BASIC SURGICAL TECHNIQUES

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Wound: bleeding

Pain

SURGERY

Anesthesia

Operating room
surgical operations

Reoperation
SURGERY

Operating room

Specialized staff
Sterile equipment
Sterile drapes

Scrubbing area

Surgical operations

still secret!
Our aim

to teach and practice

- basic surgical maneuvers
- special behavior in the operating room,
- preparation before operation,
- surgical tools and instruments,
- wound management.
Our aim

- to evaluate your own technical ability,
- reveal whether you are interested in participating in technical procedures, and
- therefore influence your choice of residency training.
Key competencies required

Technical skills & Intellectual skills

- Coordinated team work

Recognize: collapse, Decision: help (in time!)
Skills training and assessment

Surgeon

OR

Researcher
DEPARTMENT OF SURGICAL RESEARCH AND TECHNIQUES

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Team members

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Dr. Csukás Domokos  
Assistant Professor
Team members

Fehér Daniella
Biologist

Dr. Juhos Krisztina
MD

Vódliné Schum Ibolya
Assistant

Klotz Dávid
Secretary
Practical sessions
every second week (3x45 perc = 2 h and 15 min.)

1. **Getting acquainted with the operating room**, rules and behaviour, scrubbing-in, and preparation of the surgical field. Basic surgical instruments and their proper usage.

2. **Knotting and basic suturing techniques** on the skill model (simple interrupted suture).
3. Basic suturing techniques on ex-vivo animal model (**interrupted sutures**).
4. Basic suturing techniques on ex-vivo animal model (**continuous sutures**).

5. Demonstration of laparoscopic tower, the associated equipments and **laparoscopic instruments**.

6. Practicing eye-hand coordination and **fine hand movements in pelvitrainer**.

7. **Tissue dissection and suturing tasks on anesthetised rats** (removal of a „naevus“ from the back and median laparotomy).
1. **Practical session:**

scrubbing-in, gowning and gloving

Teacher will provide a brief introduction, demonstrate the appropriate technique, and provide feedback on each step.

**Task:** to demonstrate the ability:

- to perform perfect surgical scrub
- assisted-gowning technique
- gloving

understand the sterile field of the operating room

**Perfect:** 20 point, any failure: 0 point
1. Practical session: surgical instruments

Goal:
To introduce to the use and names of various surgical instruments.

Task: to identify, appropriately handle and know the use.

You should recognize and use 5 surgical instruments asked randomly: 0-5 point
2. Practical session

Knot tying/Basic Suturing on a skill model

Goal: To learn the technique of knot tying.

Task: to learn the appropriate use of suture equipments (needle holder, forceps, scissors), tie a two-handed knot, to perform an instrument tie and the proper technique of simple interrupted suture

Demonstrate appropriate use of suture equipments and tie two-handed knots
3. Practical session

Basic suturing techniques on ex-vivo animal model

simple interrupted suture

interrupted sutures: horizontal and vertical mattress (Donati)
4. Practical session

Basic suturing techniques on ex-vivo animal model

You should demonstrate the proper technique of suturing

Based on quality and dynamic performance: 0-10 point
5. Practical session

Laparoscopic instrumentation

Task: to identify, and appropriately use devices

You should recognize and use 5 laparoscopic instruments asked randomly: 0-5 point
6. Practical session

laparoscopic basic skills - practice in pelvitrainer

- A series of 6 plastic rings are picked up in turn by a grasping forceps from a pegboard on your left,

- transferred in space to a grasper in the right hand, then

- placed around a post on the corresponding right-sided pegboard.
Peg transfer

- This task is designed to develop depth perception and
- visual-spatial perception in a 2D viewing system and
- coordinated use of both the dominant and nondominant hands.

Exercise is scored for efficiency (-2:30 min:10 point) and precision (penalty).
7. Practical session

Wound management on anaesthetized rats

Tissue preparation and wound closure: removal of a „naevus” from the back and median laparotomy.
Location of practical sessions

1-2-3-4th and 7th

Surgical Teaching room.

accessed from the Main Hall of the NET.
(signs down by the stairs.)
Location of practical sessions

5th and 6th

1st Seminar room.
(laparoscopic training lab)
Expectations

- Attendance is obligatory.

- To participate on the practice is your interest: practical items you can learn only here. Without required skill you will not be able to pass exam.

- You are allowed to work only in the group where you have registered on the Neptun portal.

- Because of limited capacity of OR, absences can be replaced only after registration and joining to another group.
Expectations

Please note that during each course proper nail hygiene is necessary (fingertip-high nails), the use of nail-polish, artificial nails, any jewellery, including watches are not allowed.
Expectations

- Practical session starts exactly on time.
- Do not be late because you will not be able to accomplish your task.

Who does not respect these requirements will be not allowed to take part on the courses and considered to be absent.
Expectations

☐ Handle the surgical instruments properly.

☐ If an instrument is damaged, cracked or broken during your practice you should sign a statement.

☐ You do not need to pay for any damaged instruments except if your responsibility is clear.
Exam

- The number of missed practices may not exceed more than 25%. (only one absence!)

- Missing two or more practices, the semester will not be credited. (only one replacement is possible!)

- Basis: lectures and practices

- The **textbook** and **DVD** on the Neptun portal {Homepage » Information » Education » Documentations of faculties}

- Additional textbook (offered):
  R.M. Kirk: Basic Surgical Techniques ed. Elsevier
Exam

The exam starts with a test of a minimum requirements

- Relevant history of surgery
- Asepsis and antisepsis
- Understand the sterile field of the operating room
- Theoretical and practical aspects of wound healing, knot tying, suturing materials, and suturing
- Knowledge of general surgical and laparoscopic instruments

You are allowed to continue exam achieving at least 80%.
Exam - Practical

Workstation:
1.) scrubing- in – gowning and gloving
2.) knowledge of basic surgical instruments
3.) manual knots
4.) making stitches
5.) knowledge of laparoscopic instruments
6.) laparoscopic practice in pelvitrainer

Graded by task-specific checklists.

Last step is the theoretical part.
Final result

Workstations  60 point
Theoretical part (oral)  40 point
          100 point
After your successful final exam you are invited to participate in the research program of the department Students’ Scientific Association (TDK) and as a teacher assistant!

Please, contact course director or your teacher!
The operating room

sterile environment within a hospital where surgical operations are carried out.
Operating theater

Gaetano Petrioli (Róma, 1750)

in which students and other spectators could watch surgeons to perform surgery.

Würzburg 1804
Location of the Operating Suites

- Separated from the main flow of hospital traffic
- Should be easily accessible from surgical wards and emergency rooms.
- Floor should be covered with antistatic material,
- The walls should be painted with impervious, antistatic paint. (reduces the dust levels and allows frequent cleaning)
- The surfaces must withstand frequent cleaning and decontamination with disinfectant.
Layout of the Operating Room

- sterile supplies store
- Recovery area
- scrub-in area
- Anesthetic room
- clean corridor
In scrubbing area

Take

☐ scrub suits
☐ a protective cap covering hair
☐ masks over lower face, covering mouth and nose
☐ surgical hand scrub

protective covers on shoes
Surgical hand wash

After mechanical cleaning holding hands up above the level of the elbow, apply antimicrobial agent to hands and forearms up to the elbows.
Steps for surgical hand wash

Using a circular motion, begin at the fingertips of one hand and lather and wash between the fingers, continuing from fingertip to 5 cm above the elbow.
Steps for surgical hand wash

Repeat this process for the other hand and arm. Continue rubbing for 3-5 minutes.
“scrubbing-in”

Generally, “scrubbing-in” means a sequence of procedures where in one obtains a sterile surface.

1. Surgical hand scrub
2. Gowning (putting on sterile, surgical gown)
3. Gloving (putting on sterile, surgical gloves)

Keep hands above the level of the waist and do not touch anything before putting on sterile gown and surgical gloves.
Enter into the O.R.

The surgical hand scrub is performed outside the O.R. at the scrub station. Once completed, one must carefully enter the O.R. for **gowning** (usually with the assistance of the scrub nurse) and gloving.
Gloving

Once gowned and gloved, a person’s movements must take into consideration the sterile fields. Typically, when moving, hands should be kept directly in front of the chest, but clear of the face or other non-sterile areas.

Once gowned and gloved, hands must be kept above the waistline in constant view.
Operating team

chief surgeon, directs the surgery;

one or more assistant surgeons, help the chief surgeon;

the scrub nurse, who passes instruments to the surgeon; and

the circulating nurse, who provides extra equipment to the operating team.
Operating room

All personnel wear protective clothing called scrubs. They also wear shoe covers, masks, caps, eye shields, and other coverings to prevent the spread of germs.

The surgical site is cleansed and surrounded by a sterile drape.
Anesthesia

The monitoring equipment and anesthesia used during surgery are usually kept at the head of the bed.

The anesthesiologist stands here to monitor the patient's condition during surgery.

Depending on the nature of the surgery, various forms of anesthesia or sedation are administered.
Operating room typically contains a **monitor** that displays vital signs, an **instrument table**, and an **operating lamp**. **Anesthetic gases** are piped into the anesthetic machine. A catheter attached to a **suction machine** removes excess blood and other fluids, which can prevent surgeons from seeing the tissues clearly. **Intravenous fluids**, started before the person enters the operating room, are continued.
Temperature and Humidity

- The temperature and the **humidity (not less than 55%)** play an important role in maintaining staff and patient comfort.

- They must be **carefully regulated and monitored**. (In low humidity there is a danger of the production of electrostatic sparks.)

- Ideally, the **operating room should be 1°C cooler** than the outer area. (This aids in the outward movement of air: the warmer air in the outer area rises and the cooler air from within the operating theatre moves to replace it.)
Laminar flow & ultraclean air

Laminar airflow is designed to move particle free air over the aseptic operating field in one direction.

It can be designed to flow vertically or horizontally and is usually combined with high efficiency particulate air (HEPA) filters.

HEPA filters remove **particles > 0.3 micron** in diameter with an **efficiency of 99.97%**.
Operating theater - XXI.
Operating theater - XXI.
Operating theater - XXI.
Patient care – Future
Asepsis and antisepsis

- Antisepsis is the use of chemical solutions for disinfection
- Asepsis is the absence of infectious organisms
- Aseptic techniques are those aimed at minimising infection
- Asepsis usually involves
  - The use of sterile instruments
  - The use of a gloved no touch technique
- Antisepsis is the removal of transient microorganisms from the skin and a reduction in the resident flora
Asepsis and antisepsis

History

- 1847 - Semmelweis identifies surgeons hands as route of spread of puerperal infection
- 1865 - Lister introduces hand and wound asepsis with the use of carbolic acid
- 1880 - von Bergmann invents the autoclave
Ignaz Philipp Semmelweis (1818 – 1865) was a Hungarian obstetrician who worked to identify the cause of puerperal sepsis. Semmelweis carefully compared mortality rates among obstetrical patients in two Viennese clinics. He determined that high mortality rates in the first clinic were caused by the transfer of living organisms on caregivers hands.
The first clinic was staffed by medical students and physicians whose hands became contaminated while performing autopsies.

The second clinic, with significantly lower mortality rate, was staffed by midwives who did not perform autopsies.
Ignaz Philipp Semmelweis (1818 – 1865)

He implemented a program which required medical students to wash their hands in liquid chlorine after performing autopsies.

The mortality rate of women declined from 18% to 2% in only 5 Months.

Unfortunately, Semmelweis was unable to convince his colleagues of the importance of handwashing.
Asepsis and antisepsis

Preoperative skin preparation

- Bacterial flora of the patient is the principle source of surgical wound infection
- Focal sources of sepsis should be treated prior to surgery
- In patients with active infection consideration should be given to delaying surgery
- Pre-operative showing with an antiseptic solution does not reduce infection rate
Asepsis and antisepsis

**Skin shaving**

- Aesthetic and makes surgery, suture and dressing removal easier
- Wound infection rate lowest when performed immediately prior to surgery
- Infection rate increased from 1% to 5% if performed more than 12 hours prior to surgery
- Clippers or depilatory creams reduce infection rates to less than 1%.
Asepsis and antisepsis

Skin preparation

70% Isopropyl alcohol
- Acts by denaturing proteins
- Is bactericidal but short acting

0.5% Chlorhexidine
- Acts by disrupting the bacterial cell wall
- It is persistent and has a long duration of action (up to 6 hours)

70% Povidone - iodine
- Acts by oxidation / substitution of free iodine
- Bactericidal and active against spore forming organisms
- Effective against both gram-positive and gram-negative organisms
- Rapidly inactivated by organic material such as blood
- Patient skin sensitivity is occasionally a problem
- No evidence that one is superior to any other
Asepsis and antisepsis

- Surgical procedures must be conducted using aseptic technique which requires the use of sterile instruments and supplies.

- Many supplies such as gloves, surgical blades, and suture materials are commercially available in sterile, ready-to-use packs.

- However, it is frequently necessary to sterilize (in-house) items such as surgical instruments, drapes, gauze, gowns, and catheters/devices for implant.
Sterilization and disinfection

- Sterilization kills all viable microorganisms, while disinfection only reduces the number of viable microorganisms.
- High-level disinfection will kill most vegetative microorganisms, but will not kill the more resistant bacterial spores.
- Commonly used disinfectants, such as alcohol, iodophors, quaternary ammonium and phenolic compounds, are not effective sterilants and, therefore, are not acceptable for the use on items intended to be used in surgical procedures.
## METHODS OF STERILIZATION AND DISINFECTION

<table>
<thead>
<tr>
<th>Method</th>
<th>Concentration or Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moist Heat</td>
<td>$\geq 250^\circ F$ ($121^\circ C$),</td>
</tr>
<tr>
<td>Dry Heat</td>
<td>$171^\circ C \times 1$ hour; $160^\circ C \times 2$ hour; $121^\circ C \times \geq 16$ hours</td>
</tr>
<tr>
<td>Ethylene Oxide</td>
<td>450-500 mg/liter at 55-60$^\circ$C</td>
</tr>
<tr>
<td>Glutaraldehyde</td>
<td>Variable</td>
</tr>
<tr>
<td>Hydrogen Peroxide</td>
<td>6-25% $(stabilized)$</td>
</tr>
<tr>
<td>Formaldehyde</td>
<td>6-8%</td>
</tr>
<tr>
<td>Moist Heat</td>
<td>75-100$^\circ$C</td>
</tr>
<tr>
<td>Glutaraldehyde</td>
<td>2%</td>
</tr>
</tbody>
</table>
Prevention of wound infection

- **Exogenous**
  - Sterilisation of instruments, sutures etc
  - Positive pressure ventilation of operating theatres
  - Laminar air flow in high risk areas
  - Exclusion of staff with infections

- **Endogenous**
  - Skin preparation
  - Mechanical bowel preparation
  - Antibiotic prophylaxis
  - Good surgical technique
Wound infection rates

Clean
- No viscus opened (e.g. hernia repair)
- Infection rate typically 1-2%

Clean-contaminated
- Viscus opened but no spillage of gut contents (e.g. right hemicolecction)
- Infection rate usually <10%

Contaminated
- Viscus opened with inflammation or spillage of contents (e.g. colectomy for obstruction)
- Infection rate 15-20%

Dirty
- Intraperitoneal abscess formation or visceral perforation
- Infection rate 40%