sequence of induction = technique, indications
  - Difficult ventilation / intubation
- Malignant hyperthermia
- Acute, chronic pain
- Anatomy of spinal column – SA, EPI

History

Opium (Egypt, Syria)

- Hippokrates 400 BC ease pain

1555 Andreas Vesalius - arteficial ventilation through tube between vocal cords, ventricular fibrilation (animals)

1546 Valerius Cordus - ether – oleum vitreolum dulce

1547 Paracelsus - analgetic effect of ether

1646 Severino - cryoanaesthesia – Napoleon's wars - Larey

1773 N2O Joseph Priestley (1733-1804)

1774 oxygen

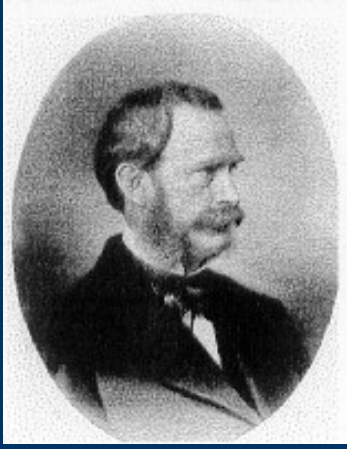
1779 Humphry Davy - anaesthetic effect of N2O

Surgery before modern Anesthesia

Surgical procedures were carried out prior to the introduction of anesthetics.

The key to success was the speed of the procedure, with successful amputations lasting 30 seconds. Strong assistants and restraints were frequently required. Alternatively, decreased cerebral perfusion via bilateral carotid compression was used to decrease sensation during the procedure. Importantly, surgical procedures were associated with significant risk of death and, at a minimum, severe pain. The development of anesthesia was heralded as one of the great advances of modern medicine, in that it allowed surgery to advance.

Beginning of GA



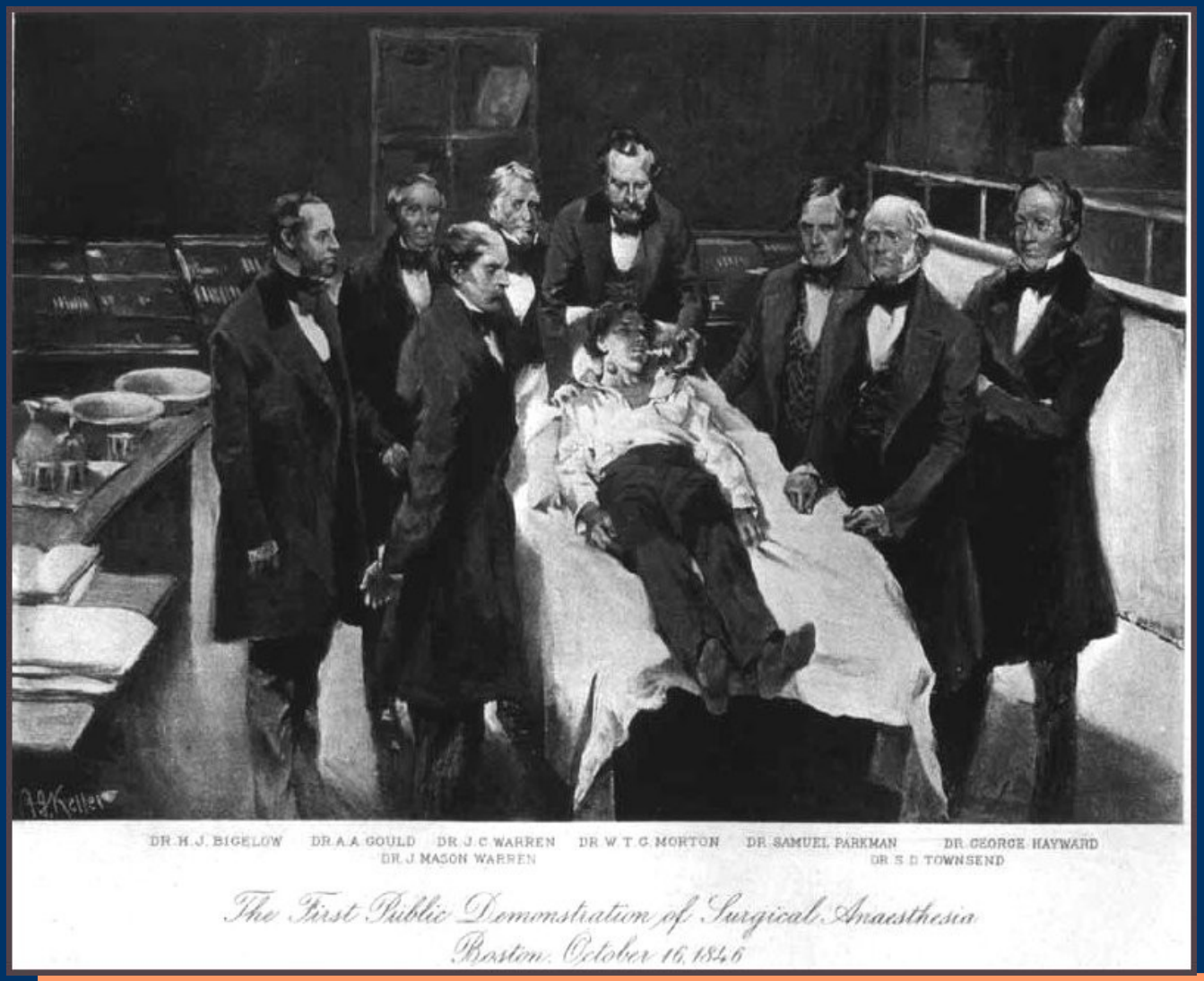
October 16th 1846 ether general anaesthesia Boston dentist William Thomas Green Morton to Gilbert Abbott (tumor of mandibule)

February 6th 1847 Prague - first Czech ether anaesthesia - Celestýn Opitz

1895 direct laryngoscopy Alfred Kirstein in Berlin.

- 1920 direct laryngoskopy to clinical praxis Magill and Rowbotham

Ether


DR. H. J. BIGELOW
DR. A. A. GOULD
DR. J. C. WARREN
DR. W. T. G. MORTON
DR. SAMUEL PARKMAN
DR. GEORGE HAYWARD
DR. J. MASON WARREN
DR. S. D. TOWNSEND
The First Public Demonstration of Surgical Anaesthesia
Boston, October 16, 1846

After ether

- 1847 – chloroform – obstetrics anesth.
- 1884 – cocaine – eye, .. mucosa
- 1885-99 – cocaine “spinaly”

- 1950's – halothan
- 1960's – enflurane, isoflurane
- 1994 – sevoflurane

Ideal anesthetic

- temporary disable function of neurons
- no influence on breathing, circulation
- safe, cheap, non-toxic,...

- Does not exist.

Anesthesiology

is a jung discipline (162y) dealing with

- The preoperative, **intra**operative and **post**operative evaluation and treatment of patients who are rendered unconscious and/or insensible to pain and emotional stress during surgical, obstetrical, therapeutic and diagnostic medical procedures;
- The protection of life functions and vital organs (brain, heart, lungs, kidneys, liver, endocrine, skin integrity, nerve) under the stress of surgical and other medical procedures;

Anesthesiology

- Monitoring and maintenance of normal physiology during the perioperative period;
- Diagnosis and treatment of acute, chronic and cancer-related pain;
- Clinical management of CPR;
- Evaluation of respiratory function and application of respiratory therapy;
- Management of critically ill patients;
- Conduct of clinical research;
- Teaching personnel involved in perioperative care

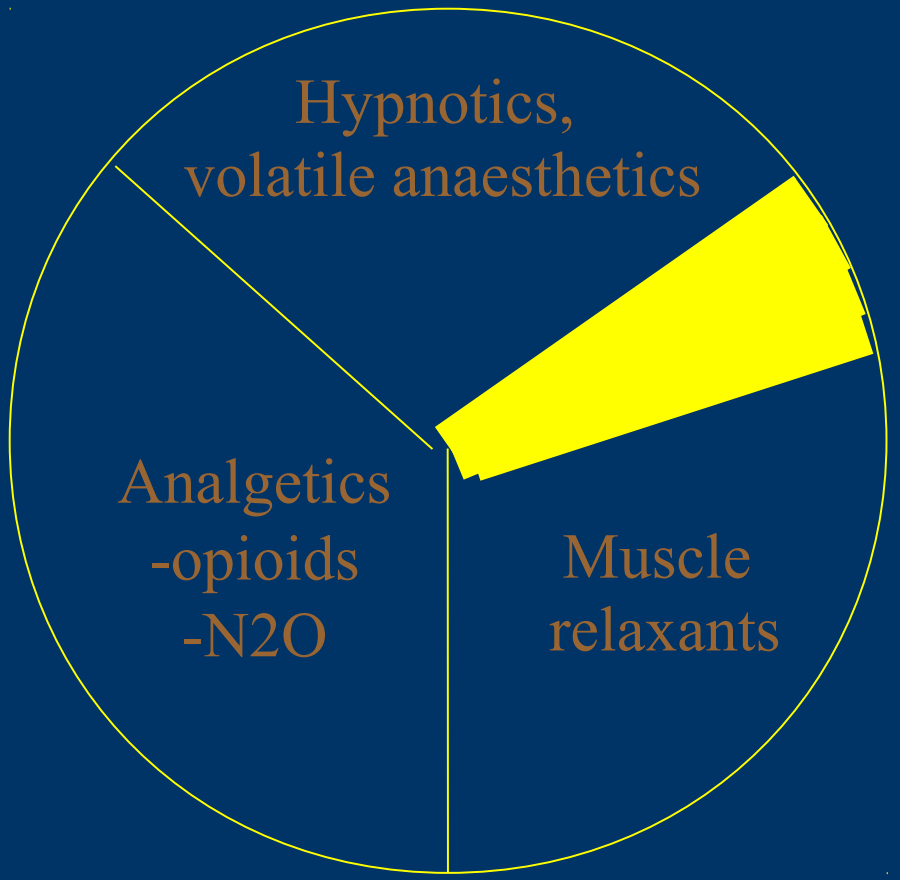
General Anesthesia - Definition

arteficial intoxication, controled coma
reversible
drug-induced loss of consciousness, felling, pain.

„No reaction“ to stimuli

allow therapy (surgery, electroshock)
allow diagnostic method (CT, MRI)

General anaesthesia



Patient + GA

preoperative anaest. visit, informed consent
premedication
venous line
monitoring

induction
(airway protection)
maintenance
(extubation)
treatment of postoperative pain

record of GA

ASA Physical Status = risk

I **Healthy** patient 0,06%

II Mild systemic disease, **no functional limitations**
hypertension, smoker, mild asthma 0,47%

III Severe systemic disease- definite **functional limitation**
coronary disease, COPD, DM, CHF, renal failure 4,39%

IV Severe systemic disease that is a constant **threat to life**
unstable angina, burn with septic shock 23,48%

V Moribund patient **not expected to survive** 24 hours with or without operation
patient with extensive bowel infarction, polytrauma 50,8%

Preoperative tests

as a component of the preanesthesia evaluation, may be indicated to:

1) discovery a disease / disorder which may affect perioperative anesthetic care,
2) verification of an already known disease, disorder, medical or alternative therapy which may affect perioperative anesthetic care,
3) formulation of specific anesth. plans

Will I change something if the resust is ...?

Preoperative examination

history (GA, RA, complications)

physical examination (neck, back)

laboratory: blood cells, ions, urea, creatinin, glucose, AST, ALT, GMT, bilirubin, AB0.

ECG (older 45).

Xray of chest (older 60 let).

function exam

- cardiological, lung, nephro, hemato

Why to do PreOP exam?

- decrease RISKs

- what is the benefit of surgery
- Airway exam

- GA // regional?
- premedication

History of Airway Management

- History
  - any difficulty, teeth?
  - TS scar [narrower trachea]?

!!! Tell the truth about troubles in anesthesia !!!

- Examination:
  - Mouth Opening(3 fingers)
  - free teeth
  - gotic palatum
  - big tongue, small mouth
  - hypoplastic mandibula
  - anteposition of larynx = mandibula-os hyoideum <3 fing.
  - fletion, extension of head
  - Mallanpati

Difficul airway

* Obesity - body weight > 110kg
* Mouth opening - inter-incisor distance < 4cm in an adult
* Ability to prognath - a large overbite, or the inability to shift the lower incisors in front of the upper incisors
* Thyromental distance - The distance from the thyroid cartilage to the mentum (tip of the chin) should be > 6.5-7 cm.
* Mentum-Hyoid distance - Similar to thyromental distance, and should be at least 3-4 finger-breadths.

Mouth opening

Should be adequate (3 cm or more) to easily

- allow a laryngoscope plus endotracheal tube (ETT).

- Patients with temporomandibular joint (TMJ) disease or trismus may not be able to open widely, and may require fiberoptic intubation by the nasal route


VODKA

Teeth

Edentulous patients are always easier to intubate, but are often more difficult to ventilate with a face mask.

Patients with teeth in poor condition or with very prominent teeth may be more difficult to intubate.

Thyromental distance

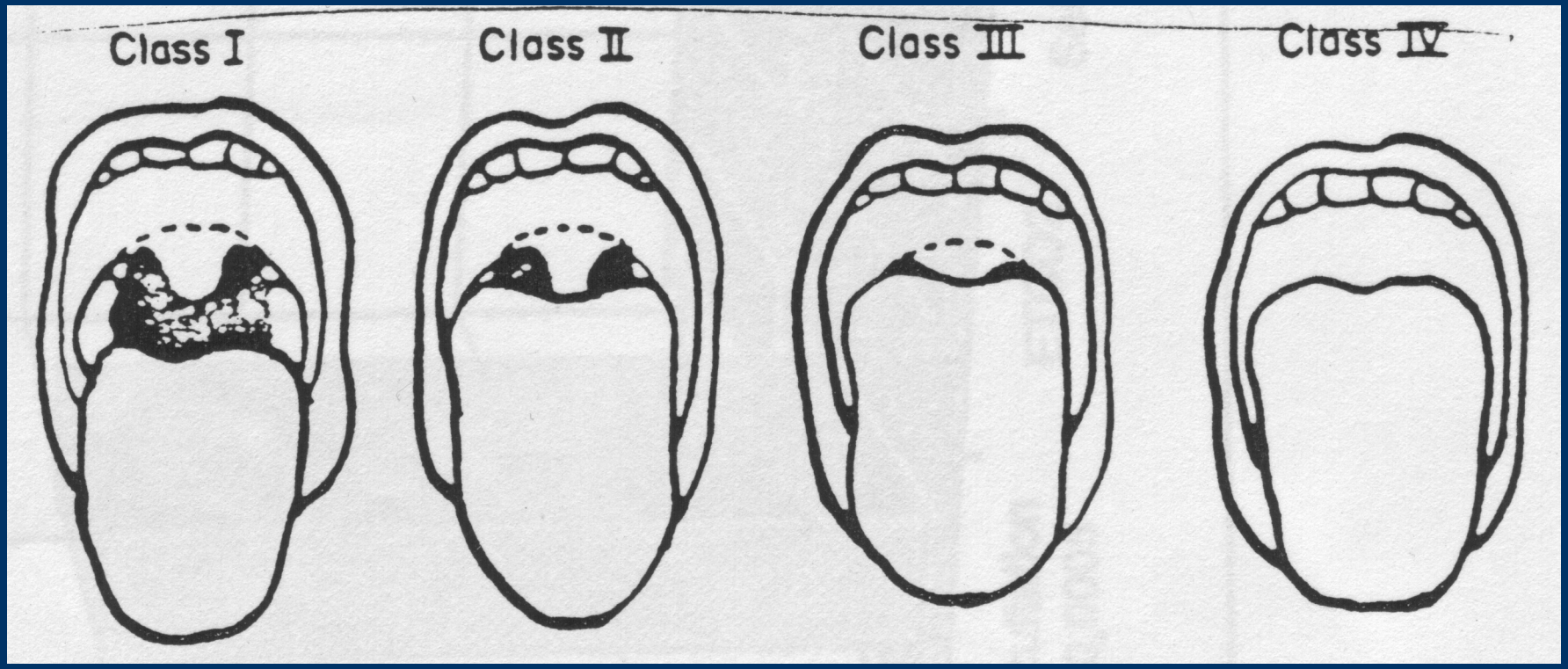
Distance from the mentum of the mandible to the thyroid, with neck fully extended.

If distance is less than 6 cm there is less space for the tongue to be displaced with laryngoscopy

Mallanpati

OTI easy 95%

OTI difficult 50%



Your easy patient?

Predicted difficult airway

- epiglotitis
- abscesus (submandibular, retropharyngeal)
- tetanus
- trauma of the neck, mouth
- tumor of the larynx, faryngx
- temporomandibular joint disease
- obezity

Respiratory risk

- spirometry, Blood gases

- COPD
- Astma
- chronic bronchitis

- acute inflamation of lunx

Cardiovaskular risks

- ECG (load)
- ECHO, (coronarography)

- hypertension (cardiac work, failure)
- ischemia (AP, IM, rhythm)
- Cor pulmonale
- Valvular abnormalities (Ao stenosis)

Prophylaxis:

- Beta blockers, ? antihypertenzive drugs

… other risks

- Diabetes mellitus
- Hepatic
  - porphyry
  - failure, cirhosis
- Renal
- CNS
  - epilepsy
  - mm. (Myastenia gr.,)

Conversation before GA or RA

empty stomach - last food, fluid

tooth (artificial, free)

weight

allergy

complication of CA in his/family history

check-up questionnaire

agreement with anaesthesia

PreOP starving

- 24 h no smoking
- 6-8 h no eating
  4h breast milk
- 2 h last clear liquid

Premedication

usually p.os - evening + morning

- sedation/**anxiolysis** (Benzodiazepines)
- analgesia only if pain (opioids)
- reduce airway secretions + heart rate control + hemodynamic stability
- prevent bronchospasm
- prevent and/or minimize the impact of **aspiration**
- decrease post-op nausea/vomiting

Premedication

goal: cooperating patient

anxiolysis

- easer induction of A.
- lower consumption of drugs

Risk of Aspiration

- Severe obesity
- Symptoms of gastroesophageal reflux
- Advanced pregnancy
- Severe ascites
- Opioid administration or other condition resulting in delayed gastric emptying
- History of gastroparesis or other motility disorder
- Bowel ileus or bowel obstruction

((Metoclopramid, sodium citrate with citric acid))
→ RSI Rapid Sequence of Induction

Induction of Anesthesia

1 – 3 drugs i.v. =

- lethal dose
- the most effective way

=> no self-controle, unable call for help, suppress of vital autoregulating mechanisms

- unmask compensated disturbances (hypovolemia, relative respiratory insuf, ...)

Induction

- 30 - 60s from fully conscious to vitally dependent on anaesthetist
- Moment with big influence on the rest of the life.

P.S. Did you ever sign “Informed Consend“

Airways

Indication for intubation:

full stomach (Rapid Sequence of Induction)

artificial ventilation after procedure

Laryngeal mask

Face mask

Orotracheal intubation, nasotracheal intubation with direct laryngoscopy

Tracheotomy

Cricothyreotomy

In the End of Anesthesia

Stable ABCD: extubation, pain, temperature control, PostAnest.CareUnit

Unstable: analgosedation + arteficial ventilation - transport to ICU

Extubation

- pay now or pay later - if in doubt, leave it in.
- always awake if - difficult mask airway or intubation, full stomach, surgical considerations, sux contraindicated
- awake means awake - if in doubt, leave it in

Postoperative care

ICU or standard department

monitoring according to the type of OP + health

control laboratory

treatment of acute pain

infusion therapy, blood loss

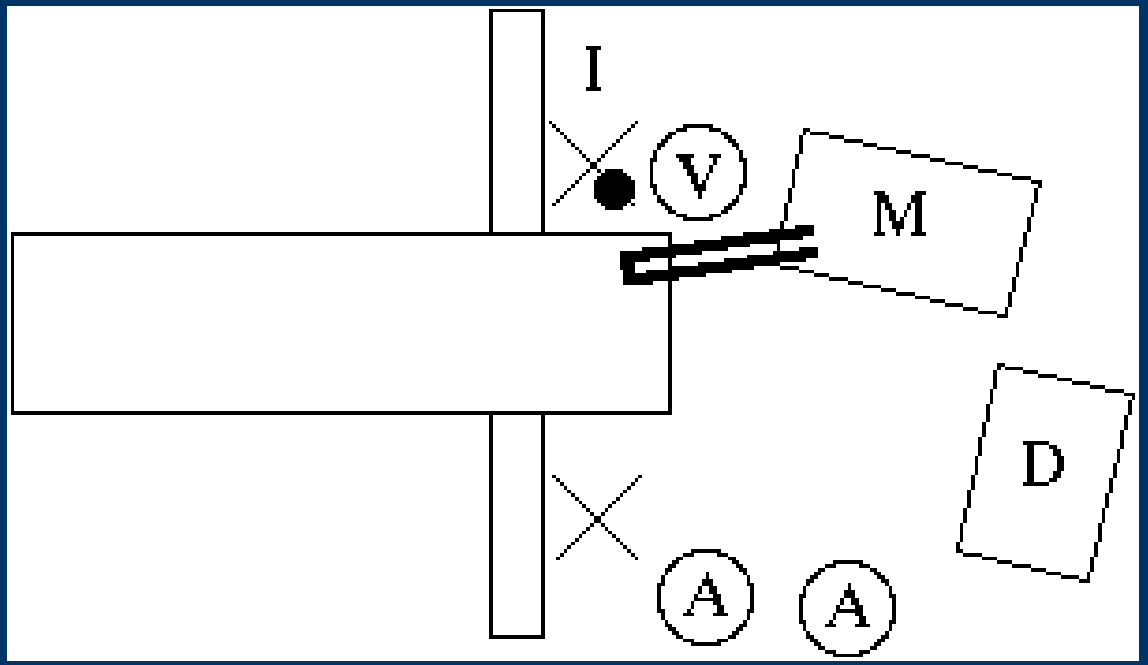
OR checklist

- Test A.Machine = does it inflate O2

[before anesthesia]

- Identity
- Procedure, side
- Allergy
- Documentation (fill in, Informed Consend)
- i.v. access
- Monitoring

ORoom



- „Dobry den“
- fellowship anesthetist ~ A.nurse

confidence, respect

- hygiene – wash your hands before every case, use gloves

Mortality of anaesthesia (ASA I)

0,008-0,009% primary connected with A

0,01-0,02% partially connected with A

0,6% 6 day mortality after operation

3 times danger than flying [1: 775 000]

Complications of GA

!!! No risk = no anaesthesia !!!

- difficult intubation, ventilation … asfyxia
- aspiration of stomach fluid … pneumonia
- overdose anaesthetic … cardiovascular, respiratory colaps
- malfunction of the monitor, ventilator
- organ failure (MI, COPD, hepatitis, ...)
- malignant hyperthermia
- allergic reaction / shock

Risk of anesthesia - mortality

- Trend to improve safety => low tolerance to complications of anesthesia

Mortality and Anesthesia:

- 1952 1 : 2 000 (Beecher, 1954)
- 1982 1 : 10 000 (NCEPOD 1987)
- 2001 1 : 50 000 – 220 000 (Brown, 2002)

- Risk of death in aviation 1: 755 000 (1997)

Death and Anesthesia

- hypoxia / UPV /
  intubation of oesophagus
- aspiration / regurgitation of gastric fluid to lung
- circulatory instability (ischaemia)
- overdose
- anaphylaxy, interaction of drugs

!!! Death was preventable (30-60%) !!!

Phraseology

- analgesia = elimination of pain
- sedation = elimination of stress, impatience, fear
  - Minimal Sedation (Anxiolysis) is a drug-induced state during which patients respond normally to verbal commands. Although cognitive function and physical coordination may be impaired, airway reflexes, and ventilatory and cardiovascular functions are unaffected.
  - Moderate Sedation/Analgesia ("Conscious Sedation") is a drug-induced depression of consciousness during which patients respond purposefully to verbal commands, either alone or accompanied by light tactile stimulation.

Phraseology

- Deep Sedation/Analgesia is a drug-induced depression of consciousness during which patients cannot be easily aroused but respond following repeated or painful stimulation. The ability to independently maintain ventilatory function may be impaired. Patients may require assistance in maintaining a patent airway, and spontaneous ventilation may be inadequate.
- General Anesthesia is … loss of consciousness during which patients are not arousable, even by painful stimulation.
  - inability to maintain ventilatory function = often require assistance in maintaining a patent airway, and positive pressure ventilation may be required.

Continuum of depth of sedation

	Minimal Sedation Anxiolysis	*Moderate Sedation/ Analgesia ("Conscious Sedation")*	*Deep Sedation/ Analgesia*	*General Anesthesia*
Responsiveness	Normal response to verbal stimulation	Purposeful** response to verbal or tactile stimulation	Purposeful** response following repeated or painful stimulation	Unarousable even with painful stimulus
Airway	Unaffected	No intervention required	Intervention may be required	Intervention often required
Spontaneous Ventilation	Unaffected	Adequate	May be inadequate	Frequently inadequate
Cardiovascular Function	Unaffected	Usually maintained	Usually maintained	May be impaired

ASA 2004/2009

Anesthesia

- General
  - inhal.,
  - TIVA
- Regional
  - central block (SA, EPI)
  - periferal blocks (brachial, nervous)
  - local anesthesia (eye – cornea + conjunctiva, infiltration)

Combined = GA + EPI-line

Useful web

http://www.virtual-anaesthesia-textbook.com/

www.asahq.org
www.akutne.cz
www.cobatrice.org
http://airwaymicrotext.homestead.com

Virtual Anesthesia Machine:

- http://www.anest.ufl.edu/vam/
- www.simanest.org

Preoperative evaluation and premedication

- Risk of A
- PreOp evaluation
- Premedication
- Safety in OR

Next week:

- Anesthesia Machine
- Monitoring