Operating room, Preoperative Preparation
• Estimation of surgical risk is one of the most important and also one of the most difficult problems in surgery.

• We have patient with his surgical disease, with his intercurrent diseases and on the other hand we have surgical procedure with its own risk.

• Benefit of the procedure (operation) should be higher than its potential risk.

• The aim of preoperative assessment is to identify potential risk of operation and the aim of preoperative care is to reduce risk of surgery at minimum.
Preoperative assessment

- **Patient’s comorbidities** should be assessed preoperatively. We concentrate on the patient’s **age**. However, even octogenarians can be fit for major operations, generally we tend to conservative or less invasive treatment in older patients.
Cardiovascular assessment

- **Cardiovascular assessment** is very important and is done by internal doctors or cardiologists. NYHA classification is used for ranking of patients with cardiac symptoms.

- NYHA I patients are without symptoms and NYHA IV have symptoms at rest.

- Patients in NYHA IV are at very high risk of operation.

- History of recent myocardial infarction or signs of myocardial ischemia are risk factors of operation.

- Echocardiography with estimation of ejection fraction is done in high risk patients.

- Presence of arrhythmias or hypertension can increase the risk of operation.
Lung functions

• **Lung functions** are also important. We can assess them by simple questions.

• How many stairs is patient able to climb? Or how many meters is patient able to walk without dyspnea?

• Smokers are at higher risk of postoperative complications.

• Pulmonary ventilation tests or chest X-ray can help to quantitate surgical risk in pulmonary compromised patient.
Renal functions

- **Renal functions** can also influence outcome of surgery. Chronic renal insufficiency or failure can increase operative risk. Serum levels of creatinine, urea and potassium are markers of kidney functions.

- High level of potassium can lead to heart arrhythmias even to cardiac arrest, so actual level of potassium should be checked in every patient with chronic renal function.

- Patient in chronic dialysis program have severe thrombocytopenia that can lead to coagulation disorder and prolonged bleeding. Doses of preventive low weight molecular heparin should be reduces in such situations.
Liver

- Liver produces amount of different proteins like coagulation factors which are important from the surgical point of view.
- Patients with liver diseases have impaired coagulation because decreased production of coagulation factors and tend to bleed.
- Other factor that contributes to bleeding in patients with liver cirrhosis is portal hypertension with fragile splanchnic varices.
- Markers of liver functions are transaminases, proteins and prothrombin level.
- Bilirubin is elevated by jaundice. When the reason of jaundice is bile obstruction by tumor or bile stone, it is important to restore bile drainage to prevent liver failure.
Coagulation

• Coagulation factors are important for stopping bleeding.
• Patients with impaired coagulation can bleed severely. The most common reasons for hypocoagulation are liver diseases or use of anticoagulation medications like cumarins.
• It is important to do routine coagulation screening in every surgical patient to identify hypocoagulation patients.
• Protrombine time (PT), aPTT, and level of serum fibrinogen are checked routinely.
• Hypercoagulation is not so easy to be recognized by routine coagulation tests but hypercoagulative patients have a positive history of deep venous thrombosis or pulmonary embolism and are at higher risk to have recurrent thromboembolic event.
• It is important to find and correct **anemia** in surgical patients.

• Reasons of anemia can be multiple but the most common reasons in surgery is bleeding, advanced tumors, end stage of chronical diseases, chronical sepsis etc.

• Hemoglobin is important for transport of oxygen and level of hemoglobin before operation should be higher than 10 g/l.
Hydration and electrolytes

• **Hydration and electrolytes.** Level of sodium, potassium, chlorides should be routinely checked before every operation.

• Injuries, burns, acute abdomen and gastrointestinal disorders like vomiting or diarrhea can lead to dehydration and metabolic disorders.

• This increases risk of perioperative complications.

• Dehydration a level of electrolytes should be corrected by infusions before operation.
**Diabetes**

- **Diabetes.** Level of glucose can be decreased after higher doses of insulin or if there is an absence of oral intake by diabetic patients.
- **Hyperglycaemia** is a result of lower doses of insulin or can be seen by infections by diabetic patients.
- Level of glucose should be corrected before operation.
- Hyperglycaemia is corrected by infusions with insulin.
- Hypoglycaemia is corrected by hyperosmolar infusion of 10% to 40% glucose.
- It is important to remember that hyperglycaemia is not isolated and is associated with dehydration and changes in serum level of sodium and potassium thus dehydration and disorder in electrolyte metabolism should be corrected together with hyperglycaemia.
Nutrition

• Assessment of nutrition is also important. Patient with chronic gastrointestinal diseases, patients with advanced tumors and addicted patients use to have malnutrition that leads to impaired wound healing and also to immunodeficiency.

• Malnutrition should be improved by peroral hyperalimentation or preoperative parenteral nutrition to improve postoperative course.
Obesity

• Obesity is also risk factor of postoperative complications. Obesity prolongs operative time, makes operation more technically demanding.

• Obese patients can have impaired wound healing.

• Rehabilitation of obese patients is not so rapid and that’s why obese patients are at higher risk of decubitus, bronchopneumonia or thromboembolic complications.

• Obese patients should reduce their weight before elective operation.
• Preoperative assessment is done by internal doctors and they state the risk of general anesthesia.
Surgical disease

- It is important to evaluate the disease from the surgical point of view.
- Surgeon should answer these questions.
• Is there any possibility to treat the disease conservatively?
• Some diseases can be treated only surgically.
• For example gastrointestinal cancer can be radically treated only by surgical resection, massive arterial bleeding can be stopped only by operation, perforated gastric ulcer with peritonitis can be treated only surgically and so on.
• But other diseases can be treated surgically, but also conservatively, for example varicous veins can be treated by operation and also by compression stockings or by sclerotherapy without anesthesia.
• What is the extent of operation? Surgical risk increases with the magnitude of the procedure.
• Patient should survive surgery and postoperative period.
• Tissue trauma, blood loss and operating time are risk factors.
• For example, young and fit patients with aortoiliac atherosclerotic disease are candidates for aortobifemoral bypass with excellent 5 year patency about 90%. But it is too hazardous operation for older patients. In such cases we tend to recanalize one iliac artery endovascularly by PTA and stents and then sew extraanatomical femoro-femoral cross over bypass from recanalized iliac and femoral artery to the femoral artery on the side with occluded iliac artery. This bypass does not have such a 5 year patency like aortobifemoral bypass but is shorter and safer, because it is not necessary to do laparotomy and is done only from femoral incisions.
• Is this operation acute? How much time do we have for preparation to operation? It is very important.

• The more time we have for preparing of the patient, the outcomes are better.

• The most urgent operations are those for bleeding, like sharp injuries of arteries, liver and spleen traumas or rupture of aneurysm of abdominal aorta. In these cases operation should be performed immediately and often we do not have any time for preparing of patient.

• A little bit more time, 1-2 hours, we have by acute abdomen. We can do necessary laboratory screening and internal assessment, we can rehydrate patient and correct electrolytes disorders.
• Elective operations are those operations which are prepared.
• We have days and weeks for preparing.
• We can compensate hypertension, arrhythmias and other intercurrent diseases. Diabetes, anemia and electrolyte disorder can be corrected.
• Outcomes of elective operation are better.
• For example operations of ruptured aneurysm of abdominal aorta have mortality of 50% but elective resection of aneurysm of abdominal aorta has only 5% mortality.
• So surgeon should all the time weight the benefit of the operation on one side and the possible risk of the operation on the other side.

• All the time we try to prepare the patient as well as possible before operation, but on the other side we cannot waste time in urgent situations like bleeding or acute abdomen.

• Finally the surgeon should decide if the operation is necessary, what should be the extent of operation and how much time we have for preparing of the patient.
Preparation to operation

General preparation

• Every patient should have internal preoperative assessment where risk of anesthesia should be estimated.

• All patients also should be informed about operation, its benefit and its potential complications.

• Patient must agree with surgery and should sign informed consent with operation.
• Cardiovascular diseases like hypertension, arrhythmia should be compensated.
• Patient should not be operated within three month after myocardial infarction, because risk of new myocardial ischemia is more than 30%, but after six month it is only 5%.
• Patients with severe myocardial ischemia can be interventionaly revascularized before extended operations.
• Patient with pulmonary diseases should be compensated.
• Chronical infections must be treated by antibiotics before operation.
• Smoking cessation is recommended, it improves postoperative course.
• Patient with chronic renal insufficiency should have good hydration before and after operation to prevent renal failure.

• Patient with chronic renal failure should have good level of serum potassium before operation to prevent cardiac arrhythmias or cardiac arrest.

• Thus they usually have dialysis day before operation.

• It is necessary to think that patients on dialysis tend to bleed because of thrombocytopenia and that’s why they should have reduced doses of low weight molecular heparin.

• Dialyzed must not have cuff of blood pressure manometer on the limb where arteriovenous shunt is placed.
• Patient with liver diseases have decreased level of coagulation factors and should be prepared by vitamin K or by frozen plasm in acute situation to prevent bleeding.

• Patient with tumor of head of pancreas have jaundice with tendency to hepatic failure.

• Preoperative endoscopic drainage of bile duct to duodenum with stent is recommended.

• This decreases level of bilirubin and improves liver functions.
• Patients on peroral anticoagulation drug like warfarin are converted to low weight molecular heparin before operation. The effect of warfarin lasts about 5 days, so oral intake of warfarin should be stopped one week before operation.

• In acute situations frozen plasms or activated prothrombin complex is administered to correct hypocoagulation caused by warfarin.

• Intake of antiaggregation medicaments like ASA or clopidogrel is not routinely stopped before operations. Those patients can bleed more but the risk of thrombotic complications like stroke or myocardial infarction is too high after stopping of these medicaments.
• Anemia is corrected by blood transfusions. Level of hemoglobin should be higher than 10 g/l before operation.
• Before major surgery we examine blood group and we have 2-4 units of compatible blood in reserve.
• Dehydration and metabolic disorder is corrected before operation by infusions.
• Typical reason of dehydration in surgery is acute abdomen, pancreatitis and also other gastrointestinal diseases.
• Hyperglycaemia is corrected by infusions with insulin and hypoglycemia with infusions with hyperosmolar glucose.
• It is important to think at prevention of thromboembolic complication.

• Prevention is done by compressive stockings, good hydration, early postoperative rehabilitation and in risk categories of patients also by administration of low weight molecular heparin.

• First dose should be given 12 h before operation.
• Antibiotic prophylaxis is administered before operations when there is high risk of infection.

• Such operations are septic operations of abscesses or peritonitis. Other operations with higher risk of infection are mesoseptic operations like gastrointestinal resection where gastrointestinal tract is opened.

• Further group of operations where antibiotic prophylaxis is required are aseptic operations with low risk of infection.

• But if any infection occurs after such operation it would bring life threatening situation. Such operations are cardiac and vascular operations.

• Also every operation when artificial material is placed in organism should be cover by antibiotics.

• These implants can be artificial heart valve, vascular prostheses and also osteosynthetic material.
Local preparation

• All patients have to be washed before surgery.

• Operative field should be shaved evening before. Skin in operative field should be without infection.

• Rings, earing and other jewelry have to be removed to prevent burns from electrocoagulation.

• Nail polish should be also cleaned up not to interfere with saturation detector.

• Dental prosthesis should be removed if it is possible.

• Patient must not eat and drink minimally six hour before elective surgery to prevent aspiration during anesthesia.
• Before more complex and longer operations urinary catheter should be inserted. It makes easier to measure urine production in perioperative period and is also prevention of urinary retention, which is common especially by older men and after spinal anesthesia.

• Before major operation central venous catheter is placed. It enables to measure central venous pressure. Central venous catheters are more durable than peripheral vein and they also enable to administer more infusions and also more concentrated solutions, like parenteral nutrition.
• Patients with bowel obstruction should have inserted nasogastric tube before operation. The aim is to derivate gastric content before operation and to prevent aspiration after introduction in general anesthesia.

• Nasogastric tube is also placed preoperatively in cases when we expect bowel paralysis postoperatively, like gastrointestinal resections or operations in retroperitoneum.
Before small and large bowel resection a bowel cleansing is used. Cleaned bowel decreases risk of infection complications perioperatively.

Historically enemas were used. Orthograde cleansing with special hypertonic solution is preferred today. Patients before elective large bowel resection have only fluid food for dinner day before operation and they drink up to four liters of orthograde cleansing solution like for example Fortrans solution.

Only patient with mechanical obstruction are prepared by enemas.

Small bowel does not have such concentration of bacteria, that is why before elective small bowel resection only two liters of orthograde cleansing is used standardly (or without orthograde cleansing).
Operating theatres

- Operating theatre meets criteria of maximal asepsis during surgery.
- Rarely is one operating theatre alone.
- Mostly are more operating theatres associated to operating tract.
• Operating tract has more zones.
• Immediately after entrance into operating tract is change room, where doctors and operating staff change and put operative clothes on.
• Then there are administrative and rest rooms in operating tract.
• Aseptic part of operating tract comprises rooms that are close to own operating theatre.
• It consists of room for washing hands of operative crew, room for storage of surgical material, room for preparing of patients and room for mechanical washing of used instruments.
• **Sterile part** and centers of operating tract are own operating theatres. Doors into operating theatres are usually automatic. Floor is antistatic. Operating theatre should be large enough because modern surgery requires placement of different devices in operating theatre like suction device, anesthesiological device, electrocoagulation, eventually cell saver which saves patient’s blood during massive bleeding, extracorporal pump for heart operations, mobile C-arm for X ray control during vascular surgery or orthopedic surgery or laparoscopic set for laparoscopy.

• There should be minimum furniture in operating theatre and it should be placed in adjacent rooms in aseptic zone. Operating theatres are air conditioned with laminar flow of air.
• There is also **exit zone** in operating tract which is for transfer of used material.
• There is also recovery room in exit zone.
• Here are placed patients immediately after operation till they are stable, awake and are able to cough and breathe spontaneously.
• Patients are under control of anesthesiologist here.
• Operating tract has its own hygiene schedule.
• Regularly are floor, furniture and wall cleaned with desinfectants. These desinfectants are periodically changed to avoid bacterial resistance.
Septic, aseptic and superaseptic operating theatres

• According septicity of operations we can divide operating theatres in septic, aseptic and superaseptic.

• **Septic operating theatres** are for septic operations like operation of peritonitis, drainage of abscesses, amputations.

• **Aseptic operating theatres** are for majority of general surgical, urological and gynecological operations.

• **Superaseptic operating theatres** are for those operations where artificial material is implanted or where infection can cause extended damage, like heart and vascular surgery, orthopedic surgery, neurosurgery.
Thank you for your attention.