UNIVERSITY OF DEBRECEN
FACULTY OF MEDICINE
DEPARTMENT OF OPERATIVE TECHNIQUES
AND SURGICAL RESEARCH

# BASIC SURGICAL TECHNIQUES

## Faculty of Medicine

4th (enlarged) Edition



UNIVERSITY OF DEBRECEN
FACULTY OF MEDICINE
DEPARTMENT OF OPERATIVE TECHNIQUES
AND SURGICAL RESEARCH

**Irén Mikó M.D., Ph.D.**
**István Furka M.D., Ph.D., D.Sc.**

# BASIC SURGICAL TECHNIQUES

## Faculty of Medicine

**Edited by**
**Prof. Irén Mikó**

Debreceni Egyetemi Kiadó
Debrecen University Press
2026

4th (enlarged) Edition

**Contributors:**

Irén Mikó M.D.
István Furka M.D.

**for the enlarged part:**

Norbert Németh M.D.
Katalin Pető M.D.
Ildikó E. Takács M.D.
Tamás Lesznyák M.D.
Andrea Furka M.D.
Miklós Szokoly M.D.

**Word processing:**
Róbert Füzesi

1st Edition: 2004
ISBN 963-472-806-5
Reprinted: 2005, 2006, 2007
2nd Edition: 2007
ISBN 978-963-907-073-8
Reprinted: 2008, 2009, 2010
3rd (enlarged) Edition: 2011
ISBN 978-963-318-145-4
Reprinted: 2012, 2013, 2014, 2015, 2016, 2017, 2018
4th (enlarged) Edition: 2019
ISBN 978-963-490-118-1
Reprinted: 2019, 2020, 2021, 2025

Printed by: Debrecen University Press
Edited by: Prof. Irén Mikó M.D., Ph.D.
Copyright 2019

© Debreceni Egyetemi Kiadó Debrecen University Press,
beleértve az egyetemi hálózaton belüli elektronikus terjesztés jogát is

ISBN 978-963-615-483-7 (pdf)

Kiadta a Debreceni Egyetemi Kiadó Debrecen University Press
Felelős kiadó: Karácsony Gyöngyi
dupress.unideb.hu
Készült a Debreceni Egyetemi Kiadó nyomdaüzemében, 2025-ben

# Contents


1. Surgery. Operation. Surgical indications/contraindications. .....3
Terminology for surgery. .....5
Surgical techniques. .....6
Deontology. Surgical deontology. .....7
Administration, ethical and legal respects. Informed consent. .....9
2. Surgical armamentarium. .....11
Surgical instruments. .....12
Cutting instruments. .....13
Hemostatic instruments. .....16
Grasping and retracting instruments. .....18
Special instruments. .....20
Suturing instruments. .....21
3. Surgical sutures. .....23
Surgical needles. .....25
Surgical biomaterials. .....27
Surgical suture materials. .....28
Knotting techniques. Mariner knot. Surgical knot. .....38
Suturing techniques. .....43
Surgical staplers. Surgical clips. .....48
Steps in taking a stitch. .....49
Simple interrupted stitch. .....53
Suture removal. .....55
Simple continuous suture. .....56
4. Asepsis, antisepsis. Preparations for operation. .....57
Clothing for operating room personnel. .....58
Surgical hand and arm disinfection (Scrubbing). .....59
Gowning. Glowing. .....67
Preparation of the operative field. Skin disinfection.....70
Isolation of the operative field. .....71
Operating room environment. .....72
Sterilization methods of medical devices. .....73
Operating theatre. .....76
5. Surgical hemostasis. .....77
Stop the bleeding temporary. .....79
Stop the bleeding definitively. .....81
Methods for closing the lumen. .....82
Dissection of blood vessels. Venous cutdown technique. .....84
6. Punction of the vessels. Injection techniques. .....87
Injections. Rules and regulations. .....88
Tools of injections. .....89
Intracutaneous injection. .....90
Subcutaneous injection. .....91
Intramuscular injection. .....92
Intravenous techniques. Intravenous injection. .....93
Securing the vein with cannulation. Percutan cannulation. .....97
Blood sampling methods. .....101
Tools of blood sampling. .....102
Infusions. .....106
The usage of the infusions. .....108

7. Laparotomy. .....110
Anatomy of the abdominal wall. .....112
Incision's directions. .....113
Laparotomy - median (midline). .....115
Laparotomy - paramedian. .....116
Wound healing. Wound dressings. .....121
8. Basic principles of small bowel surgery. ..... 131
Technique of one layer end-to-end intestinal anastomosis.....136
9. Catheters and drains. .....141
Catheters. .....142
Catheterization of urinary bladder. .....147
Drains. .....150
10.Surgery of parenchymal organs. Organ saving methods. .....152
Anatomy of the liver. „Segments", blood supply. .....154
Anatomy of the pancreas. „Segments", blood supply. .....158
Anatomy of the kidneys. „Segments", blood supply. .....159
Anatomy of the spleen. „Segments", blood supply. .....160
Transplantation of parenchymal organs. .....162
11.Bioplasts and surgical tissue adhesives. .....163
Bioplasts. .....164
Advantages of bioplasts. .....166
Surgical tissue adhesives. .....170
Advantages of surgical tissue adhesives. .....170
12.Conicotomy, Tracheostomy. .....174
Priorities. Anatomy. .....176
Conicotomy. .....177
Tracheostomy. .....178
Complication's possibilities. .....179
13.Basic principles of vascular surgery. .....180
Anastomosis types. .....184
Operative techniques. .....185
14.New surgical techniques, procedures. .....188
Microsurgery. Required tools. .....189
Microsurgical instruments. .....190
Application fields of microsurgery. .....191
Laparoscopic surgery. .....193
Laparoscopic instrumentarium. .....194
Laparoscopic instruments. .....195
Application fields of laparoscopy. .....197
NOTES. .....199
Single-port techniques. .....200
Da Vinci Surgical System. .....201

# SURGERY. OPERATION. TERMINOLOGY FOR SURGERY. SURGICAL TECHNIQUES. SURGICAL DEONTOLOGY. ADMINISTRATION, ETHICAL AND LEGAL RESPECTS.

# 1.

# SURGERY

**Surgery is a branch of medicine,
concerned with the diagnosis and treatment of injuries
and the excision and repair of pathological conditions
by means of operative procedures.**

**THE HAND OF THE SURGEON IS THE BEST INSTRUMENT!**

**Gr. cheirourgia = „handwork”**

## Operative medicine!

# OPERATION

**Diagnostic or therapeutic intervention
with instruments**

**IN STERILE CONDITION**

**in order to break or reconstruct
the continuity of different tissues.
(curative or palliative interventions)**

## INDICATIONS AND CONTRAIDICATIONS.

**The decision - making as to whether or not
to carry out a given operation**

**absolute, relative, vital indications**

**absolute, relative contraindications**

# TERMINOLOGY FOR SURGERY

## ELECTIVE OPERATION

**The best time is elected
in respect of the patient,
so the operative risk may be lower.**

***-relative indication-***

## URGENT OPERATION

**Having the diagnosis, for the safety of the patient
only the most important preparations must be done
and the operation must be performed as soon as possible,
keeping the operative rules.**

***-absolute indication-***

## EMERGENCY OPERATION

**The aim is to save the life of the patient.
The operation must be performed without delay,
as fatal end is in direct ratio to the passed time
between the beginning of the problem
and the time of operation.
Some of the operative rules may be disregarded.**

***-vital indication-***

## REOPERATION

**Soon after the previous intervention
a repeated operation is required
in order to treat the complications.
Multiple operations are possible.**

# SURGICAL TECHNIQUES

## The science of interventions' methodology.

**ESSENTIAL**

**USEFUL**

**ORIENTATION**

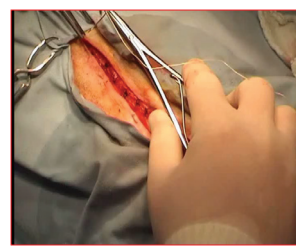
} **KNOWLEDGE**



**microsurgery**



**hemostasis**



**wound closure**



**laparoscopy**

**minimal invasive interventions**

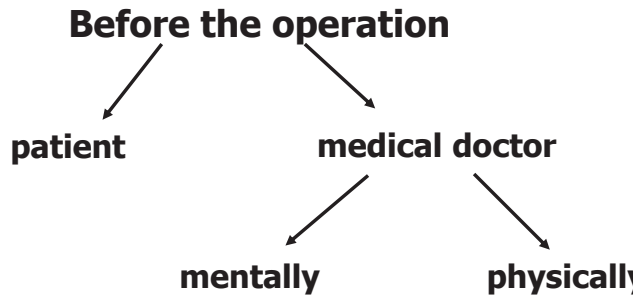
**essential** **useful** **orientation**

# DEONTOLOGY

## The science of professional duties and etiquette

**Gr. deonta - things that ought to be done**
**Gr. logos (logy) - the science of something**

# SURGICAL DEONTOLOGY




**During the operation**

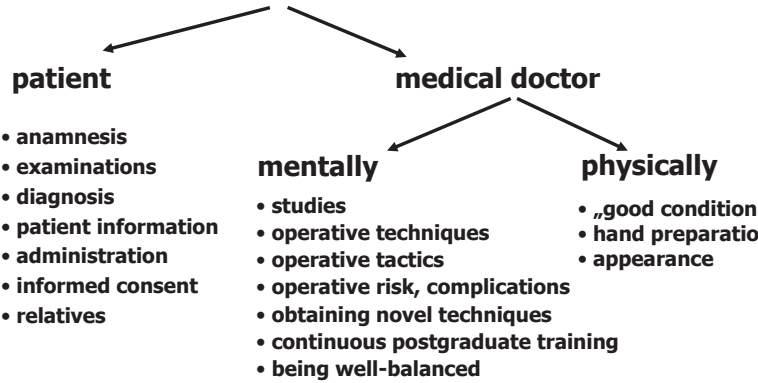
**After the operation**

---

# IT IS A CONTINUOUS PROCESS

# SURGICAL DEONTOLOGY

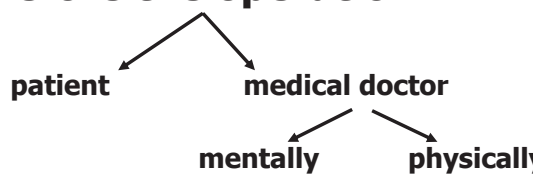
## Before the operation




**RESPONSIBILITY** **CONFIDENCE**

# SURGICAL DEONTOLOGY

## Before the operation




## During the operation

## After the operation

- administration
- bandaging
- control examinations

---

# IT IS A CONTINUOUS PROCESS

# ADMINISTRATION, ETHICAL AND LEGAL RESPECTS

## INFORMED CONSENT

- **fully informed**
- **individual**
- **concerning the state of health of the patient**
- **based on latest medical knowledge**
- **continuous and precise**
- **in written form**

# INFORMED CONSENT CONTAINING

- **state of health**
- **type of intervention**
- **possible complications**
- **consequences of refusing the procedure**
- **alternative treatments**
- **postoperative care, life style**
- **in written form**

**SIGNATURE OF THE PATIENT!**

# SOME SPECIAL POINT OF VIEW OF INFORMED CONSENT IN JUDGEMENT

## informed consent has to be:

**- objective,**
**- real,**
**- detailed and careful.**

## After the informed consent:

**- the patient has to make his/her own decision,**

**- the surgeons are responsible that the patient had been informed well before the operation.**

# SURGICAL ARMAMENTARIUM.

# 2.

# SURGICAL INSTRUMENTS

## I. Cutting instruments
## II. Hemostatic instruments
## III. Grasping and retracting instruments
## IV. Special instruments
## V. Suturing instruments





**instrument tray** **big table instrument table/trolley**

# CUTTING INSTRUMENTS

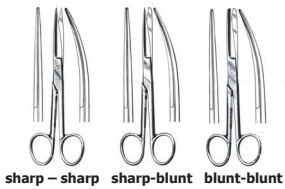
***scalpels***
**conventional**
**changeable blade**

***scissors***
**straight - curved**
**sharp - blunt**
**Mayo-, Cooper scissors**
**peritoneal-, knee scissors**

***Diathermy***
***electro-surgical tools***
**(<u>cutting function</u> and coagulation)**








## Cooper scissors



**Sir Astley Cooper**
**1768-1841**

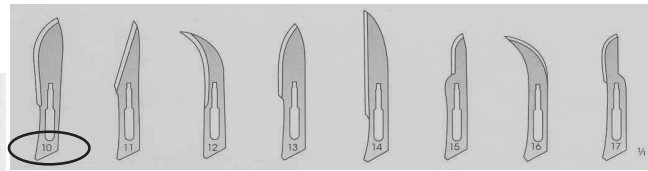
## Mayo scissors

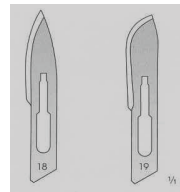


**Charles Horace Mayo**
**1865-1939**

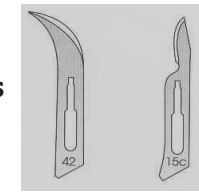


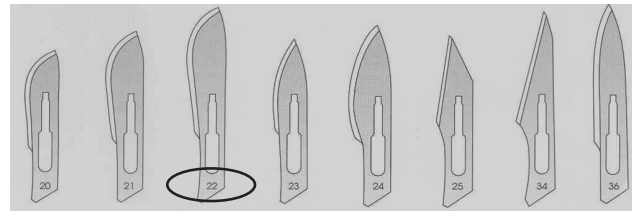
scalpel handles



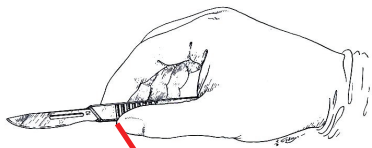




**scalpel blades**
**belly of blades**



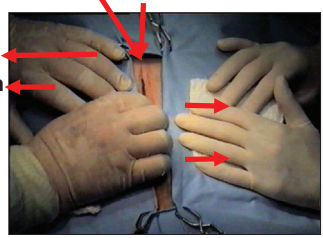




# Handling of scalpel





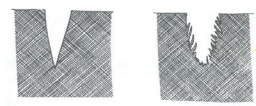
strecht
the skin



strecht the skin

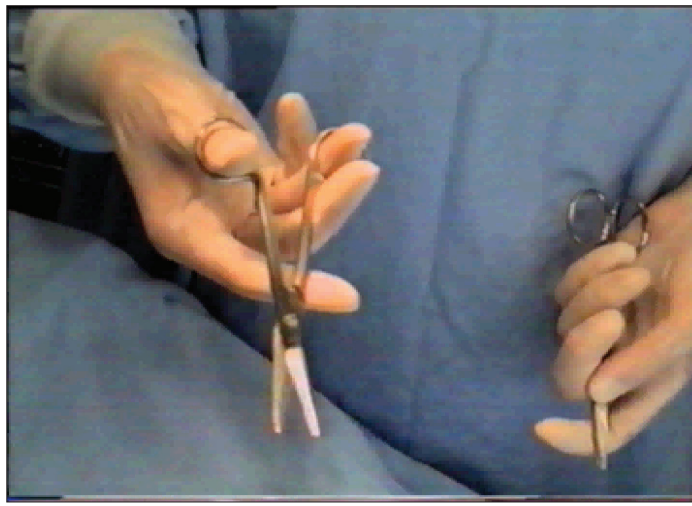


strecht the skin



correct.....incorrect incision

# Handling of scissors



**thumb - ring finger → for maximal control**



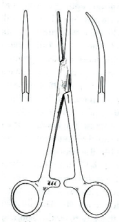
**thumb - ring-finger**



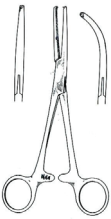
**thumb - middle-finger**

# HEMOSTATIC INSTRUMENTS

## *Hemostatic clamps*



← Péan
Kocher →
Lumniczer
mosquitos





Deschamps needle



smooth



toothed

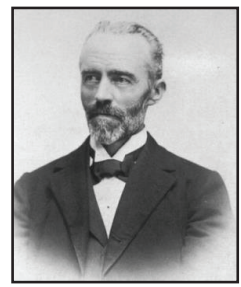
**Diathermy**
**electro-surgical tools**
**(cutting and coagulation function)**

**Stapler (Ligaclip)**

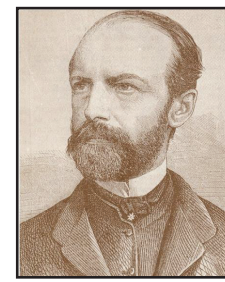




**Émile-Jules Péan**
**1830-1898**

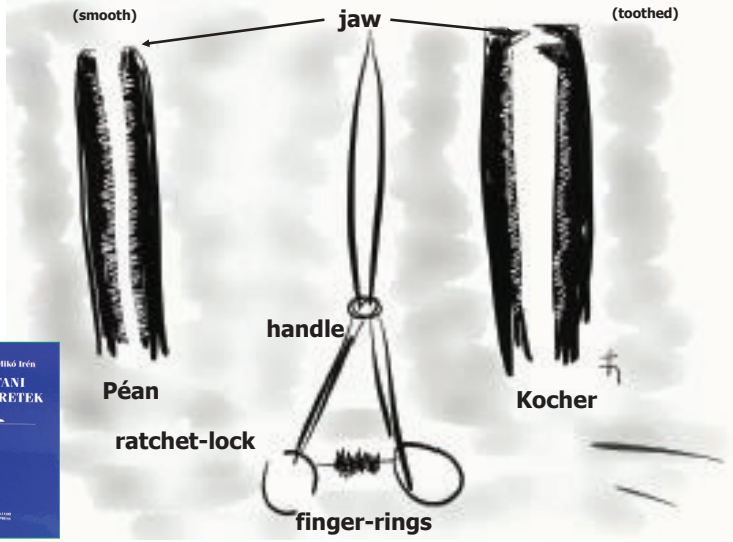


**Theodor Kocher**
**1841-1917**
**Nobel - Prize**



**Sándor Lumniczer**
**1821-1892**

# HEMOSTATIC INSTRUMENTS

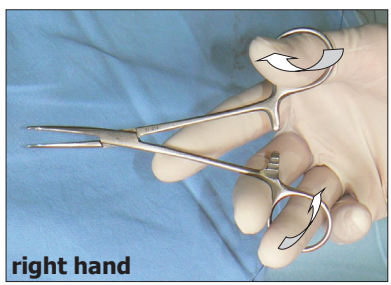


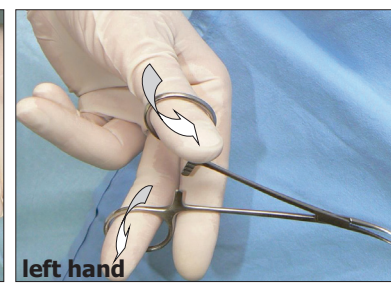


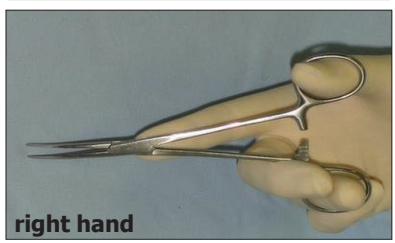


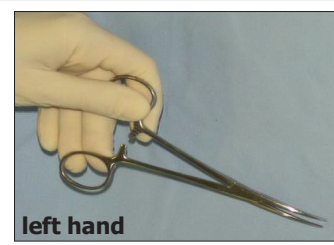
Furka I., Mikó I.: Műtéttani alapismeretek, 2015. évi javított kiadás. Debreceni Egyetemi Kiadó, 2015
(Basic Surgical Techniques, Debrecen University Press)

# Handling of hemostatic clamps



# GRASPING AND RETRACTING INSTRUMENTS I.

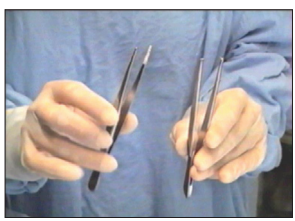


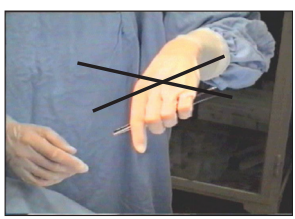
## *Grasping instruments*

**surgical forceps** (toothed)
**anatomical forceps** (smooth)
**special forceps**
**(dental, bayonett-shape)**

**towel clamp, Backhaus**
**Doyen**
**peritoneal clamp** (Mikulitz)
**Lumniczer** (double function)

# Handling of forceps







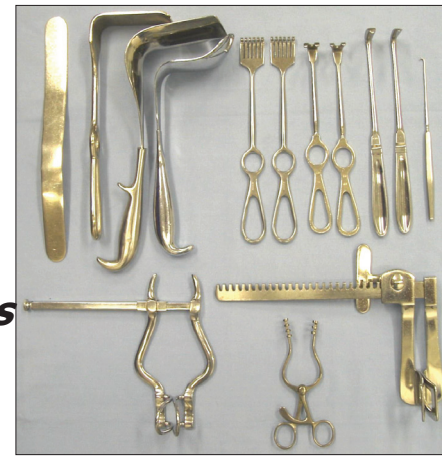
**„pencil grip"**

# GRASPING AND RETRACTING INSTRUMENTS II.

## *Retracting instruments*

### *manual-retractors*

**skin hook**
**Langenbeck (1 prong)**
**rake retractors (2 to 8 prongs)**
**-blunt or sharp-**
**retractors for deep surgery**



### *spatulas*

### *self retaining retractors*

***(auto-retractors)***
**mastoid retractor**
**abdominal retractor**

# GRASPING AND RETRACTING INSTRUMENTS III.




**ROMICRO SET**





**special retractors with light source**

# SPECIAL INSTRUMENTS

***vascular clamps (1)***

**Satinsky**
**De Bakey**
**Blalock**
**bulldog**

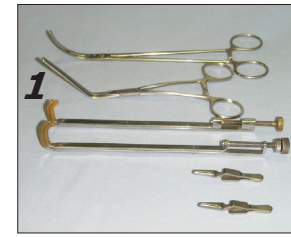


Michael DeBakey
1908-2008



Alfred Blalock
1899-1964

**(temporary, atraumatic, non-crushing)**

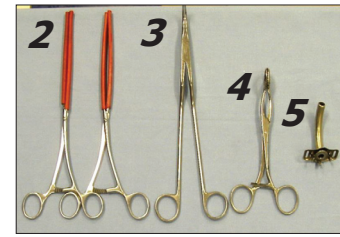



***intestinal clamps (2)***

***dissector (3)***

***tongue forceps (4)***

***Luer trachea cannula (5)***




**Specialisations:** **surgery, gynecology and obstetrics, urology, ophthalmology, traumatology and orthopedic surgery, plastic and reconstructive surgery, heart surgery, neurosurgery, pediatric surgery, oral and maxillofacial surgery, oto-laryngology**

- **amputating and resection knives (double cutting)**
- **cartilage knives**

- **amputation saws**
- **(Charriere, Satterlee)**
- **wire saws - straight, curved (Gigli saw - 4 or 6 wires twisted)**

- **mallets**
- **chisels and gouges**
- **radpatories: sharp/blunt rib raspatories**
- **bone files and rasps**
- **bone curettes (Volkmann)**
- **bone holding forceps**
- **bone rongeurs (Luer, Luer-Stille)**
- **bone cutting forceps (Liston, Böhler)**
- **wire cutting scissors**
- **needle holders with scissors**

- **hand drills – wire guides**

- **tongue forceps**
- **probes, guiding probes**
- **trocars (for abdominal puncture with stop-cock and lateral drain)**

- **pick-up forceps (for used tampons and dressing (Sauerbruch)**
- **dressing-, sponge holding-, organ- and tissue grasping forceps**

---

**NON-SURGICAL INSTRUMENTS**

- **nail cleaner**
- **nail file**

- **plaster scissors**
- **bandage and clothing scissors**

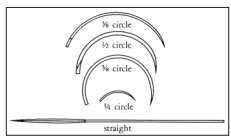
# SUTURING INSTRUMENTS

## *needle holders*

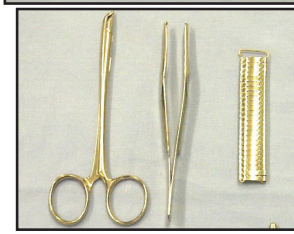
**Mathieu - conventional (1)**
**Hegar - atraumatic (2)**
**Zweifel (3)**



## *needles*
## *suture materials*



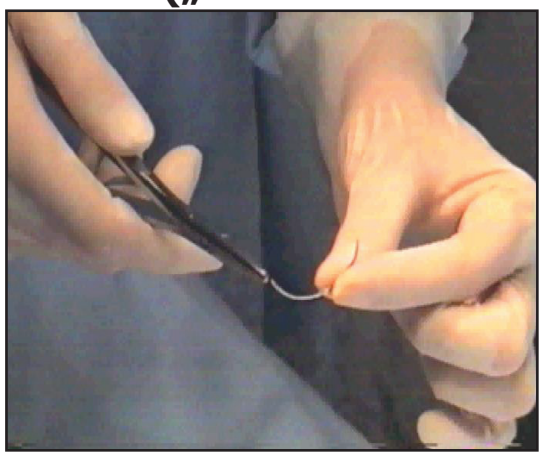


## *clips*

**clip applying forceps**
**clip removing forceps**

# TAKING NEEDLE TO NEEDLE HOLDER PREPARATION FOR A STITCH („conventional" needle)



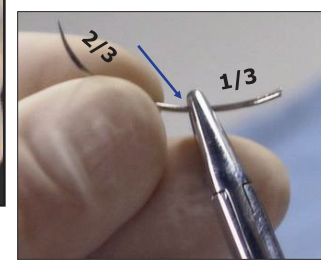
**needle fixation**

**jaw**

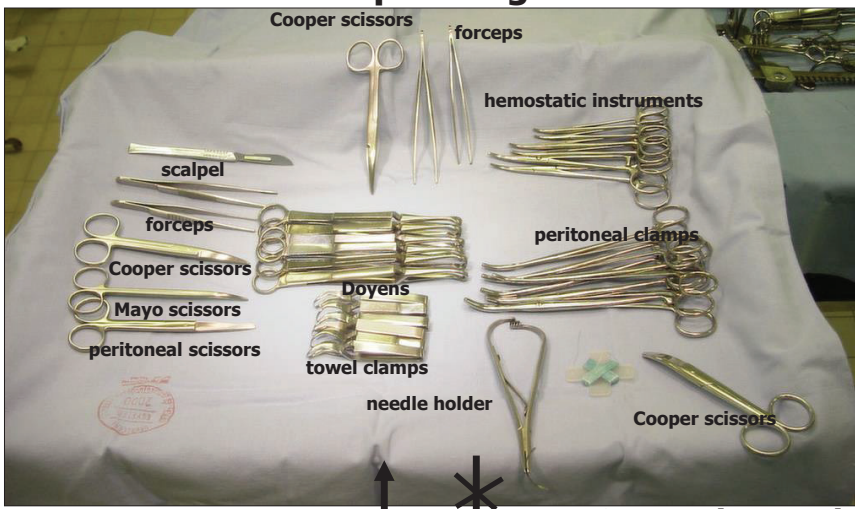
**handle**

**ratchet-lock**

**with or without finger-rings**

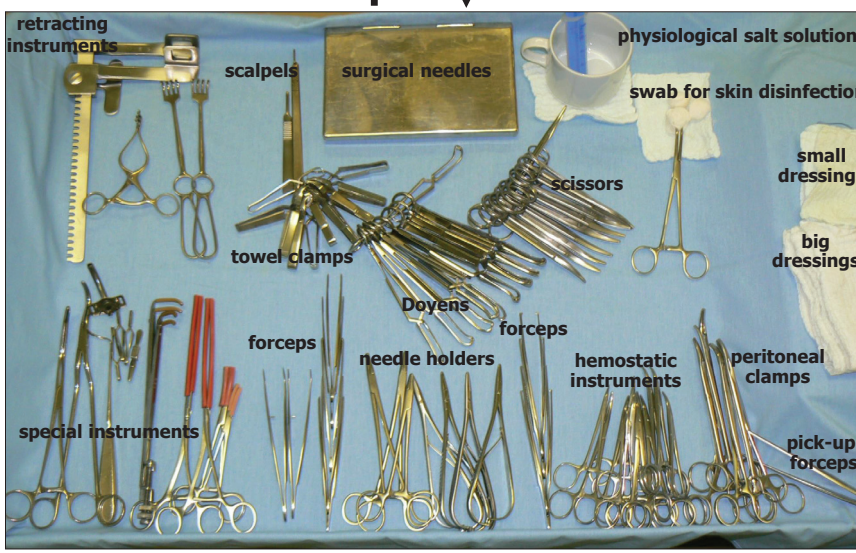


# SURGICAL INSTRUMENTS
## on the operating tables




for general abdominal operation

**Sonnenburg table**




for general abdominal operation

**big/instrument table**

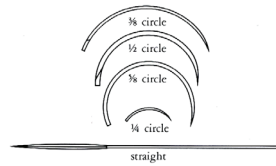
# SURGICAL SUTURES.
# SURGICAL SUTURE MATERIALS.
# KNOTTING TECHNIQUES.
# SUTURING TECHNIQUES.
# SURGICAL STAPLERS.

## 3.

# DYNAMIC UNIT








***surgeon***

***needle holders***

***surgical needles***

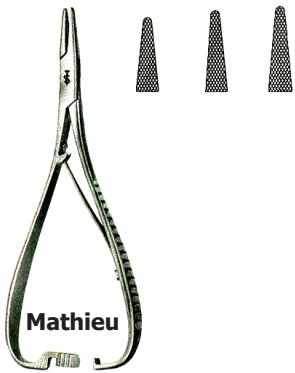
***surgical suture materials***

*******

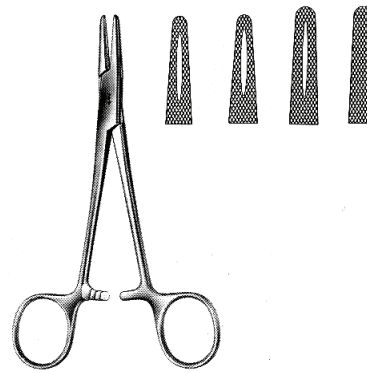
***(clips, tissue adhesives)***



# Different types of needle holders




**conventional**



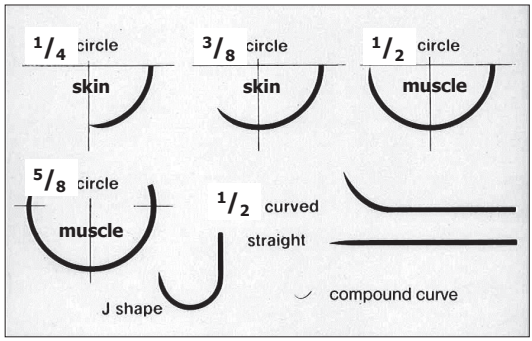

**autraumatic**



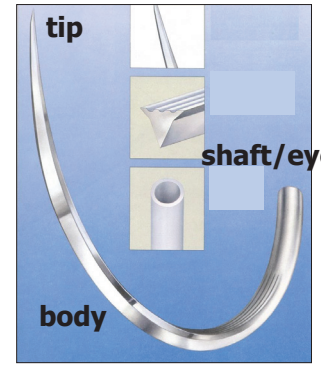
# SURGICAL NEEDLES

## *Shape*

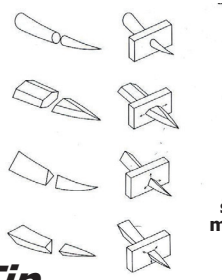
### straight - curved

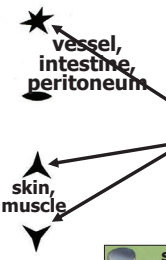



The length of the circumference of the circle.




Needles' lenghts from 4 to 60 mm



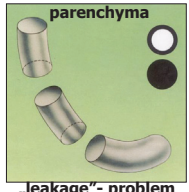



## *Body cross-section*

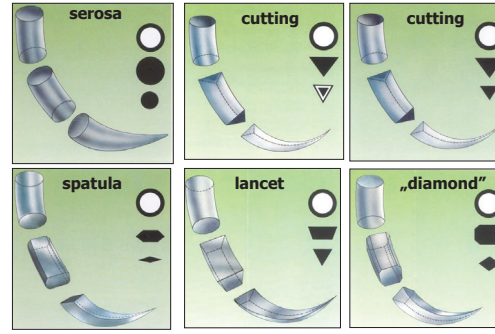
**round bodied (serosa)**
**triangular (cutting)**
**spatula, lancet, diamond...**

## *Tip*

### sharp - blunt



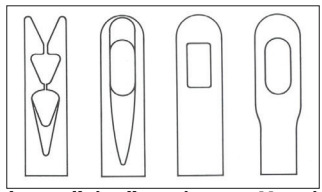

„leakage"- problem liver surgery



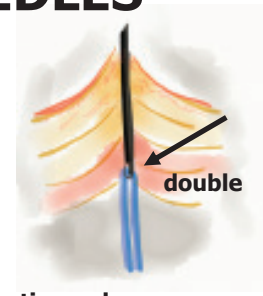
# SURGICAL NEEDLES

## *Shaft/eye*

### conventional

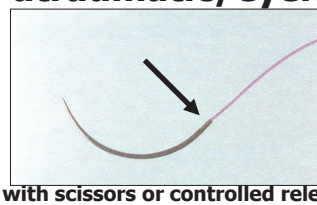


French or split/ordinary/square Mayo/round

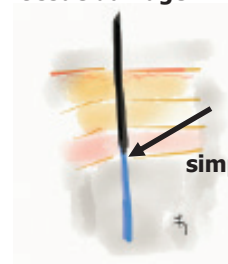



tissue damage

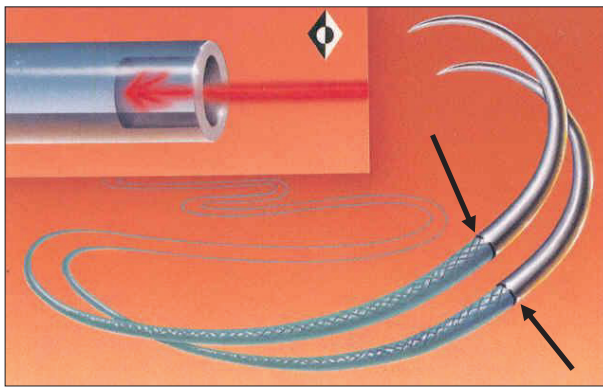
### atraumatic/eyeless



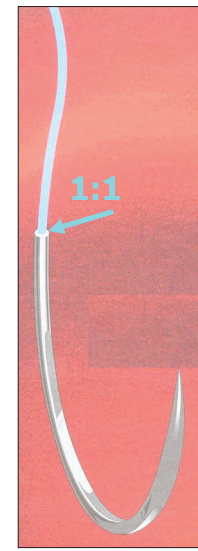
with scissors or controlled release




# ATRAUMATIC NEEDLE - SUTURE MATERIAL



**„double armamentarium"**
**(vascular surgery)**



# SURGICAL BIOMATERIALS

**Absorbable or non-absorbable materials that contribute wound healing and improve function failure.**

**Implanting into the organism they create favourable situation without tissue damage.**

**They are not medicines.**

***surgical suture materials***

***surgical clips***

**bioplasts**

**tissue adhesives**

**surgical meshes**

# SURGICAL SUTURE MATERIALS

## Natural or synthetic materials.

## They keep wound edges together during the early wound healing.

## The wound healing depends on the regenerative capacity of the organism.

**(diabetes mellitus, uremia, jaundice, malignant tumours, chemotherapy, radiotherapy, immunodeficiency…)**

# „IDEAL" SUTURE MATERIAL

### *Physical properties*

- high tensile strength
- high breaking strength
- good tying capacity
- good knot holding security
- high flexibility
- monofil
- surface smoothness
- no cutting or serrating effect
- easy to sterilize

### *Biological properties*

no { edema, allergic, toxic, carcinogenic effect, drainage effect }

minimal tissue reaction

### *Chemical properties*

Resistance to { acids, alkalis, bacteria, enzymes }

**minimal adhesion effect**

# NONABSORBABLE SUTURE MATERIALS

## NATURAL

## ORIGIN

## SYNTHETIC

***Animal origin***

***Silk***

**Silk, Silkam, Mersilk, Sofsilk**

***Plant origin***

***Linen***

**Linen, Linatrix**

***Mineral origin***

***Steel***

**Steel Stainless, Surgisteel Flexon, Steelex**

***Polyamid***

**Nylon, Supramid, Dermalon, Ethilon, Perlon, Surgilon, Dafilon, Bralon, Monosof, Nurolon, Silon, Silon braided**

***Polyester***

**Dacron, Ethibond, Mersilene Tevdek, Ti-cron, Mirafil, Synthofil, Miralene, Dagrofil, Surgidac, Securex, Tervalon**

***Polypropylene***

**Prolene, Premilene, Surgipro, Surgilene, Chiralene**

***Polytetrafluoroethylene (PTFE)***

**Gore-Tex**

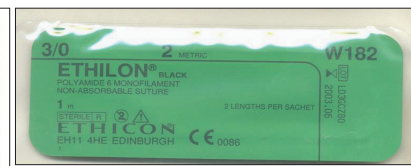
***Polybutester***

**Novafil**

***Polyvinynil-difluorid (PVDF)***

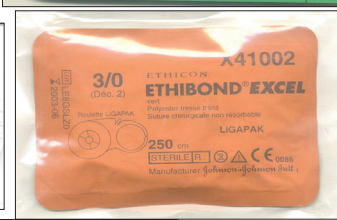
**Chiraflon**

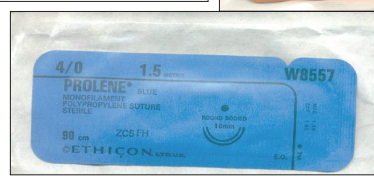









**double envelope** → **outer peelpack-type cover**

→ **inside steril suture envelope**

# ABSORBABLE SUTURE MATERIALS

## NATURAL ORIGIN

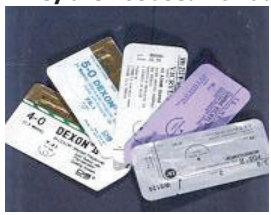
***Animal origin***

***Cat gut***
**Soft cat, Plain gut,**
**Surgigut (plain, chromic)**
**Chromic cat gut**

***Collagen***
**Plain collagen,**
**Collagen chromic**

**degradation/absorption:**
**by enzymatic digestion**

**They are not used nowadays**




## SYNTHETIC ORIGIN

***Polyglycolic Acid***
**Dexon Plus, Dexon II, Safil,**
**Safil quick, Chirlac rapid, Chirlac braided**

***Polyglactin 910***
**Coated Vicryl, Vicryl rapide, Vicryl* Plus**

***Polydioxanone***
**PDS II , PDS* Plus, Poly-Dox**

***Polyglyconate***
**Maxon**

***Lactomer 9-1***
**Polysorb**

***Glycomer 631***
**Biosyn**

***Glyconate***
**Monosyn**

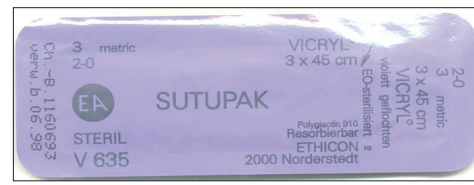
***Polyglecaprone 25***
**Monocryl, Monocryl* Plus**

***Polyglytone 6211***
**Caprosyn**

***L-lactid/glycolid***
**Panacryl, Caprolac**

**degradation/absorption: by hydrolysis**









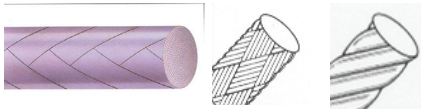

**double envelope** → **inside steril suture envelope**

# FIBER CHARACTERISTIC

**monofilament**

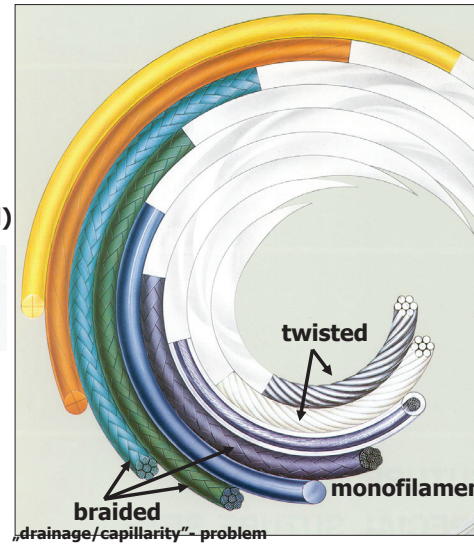


**polyfilament** (twisted, braided)

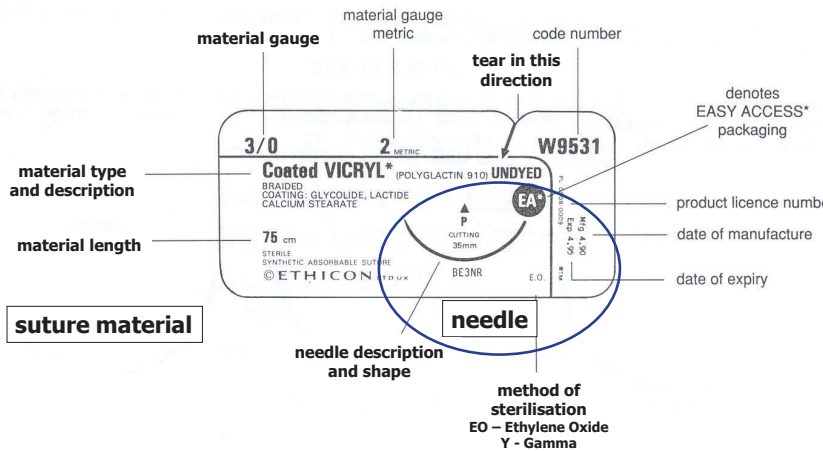


**pseudo-monofilament**






# EXPLANATION OF LABELLING SUTURE MATERIALS



# ANTIBACTERIAL VICRYL* PLUS

**(IRGACARE MP) impregnated with Triclosan**

**Prevention against the surgical wound infection**



**Staphylococcus aureus**

**Methicillin resistent Staphylococcus aureus (MRSA)**

**Staphylococcus epidermis**

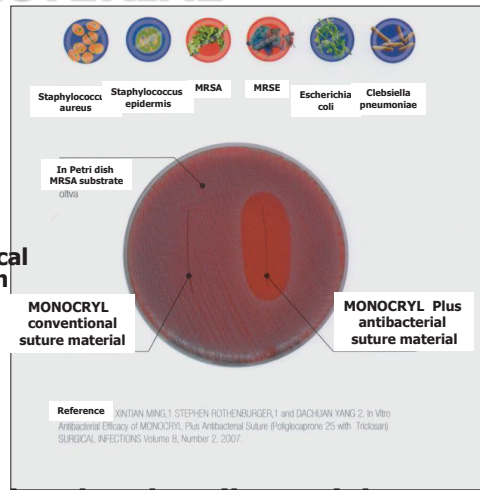
**Methicillin resistent Staphylococcus epidermis (MRSE)**

**Antibacterial suture material in Staphylococcus aureus substrate in Petri dish**

# ANTIBACTERIAL MONOCRYL* PLUS

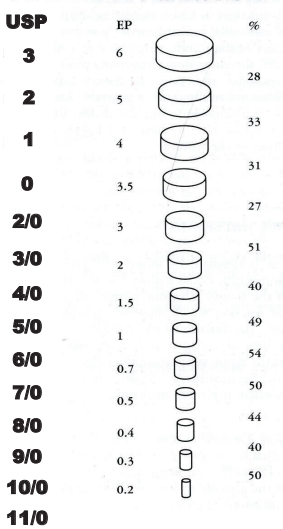
**(IRGACARE MP) impregnated with Triclosan**

**Prevention against the surgical wound infection**




**Conventional and antibacterial suture material in Methicillin Resistent Staphylococcus Aureus substrate in Petri dish**

# SIZE OF SUTURE MATERIALS




***Metric size***

**(European Pharmacopeia)**

**from 0.1 metric (0.010-0.019 mm)**
**to 10 metric (1.00-1.09 mm)**

***USP size***

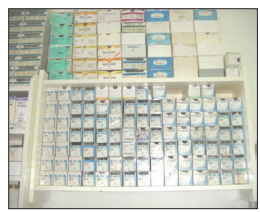
**(American Pharmacopeia)**

**from 11/0 size (0.010-0.019 mm)**
**to 6 size (1.00-1.09 mm)**

# STORAGE OF SUTURE MATERIALS

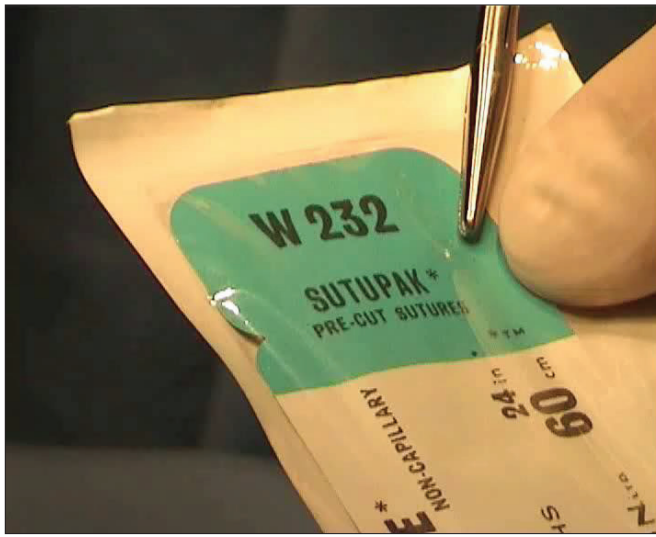








# SUTURE PACKAGINGS




**„SUTUPAK"**

**FOR SUTURES**
**pre-cut sutures**



**„LIGAPAK"**

**for**
**LIGATURES**

**or**
**SUTURES**

**double envelope** → **outer peelpack-type cover**
**double envelope** → **inside steril suture envelope**

# EXAMINATION OF SUTURE MATERIALS

## *Intraoperative*

**handling**

**flexibility**

**knotting ability**

**knot holding security**

**cutting or serrating effect**

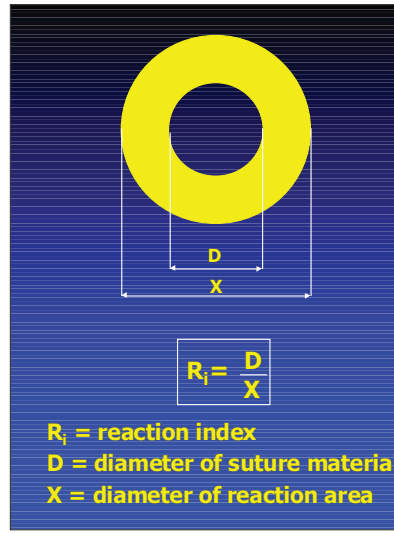
## *Postoperative*

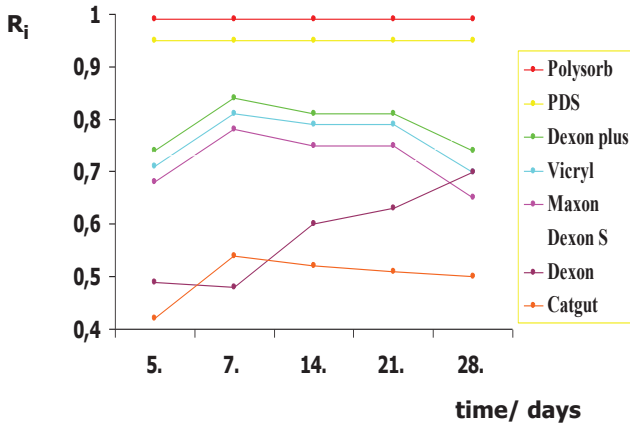
**adhesions**

**Reaction index ($R_i$)**

**histological examinations**

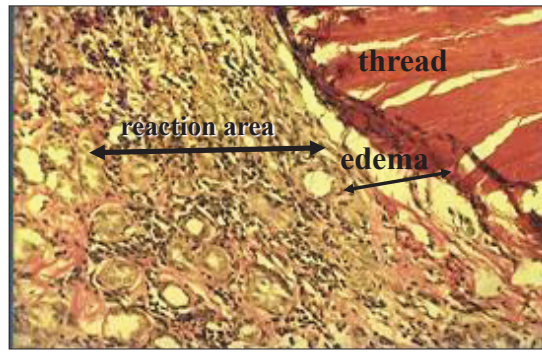
# REACTION INDEX ($R_i$)



# TISSUE REACTION

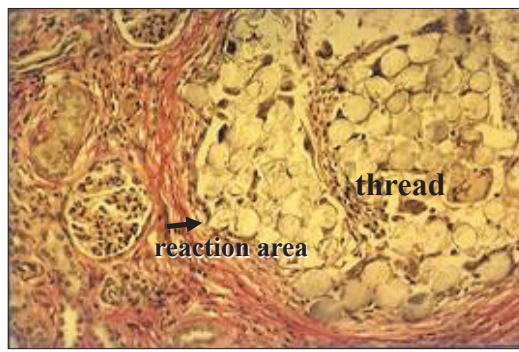
## CAT GUT




**Magnification: 200X**

# TISSUE REACTION

## DEXON plus




**Magnification: 200X**

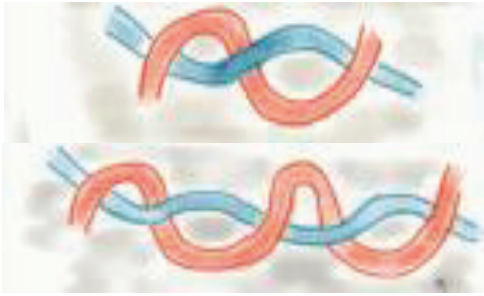
# KNOTTING TECHNIQUES

## Mariner knot (Square knot)



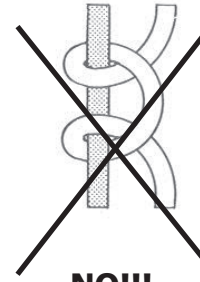
**X 1 X 1**
**x=crossing threads**

## Surgical knot (Surgeon's knot)



**X 2 X 1**
**x=crossing threads**

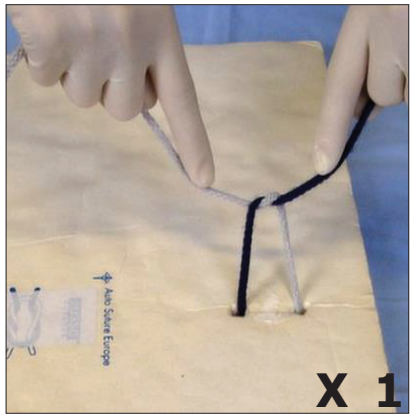
## "Lady's" or "Granny's" knot



**NO!!!**
**without crossing threads!!!**

# Knotting techniques

## Mariner knot (Square not)

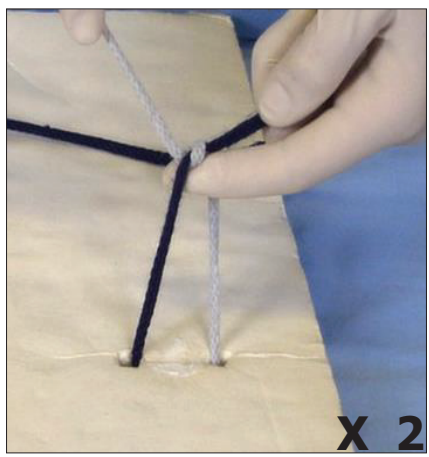


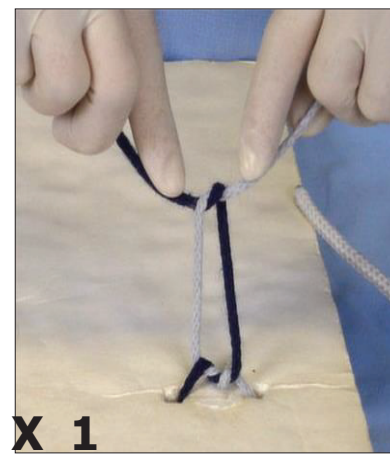




**X=crossing threads**

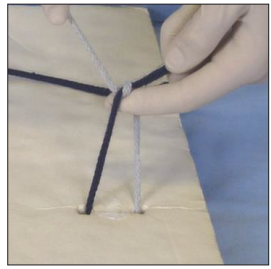
## Surgical knot (Surgeon's knot)

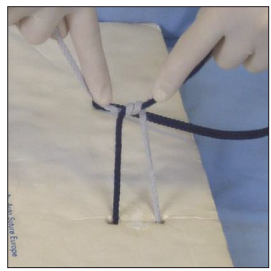
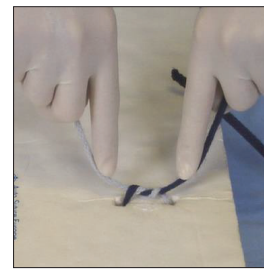


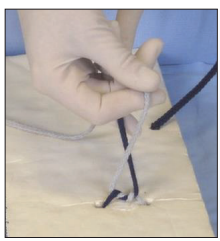
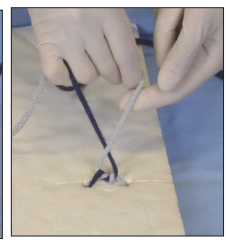
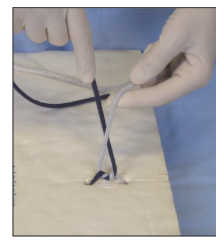
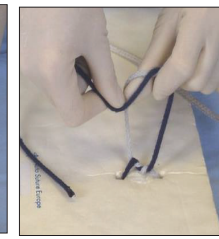



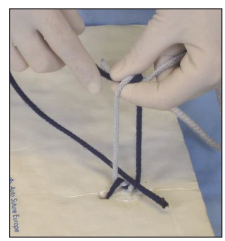
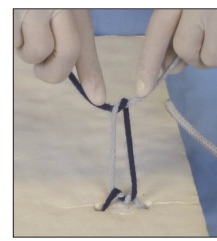
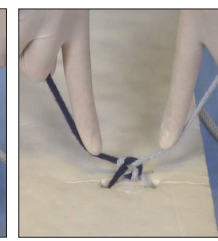

**X=crossing threads**

# Surgical knot



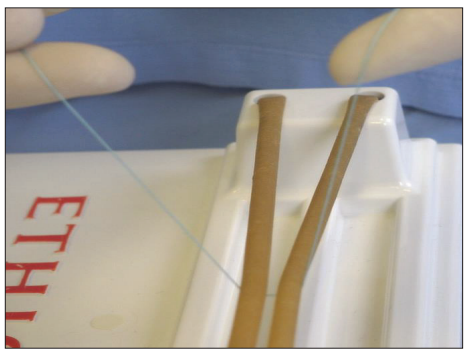






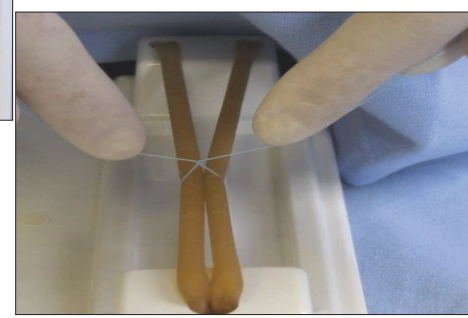




**X 2 X 1**

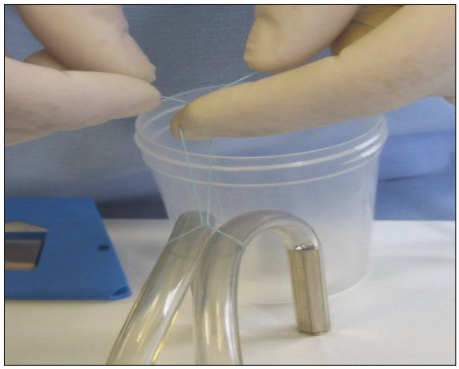
# Different training tables for knots I.

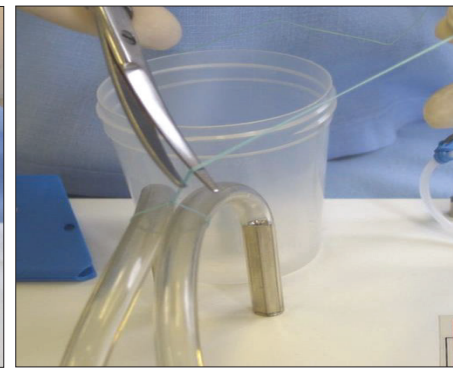


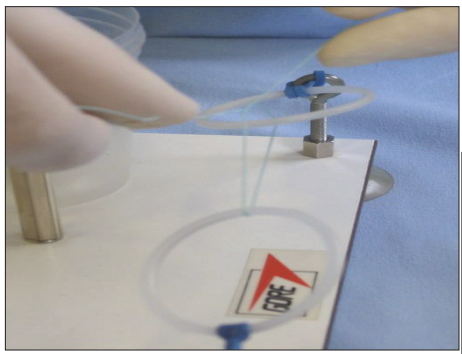



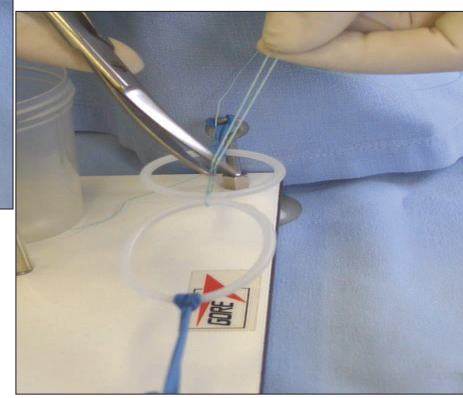


# Different training tables for knots II.





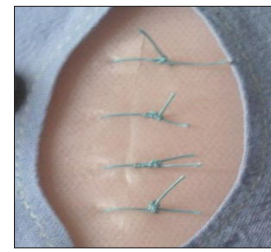


# SUTURING TECHNIQUES I.

## *Interrupted sutures/sutura nodosa*

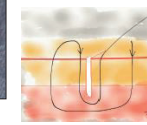
**simple**
**special**
**„mattress" sutures:**
**vertical - Donati**
**horizontal**
**parenchymal sutures**
**(U, X, Z, 8)**



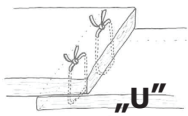
**simple**



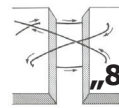
**horizontal „mattress"**



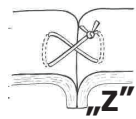
**Donati**
**(vertical „mattress") special**



**„U"**



**„8"**

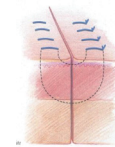


**„Z"**

**parenchymal**



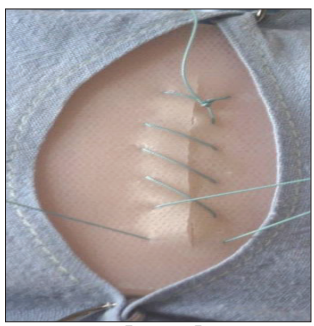
**„ X"**



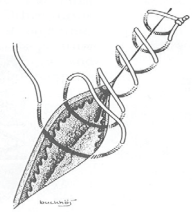
**„pillow-effect"**

# SUTURING TECHNIQUES II.

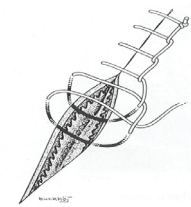
## Continuous sutures/sutura pellionum



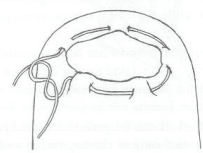
**simple**
**continuous**



**simple**



**special**
**„locked"**

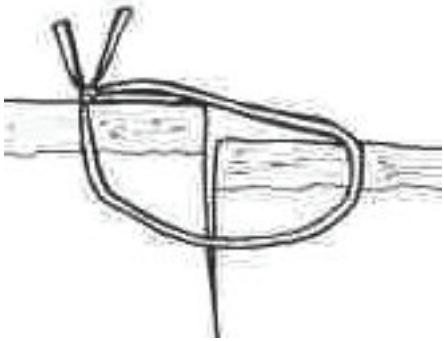


**special**
**„purse-string"**

# POSSIBLE MISTAKES

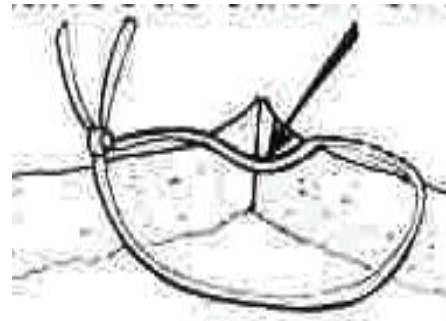
## *Interrupted suture*

**simple**



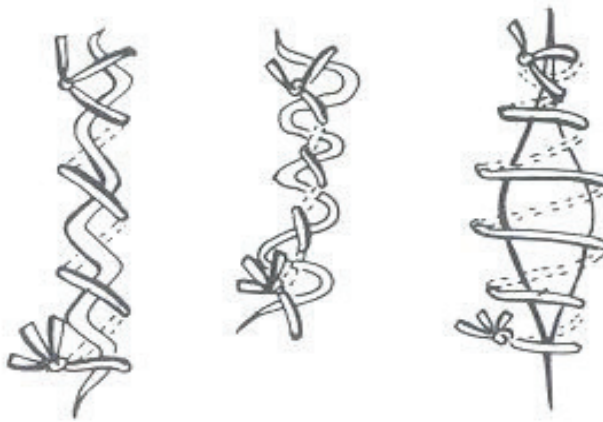
**„step" formation**

**special Donati stitch**



**temporary tattooing of the cutaneous stitch channel**

## *Continuous suture*



**The wound edges take a more or less zig-zag course.**
**If the suture is pulled too tight, the wound may become distorsed.**

# REASONS FOR COMPLICATIONS I.

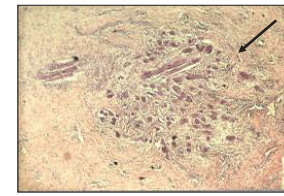
**choice of wrong suture material (cutting or serrating effect in parenchymal organs)**

**wrong localisation of suture material (submucosa-muscle)**

**faulty knot-tying technique e.g. 3 parallel knots for monofil suture material**

**wrong localisation of suture material (submucosa-muscle)**







**Consequence:**
**suture insufficiency!**
**wound dehiscence!**

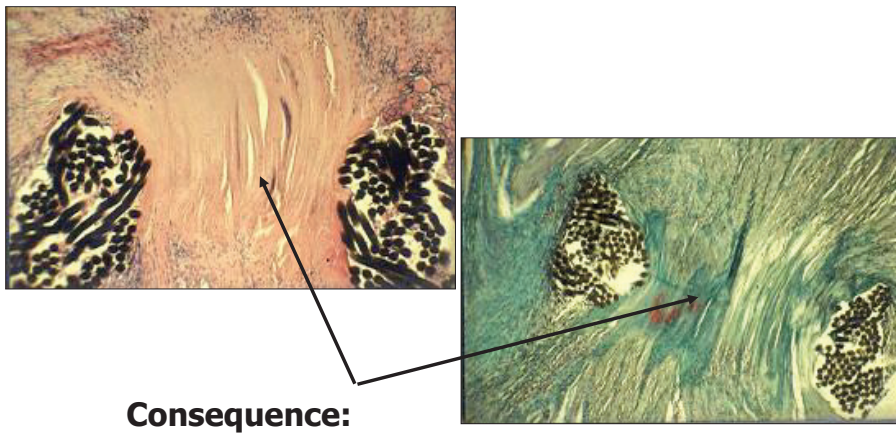
# REASONS FOR COMPLICATIONS II.

**„tight" knots**
**microcirculatory damage**
***(role of the assistant!!!)***

**faulty handling**
**(damage to the coat of**
**pseudo-monofilament threads**
**or damage to monofilament**
**or polyfilament threads**
**with an instrument)**

**using threads**
**made not for surgery**

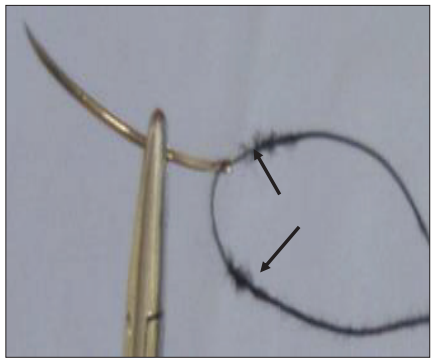
**„tight" knots ⟶ microcirculatory damage**
***(role of the assistant!!!)***



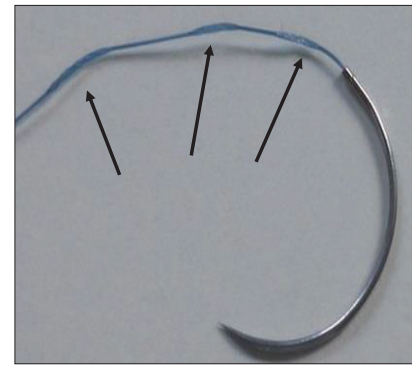
**Consequence:**
**suture insufficiency!**

# REASONS FOR COMPLICATIONS III.

## faulty handling

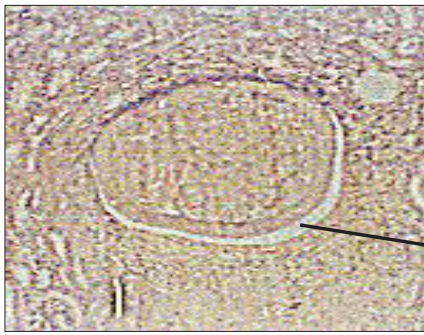


damage of the polyfilament suture material's structure caused by shaft of the needle



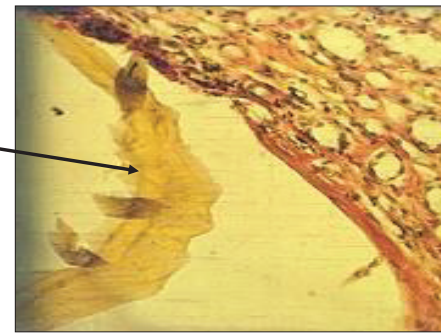
damage of the monofilament suture material's structure caused by jaw the needle holder

## damage to the coat of pseudo-monofilament thread



intact pseudo-monofilament thread

faulty handling



damaged outer sheath of the coated pseudo-monofilament thread

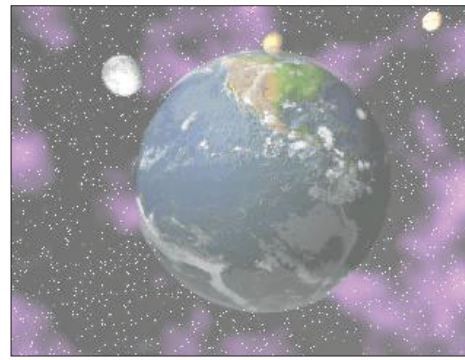
# SURGICAL STAPLERS



Petz, Aladár
1888-1956
Győr
Hungary







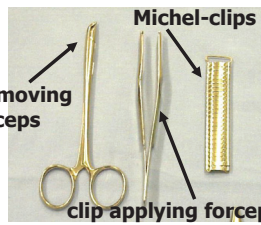
**The creator of the principle of surgical staplers**

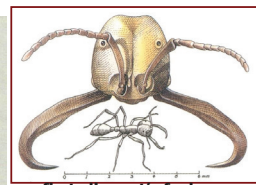
1921. 8th Congress of Hungarian Surgical Society
1924. „World patent"

**NOTE! to petz, petzen**

# SURGICAL CLIPS

## *conventional*



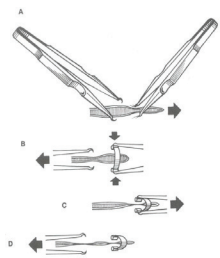



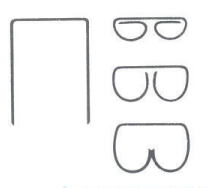
first clip: ant's feeler from starved ants

## *staplers*




skin closure





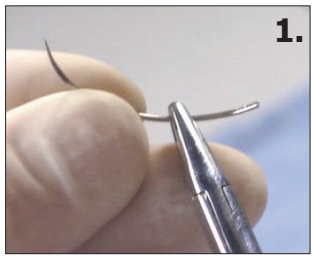
paperclip-theory

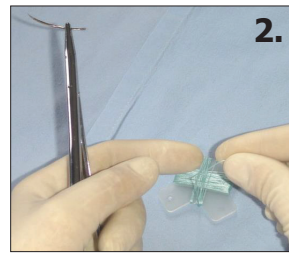


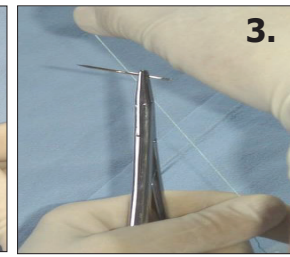
clip removing tools

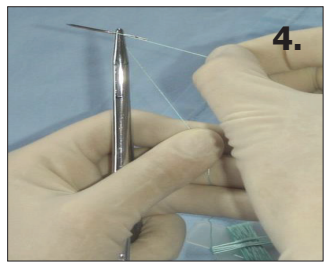
# STEPS IN TAKING A STITCH.

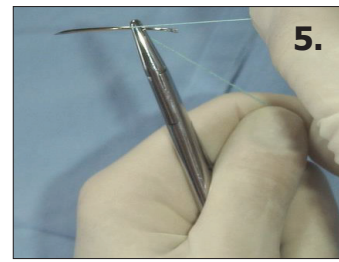
# Taking suture material into the needle's shaft -conventional technique-

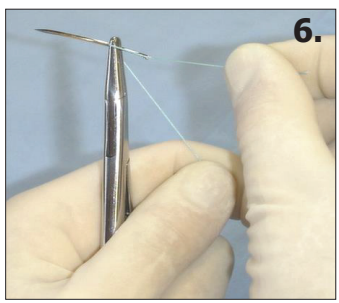


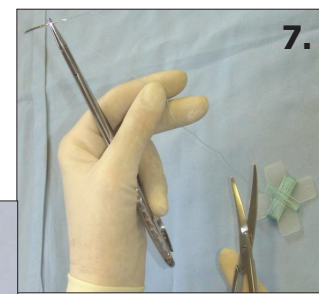



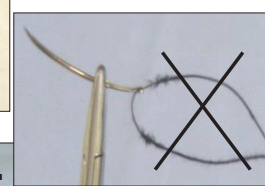



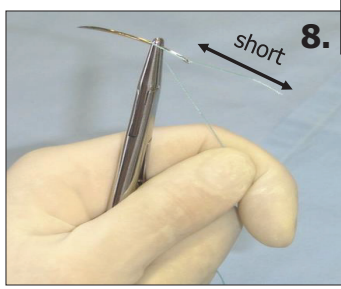



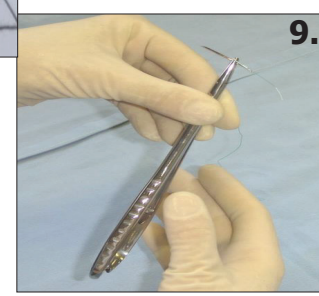



!!!



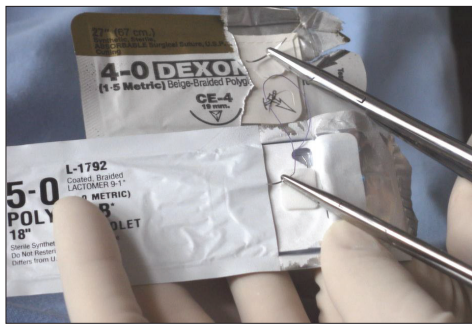
# Handling atraumatic needles - suture materials



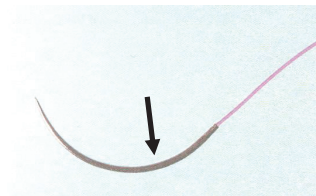

**opening of the suture materials package**

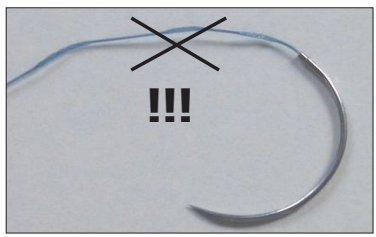
**double envelope**
- **outer peelpack-type cover**
- **inside steril suture envelope**

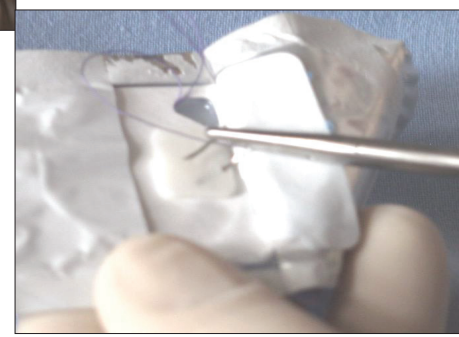


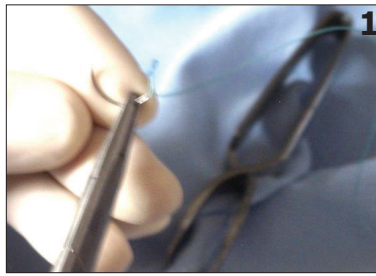

**needle fixation**

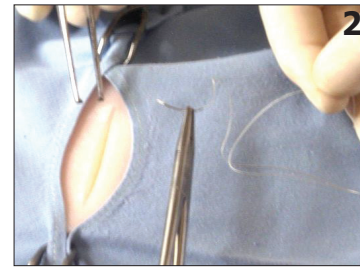


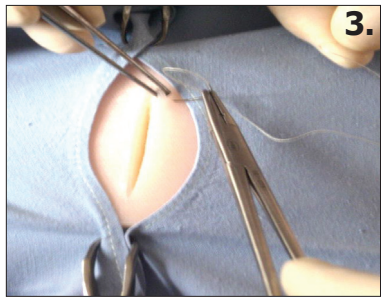


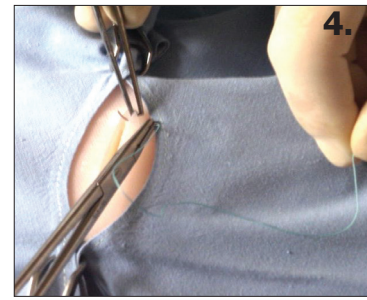



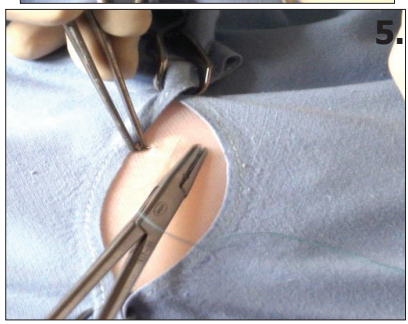
# Steps in taking a simple interrupted stitch I.

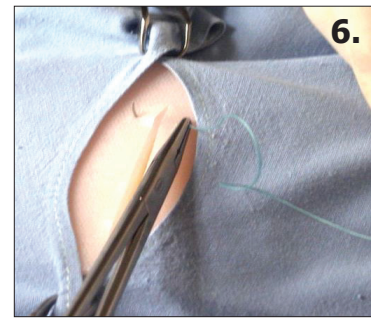


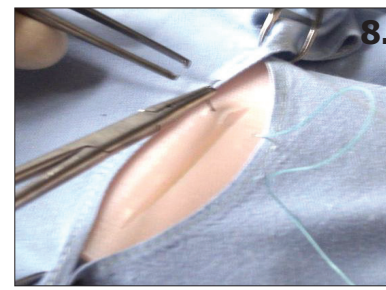



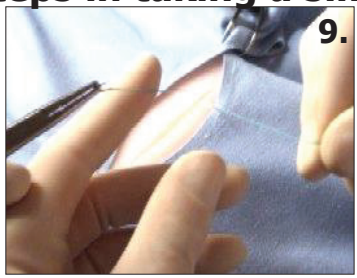







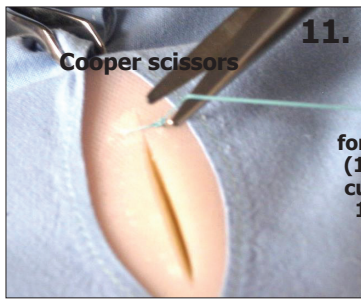


# Steps in taking a simple interrupted stitch II.

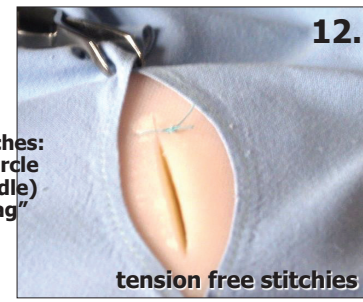


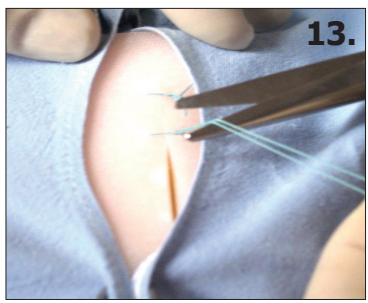







for skin stitches:
(1/4, 3/8 circle
cutting needle)
1 cm ~ „flag"

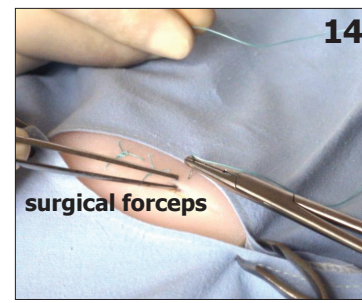


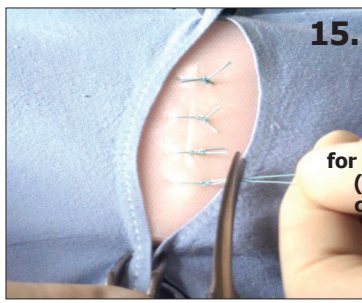




distance

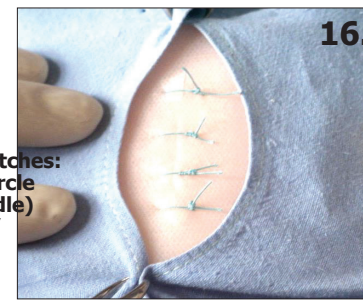
depth

identical
points

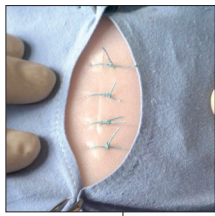


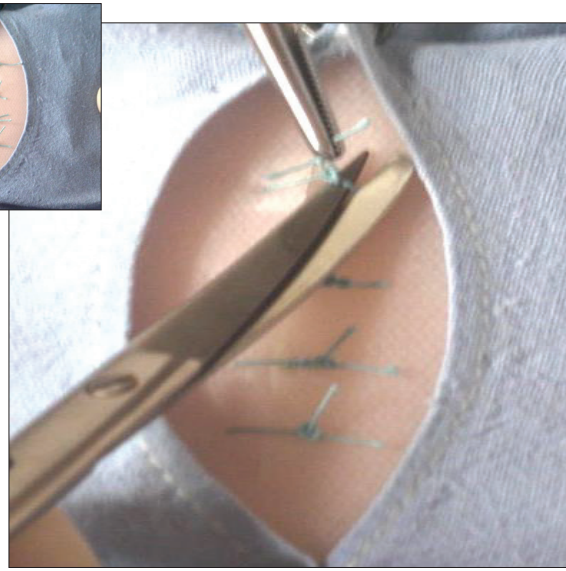




for muscles stitches:
(1/2, 5/8 circle
cutting needle)
no „flag"



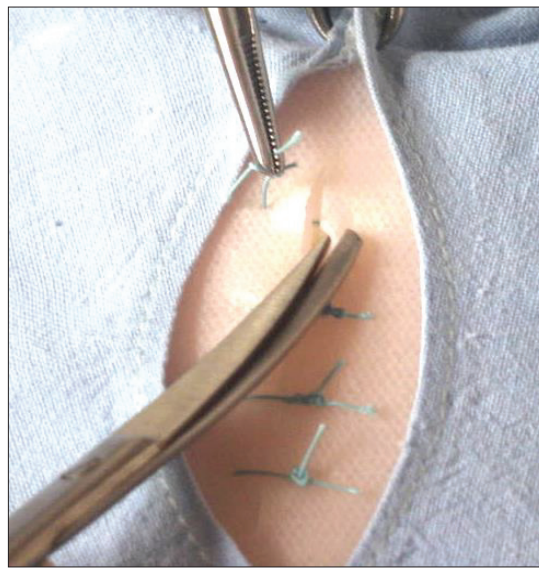
# Suture removal

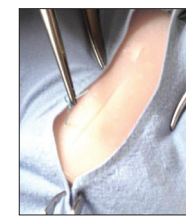




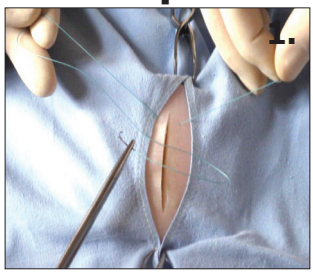
**after skin disinfection!**

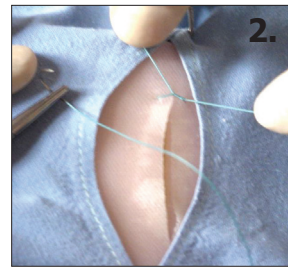
**under the knot, above the skin**

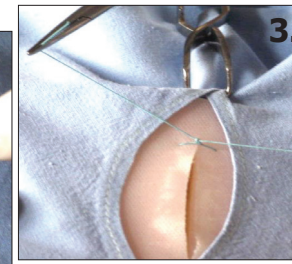


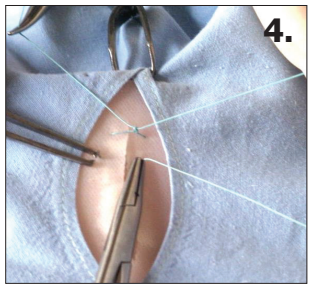


# Steps in taking a continuous suture

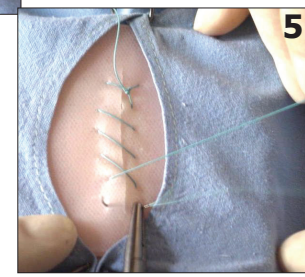


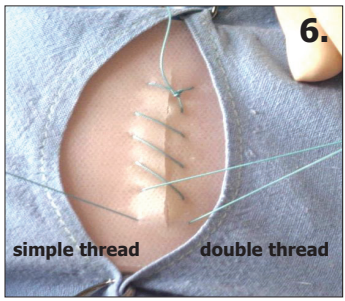



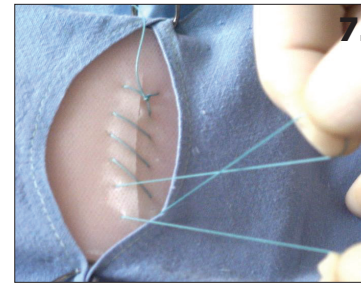



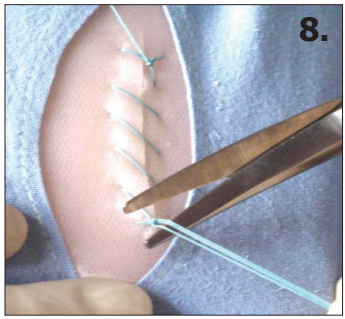

role of assistant



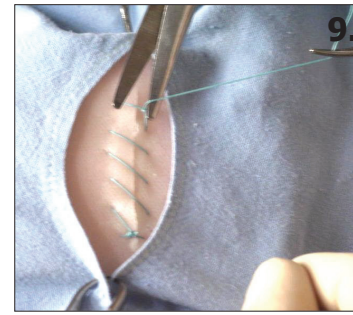




knotting




cutting the ends of sutures



# MUSEUM OF SURGICAL SUTURE MATERIALS



**Department of Operative Techniques and Surgical Research**
**University of Debrecen**

# MUSEUM OF SURGICAL STAPLERS





Petz-type stapler 1940's



NZSKA-60 surgical stapler (Modell 296)



linear staplers



staplers for resection



circular staplers

**Department of Operative Techniques and Surgical Research**
**University of Debrecen**

# ASEPSIS, ANTISEPSIS. PREPARATIONS FOR OPERATION.

## PREPARATIONS FOR OPERATING ROOM PERSONNEL. PREPARATION OF THE OPERATIVE FIELD. OPERATING ROOM ENVIRONMENT.

# 4.

# ASEPSIS

**the prevention of contact with microorganisms**

- design of the operating theatres
- behaviour in the operating theatre
- sterilization (clothing, instruments, isolation towels)

# ANTISEPSIS

**the prevention of infection by inhibition of infective agents**

- hand and arm disinfection (scrubbing)
- disinfection of the operative field
- isolation of the operative field

# CLOTHING FOR OPERATING ROOM PERSONNEL

**scrub suite (shirt + trousers)**
**theatre shoes/slippers, socks (shoe covers)**
**surgical cap**
**surgical face mask**
**(protective glasses)**





**conventional**



**disposable**











***ASEPSIS***

# SURGICAL HAND AND ARM DISINFECTION (SCRUBBING)

***Aim***

**Removing all pathogenic agents (microorganisms) from the surface of the skin**

**transient flora** (foreign bacterial flora)
⟶ **removing completely**

**resident flora** (own bacterial skin flora)
⟶ **removing partially**

**Reducing bacterial count in deep pores and fixing them.**

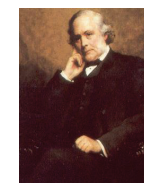
***ANTISEPSIS***

## DISINFECTION SOLUTIONS



Ignác Semmelweis
1818-1865

***Historical data***



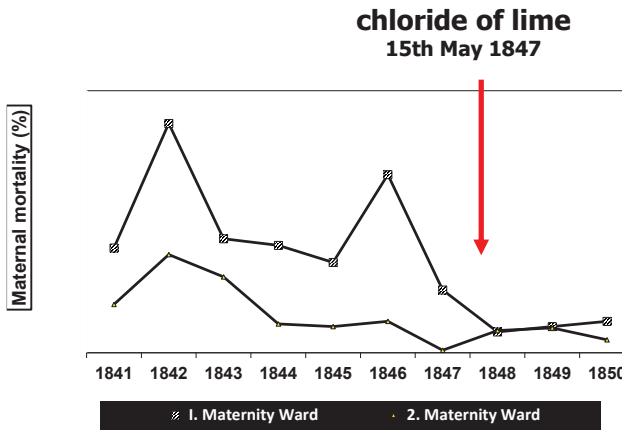
Lord Joseph Lister
1827-1912

**Semmelweis (15th May 1847) hand-wash with chloride of lime**
**Lister (1867) hand-wash with soap +2%-5% carbolic acid**
**(12th Aug. 1865. Carlisle – 1867. Glasgow, Royal Infirmary)**
**Fürbringer (1888) hand-wash with soap + sublimate**
**Ahlfeld (1896) hand-wash with soap + alcohol**
**Spasokukotsky-Kochergin (1940) liquor ammoniae solution**

***ANTISEPSIS***

# DISCOVERY

**Maternal mortality, from puerperal sever/sepsis**
**General Hospital, Vienna, 1841-1846**




# History of the surgical scrubbing technique

**1847. hand-wash with chloride of lime - General Hospital, Maternity Ward, Vienna**



**Semmelweis introduced**
**the compulsory hand-wash with chloride of lime**

# History of the surgical scrubbing technique

**Lord Joseph Lister**
**1827-1912**



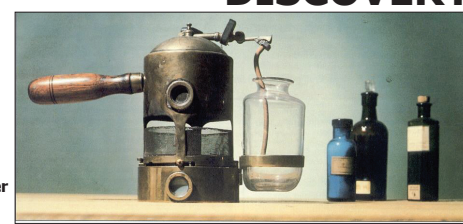
**The room in the Royal Infirmary, Glasgow, where the first compound fracture was treated by antiseptic (carbolic acid) surgical technique**

**12th August 1865 - James Greenles**

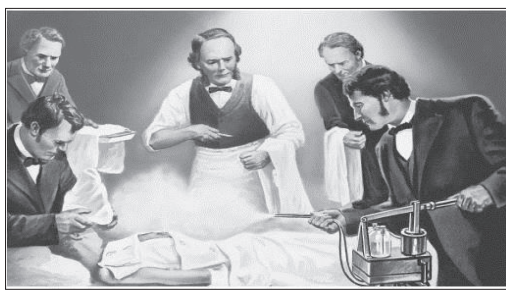
## DISCOVERY



**Lord Joseph Lister**
**1827-1912**



**simple sprayer**



**sprayer with steam pump - carbolic acid**
**Queen Victoria**



**Statue of Lord Joseph Lister**
**in Portland Place, London**
**-the only public monument to a surgeon-**
**in the United Kingdom**

# DISINFECTANTS

**Used for sterilizing objects and places that can't be sterilized by the usual physical methods.**

**antiseptic** **disinfectants**

**The disinfectants are those compounds that serve for destruction or inhibition of the reproduction of live infective agents (mostly bacteria, fungi) under correct application.**

***ANTISEPSIS***

## *Requirements*

- **wide range of effectivity**
- **short reaction time: 5-10 min**
- **good solubility and penetration ability**
- **effective in small concentration for the microorganisms**
- **do not damage the surface, do not discolour**
- **stable, not bad smell**
- **economical**

- **bactericidal**
- **fungicidal**
- **sporocidal**
- **virucidal**

} **effect**

***ANTISEPSIS***

# SCRUB SOLUTIONS / SKIN ANTISEPTICS

## *Disinfection components*

- izopropyl-alcohol
- benzalconiumchlorid
- undecylenacid
- ethyl-alcohol
- benzylalcohol
- hydrogen peroxide

***ANTISEPSIS***

## *Scrub solutions*

- Skinman soft N
- Skinman asept
- Biotensid
- Sterillium
- Descoderm
- Desderman N
- Desmanol
- Ditensimed
- Spitaderm

## *Requirements*

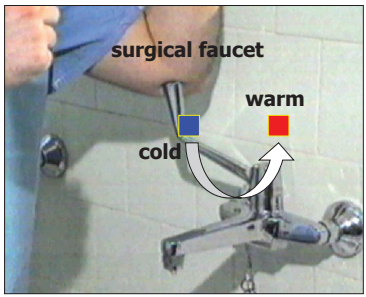
- bactericidal (tuberculocid)
- virucidal (HBV, HIV)
- fungicidal
- sporocidal

} **effect (Skinman soft N)**

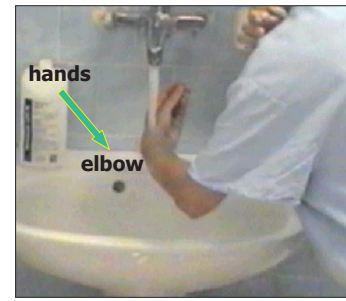
- form a film on the skin
- blood and other tissue fluids don't reduce their effect
- don't dry the skin
- no allergic

***ANTISEPSIS***

# CONVENTIONAL SCRUBBING TECHNIQUE




1st phase

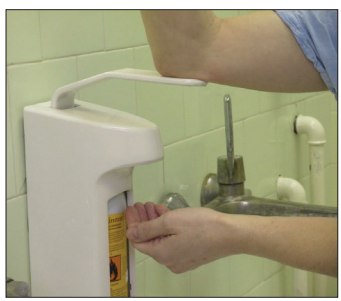



- clean the fingernails prior to the scrub (NO artificial fingernails, NO nail-polish, NO jewellery)

- rinse from the hands downwards toward the elbow !

- wash hands and forearms with soap and warm running water

**SCRUB ROOM**



2nd phase



- rub the antiseptic solution into hands and forearms

- length of the scrub takes a minimum of 5 minutes

**5x1 minute, 5-5 ml**

- hands and forearms should be dry at the end of scrubbing!

fingers
interdigital folds
thenar
hypothenar
[steps 1-6]

***ANTISEPSIS***

# SCRUBBING TECHNIQUE

## 2nd phase



**Step 1.**
**put palm on palm**



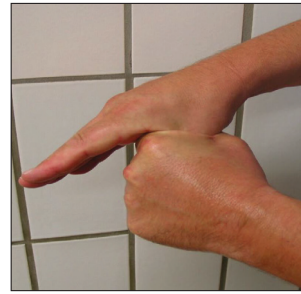
**Step 2.**
**right inner side on left palm**
**and left inner side**
**on right palm**



**Step 3.**
**palm on palm**
**with crossed**
**and opened fingers**



**Step 4**
**outside of the fingers**
**on opposite palm**
**with crossed fingers**



**Step 5**
**the circling rub**
**of the right thumb**
**in closed palm**
**and vice versa**



**Step 6**
**the circling rub**
**back and forth**
**with closed fingers**
**to the right hand**
**in the left palm and vice versa**

**Pay attention especially for scrubbing the fingertips, the finger matrix, the thumb and palm. Considering other parts of the hands these regions have the highest number of pathogenic agents.**

***ANTISEPSIS***

# SCRUBBING TECHNIQUE - latest method
## 2x1.5 minutes








**1st phase**

- **clean the fingernails**

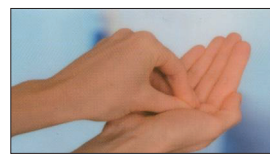
↓

**wash hands and forearms**
**with soap (e.g. Baktolin basic)**
**and warm running water (1-2 minutes)**

↓

**rinse the soap from the hands downwards toward the elbow**
**and dry the forearms**
**using non-steril but germ free disposable paper towel**







**2nd phase**

**rub the antiseptic solution into dry hands and forearms**
**(e.g. Sterillium®)**

**length of the scrub takes 3 minutes**
**2x1.5 minutes, 5-5 ml**

**during scrubbing the forearms must be kept wet**
**with the antiseptic solution**

**hands must be kept above the level of the elbows**

**hands should be dry in the end of scrubbing**

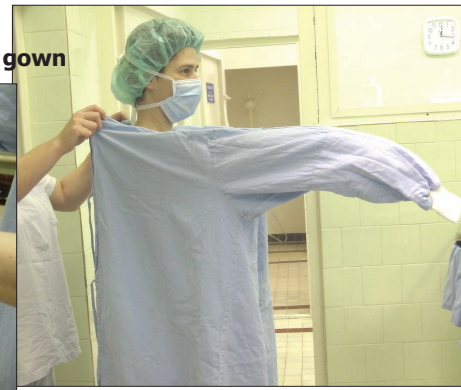
**Pay attention especially for scrubbing the fingertips, the finger matrix, the thumb and palm.**
**Considering other parts of the hands these regions have the highest number of pathogenic agents.**

***ANTISEPSIS***

# GOWNING

**correct method of removing on a steril gown**





**correct method of putting on a steril gown**

**first textile!**

**nothing touched!!!**

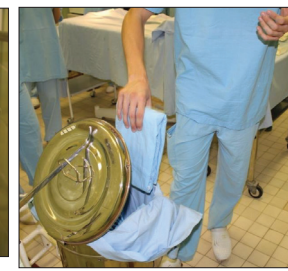
**Thank you!**

**Schimmelbusch box**
**(Curt Schimmelbusch 1860-1895)**

**correct method of removing on a steril gown**





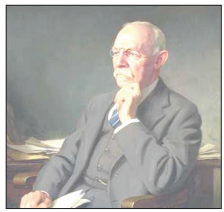


**correct method of putting on a steril gown**

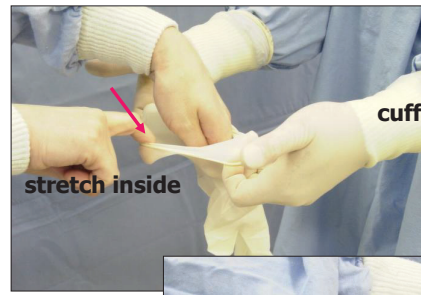




# GLOVING - with scrub nurse



William Stewart Halsted
(1852-1922)
1886 - surgical gloves
(Caroline Hampton)




with scrub nurse

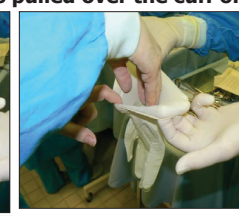





the cuff is pulled over the cuff of the sleeve





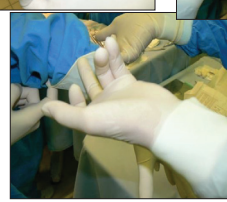


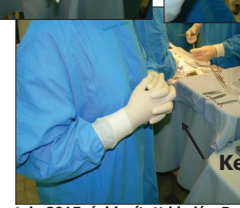










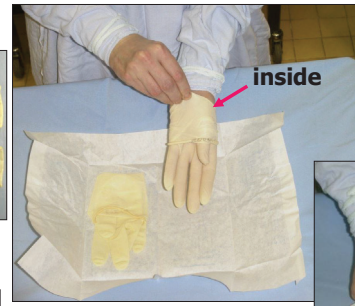
Keep in prayer position.

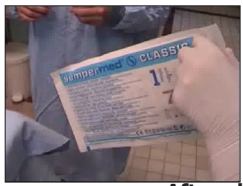
Furka I., Mikó I.: Műtéttani alapismeretek, 2015. évi javított kiadás. Debreceni Egyetemi Kiadó, 2015
(Basic Surgical Techniques, Debrecen University Press)

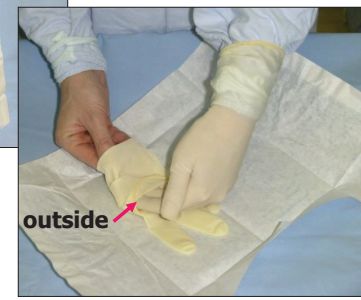
# GLOVING - without scrub nurse




**Various sizes:**
**6; 6 1/2; 7; 7 1/2; 8**

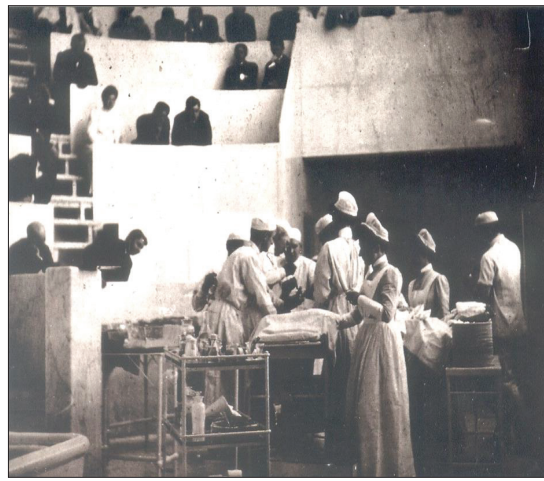


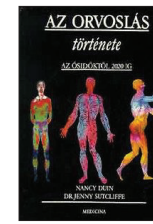




**After gloving the hands must be held up clasped in front of the chest.**
**Never dropped below the waist!!!**

## *TALCUM GRANULOMA, ADHESION*



**William Halsted**
**Johns Hopkins Medical School (Baltimore, USA)**



# DISINFECTION OF THE OPERATIVE FIELD

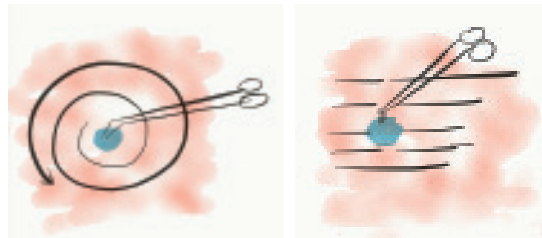
## *Skin disinfection*

**start at the center ⇒ work outward**

**- in concentric circles or**

**- in stripes on two sides alternately**

**minimum 2x or 3x!**



## *Disinfection solutions*

- **Betadine – 70% povidone iodine**
- **Dodesept**
- **Kodan**
- **Cutasept**




***iodine burning or allergy!*** ➔

***ANTISEPSIS***

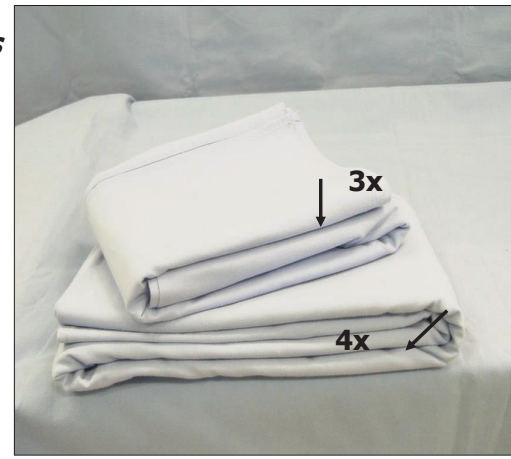
# ISOLATION OF THE OPERATIVE FIELD

***Isolation towels/drapes***

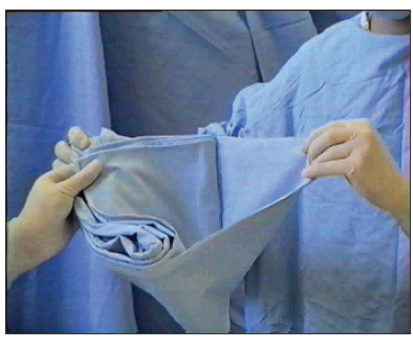
**1 large** **(big table)**

**2 large (4x folded)**
**2 small (3x folded)**
**1 small**

**(linen or disposable materials)**




# Draping





**with isolation drapes**

# OPERATING ROOM ENVIRONMENT



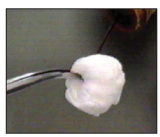
***ASEPSIS***

# DRESSINGS/SWABS



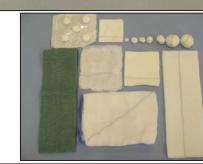
small dissection swabs,
„bits" „pledgets"







X-ray sensitive dressings





small dressings
large dressings

swab checking
systems !!!



# OPERATING ROOM ENVIRONMENT

## Sterilization methods of medical devices

### steam sterilization - autoclaving (atm-$^0$C)

**gowns, isolation towels, instruments**
**121 °C – 108 kPa – 20 mins**
**134 °C – 206 kPa – 10 mins**

**indicator tape**



**yellow** **brown**

### dry heat sterilization ($^0$C)

**instruments**
**160 °C – 45 mins**
**180 °C – 25 mins**
**200 °C – 10 mins**

### gas sterilization (Ethylene Oxide-EO)

**gloves, suture materials**
**rubber, plastic and metal materials (catheters, tubes)**

### $\gamma$ or x rays - irradiation

**suture materials, infusion solutions, gloves, instruments, catheters**

### cold sterilization (10% glutaraldehyde)

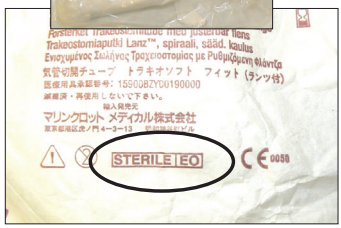
**plastic devices, endoscopic instruments**

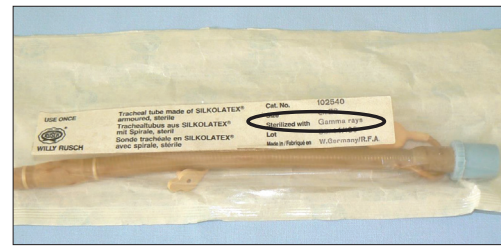
### plasma sterilization

**hydrogen-peroxide – gas plasma**
**37-44 °C – 45-75 min, 400W radio frequency – 13,56 MHz**
**biological indicator**

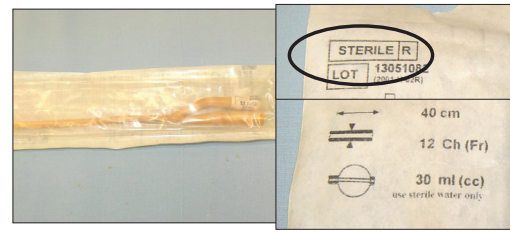
# Sterilization methods of medical devices





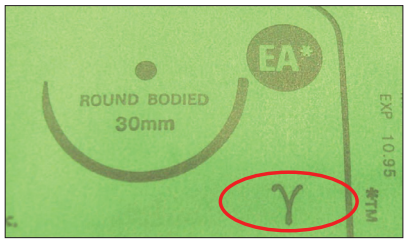

**tubes**

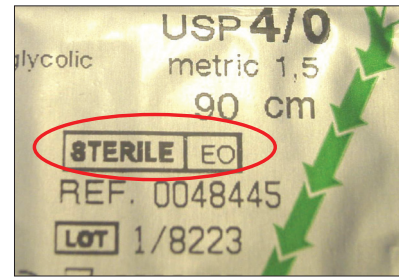



**catheters**



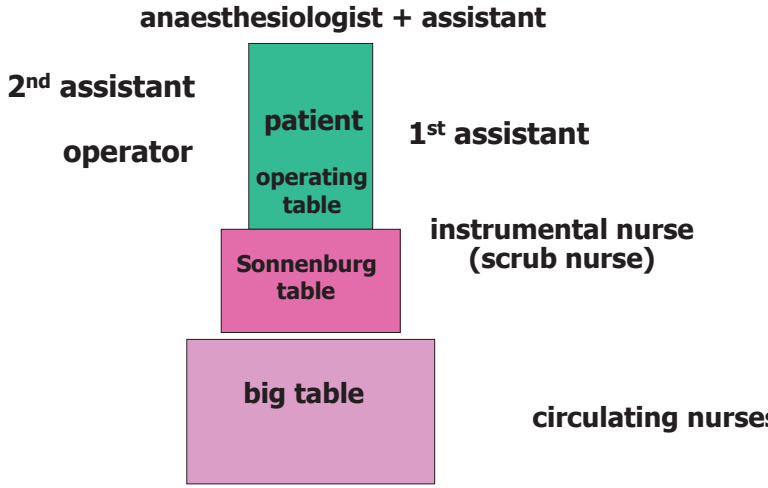

**gloves**




**surgical suture materials**

# OPERATING THEATRE'S STAFF




## Behaviorial rules and regulations in the operating theatre

**anaesthesiologists (doctor, assistant)**
**surgeons (operator, assistants)**
**instrumental nurses**

**circulating nurses**
**labor assistants**
**technical staff**
**visitors (medical students, guests)**

***ASEPSIS - ANTISEPSIS***

# OPERATING THEATRE










Dressing room



Scrubbing room



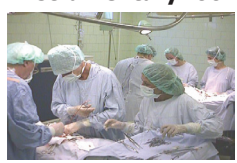
Operating theatre



Instrumentary room



Sterilization room







Operating work

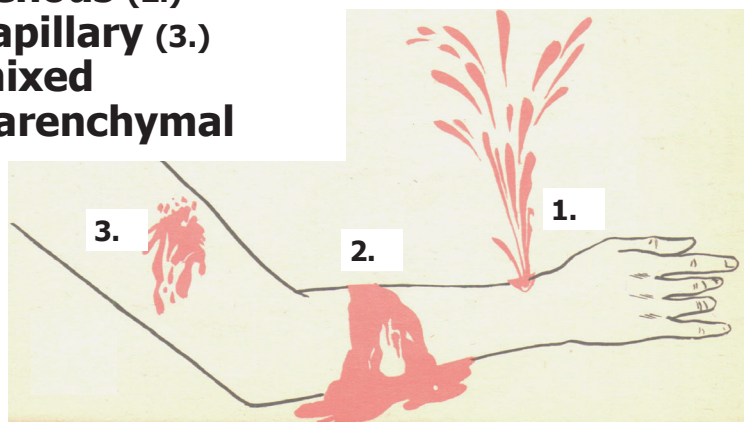
**Department of Operative Techniques and Surgical Research / University of Debrecen**

# SURGICAL HEMOSTASIS. DISSECTION OF BLOOD VESSELS. VENOUS CUTDOWN TECHNIQUE.

5.

# TYPES OF BLEEDING

**arterial** (1.)
**venous** (2.)
**capillary** (3.)
**mixed**
**parenchymal**




# HEMOSTASIS

## I. Temporary methods (first aid)

**Aim: to carry the patient to the hospital in good condition for definitive treatment**

## II. Definitive methods (surgery)

1. closing of the lumen
2. reconstruction of the lumen (vascular surgery)

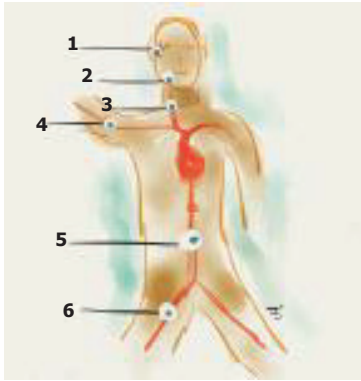
## III. Treatment of the consequence of the bleeding

1. intravenous therapy
   - i.v. injection
   - i.v. cannulation
2. venous cutdown technique (surgery) (external jugular vein, median cubital vein, saphenous vein)

# I. STOP THE BLEEDING TEMPORARY

## *1. Arterial bleeding*

• **digital pressure - centrally from the bleeding site**




**1. superficial temporal artery**
**2. facial artery**
**3. common carotid artery**
**4. axillary artery**

**5. abdominal aorta**
**6. femoral artery**

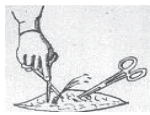
**„pressure bandage" - application of tamponade**



**„tourniquet" - till disappearing of the peripheral pulsation**
**(damage of vessels, nerves)**



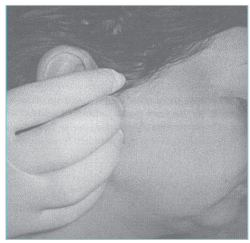
**clamping the vessel - only in life saving situation!**



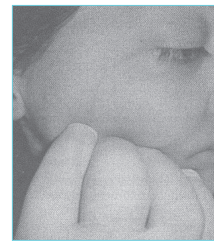
**Secondary bleeding!**

# 1. Arterial bleeding

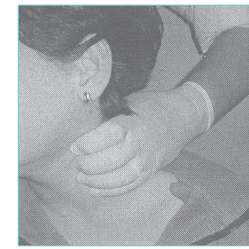
## digital pressure – centrally from the bleeding site



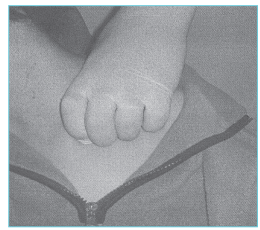
superficial temporal artery



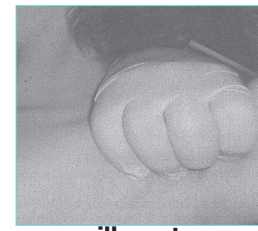
facial artery



common carotid artery



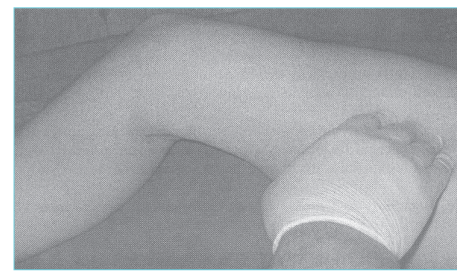
subclavian artery



axillar artery



brachial artery



femoral artery






popliteal artery



abdominal aorta

# I. STOP THE BLEEDING TEMPORARY

- ***Venous bleeding*** **- pressure bandage**

**BUT: no tourniquet!**
**(injury of nerves, paralysis)**

- ***Capillary bleeding*** **- sterile bandage**

**BUT: hematological disorders!**
**anticoagulant therapy!**

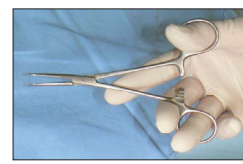
# II. STOP THE BLEEDING DEFINITIVELY

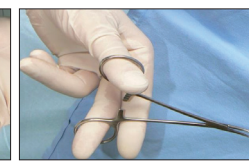
## *1. Closing of the lumen*

**hemostatic instruments**

**- Péan**
**- Kocher**
**- Lumniczer**
**- mosquitos**







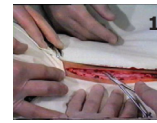
## *2. Reconstruction of the lumen (vascular surgery)*

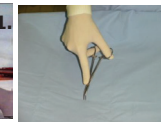
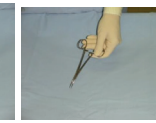
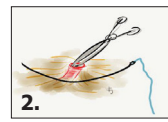
**special instruments (vascular clamps)**
**(temporary, atraumatic, non-crushing)**

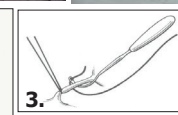
# METHODS FOR CLOSING THE LUMEN

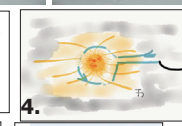
***a./ Mechanical***

1. ligation of vessel
2. suture ligation
3. ligation in continuity
4. surrounding ligature
5. torsion
6. ligating clips



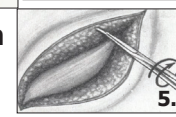






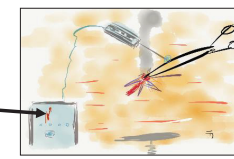



***b./ Physical***

- hot physiological saline solution
- electrocoagulation
- laser coagulation
- ultrasound coagulation





***c./ Chemical*** **(drugs)**

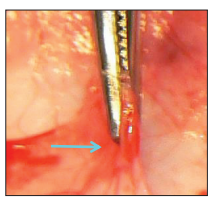
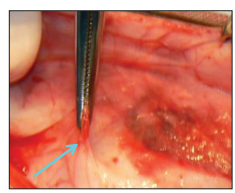
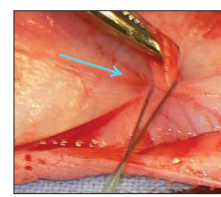
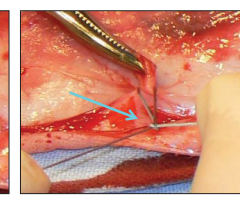
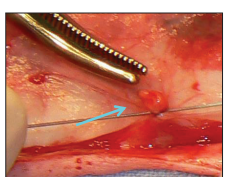
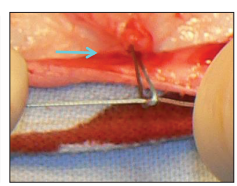
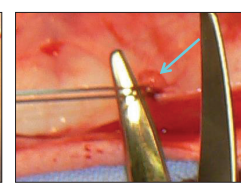
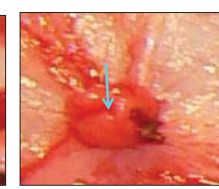
e.g. aethoxysclerol

***d./ Biological***

(bioplasts - hemostatic agents)
e.g. QuickClot

***e./ Combined methods***

## CLOSING THE LUMEN
### mechanical method



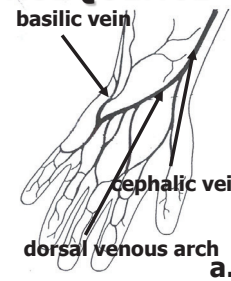

**Ligation of vessels. Steps of suture ligation.**

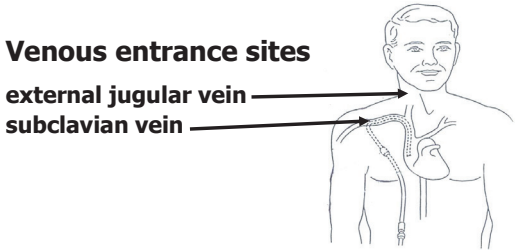
Furka I., Mikó I.: Műtéttani alapismeretek, 2015. évi javított kiadás. Debreceni Egyetemi Kiadó, 2015
(Basic Surgical Techniques, Debrecen University Press)

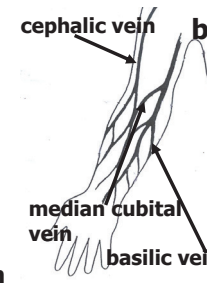
## III. TREATMENT OF THE BLEEDING'S CONSEQUENCE

### *1. Intravenous therapy*

- injection - superficial veins
  - a./ hand veins
  - b./ forearm veins
- central venous techniques



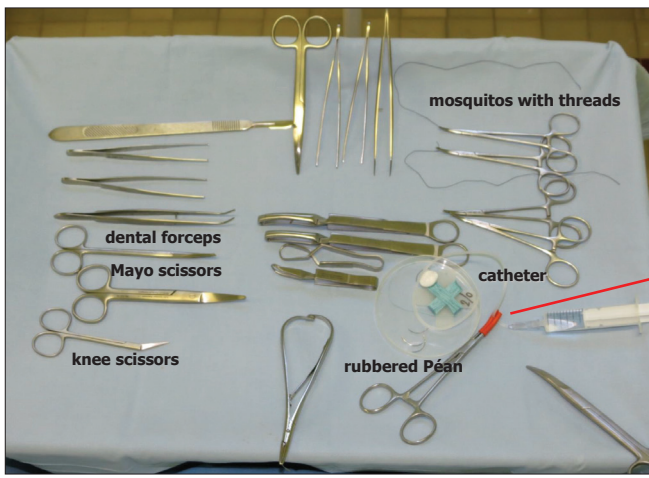



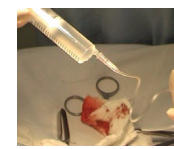



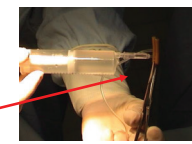

### *2. Venous cutdown technique*

external jugular vein,median cubital vein, saphenous vein

## VENOUS CUTDOWN TECHNIQUE - INSTRUMENTARIUM





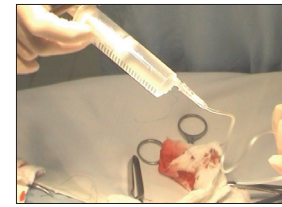
catheter preparation without air bubbles!!

Before the operation!

Sonnenburg table's order

# VENOUS CUTDOWN TECHNIQUE

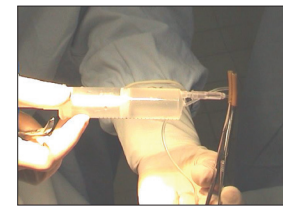
**jugular vein**



**patient's position**
**(pillow under the shoulders)**

**external jugular vein**

**catheter preparation**
**(without air bubbles)**
**closing the catheter**



**instruments' preparation**

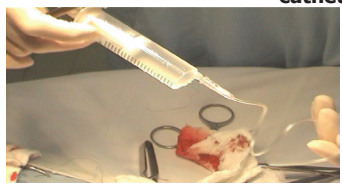
**skin preparation and isolation**
**(orientation)**

**skin incision - scalpel**
**stop the bleeding - Péan**
**expose the vein - Mayo scissors, dental forceps**
**isolate the vein between ligatures - 2 mosquitos with thread**
**distal ligature**
**V-shaped cut (venotomy) - dental forceps, knee scissors**
**insert the catheter (6-8 cm) - suck back!**
**central ligature (secure the catheter)**
**connect the infusion**
**fixing the catheter with „U"-stitch - mosquito with thread, Mathieu needle holder with skin needle**
**close the incision (Donati stitches)**
**fixing the catheter with flying stitch**
**Mathieu needle holder with skin needle and thread**

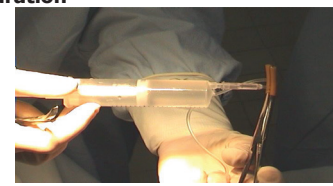
**LIFE-SAVING METHOD!!!**

# VENOUS CUTDOWN TECHNIQUE
## Life-saving method!!!

catheter preparation



1.



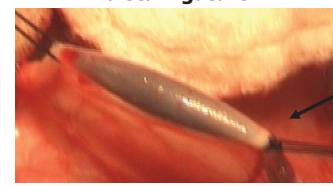
2.

isolate the vein between ligatures



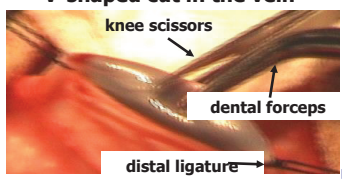
3.

distal ligature



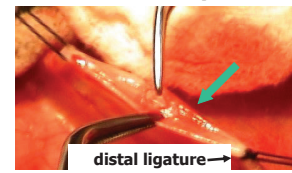
4.

V-shaped cut in the vein




5.

venotomy



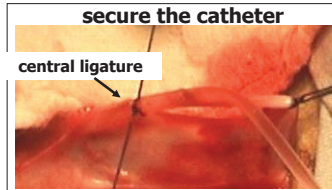

6.

insert the catheter



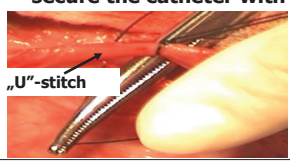
7.

secure the catheter




8.

secure the catheter with an additional suture - „U"-stitch

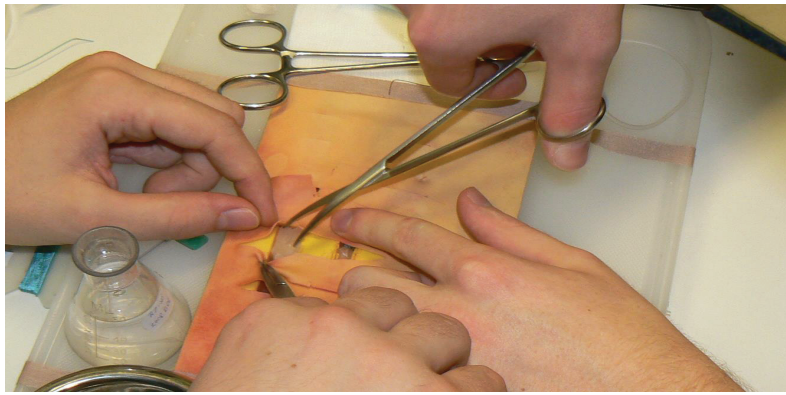


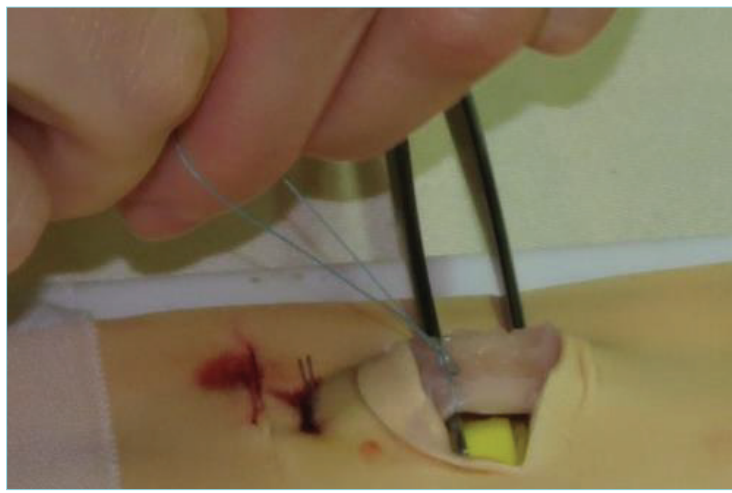

9.




10.

# SURGICAL TRAINING MODEL FOR VENOUS CUTDOWN TECHNIQUE





# PUNCTION OF THE VESSELS. INJECTION TECHNIQUES. BLOOD SAMPLING METHODS. INFUSIONS.

# 6.

# INJECTIONS

## the most frequent possibilites

**intracutaneous (i.c.)**
**subcutaneous (s.c.)**
**intramuscular (i.m.)**
**intravenous (i.v.)**






**Preparation for injection techniques**

# RULES AND REGULATIONS

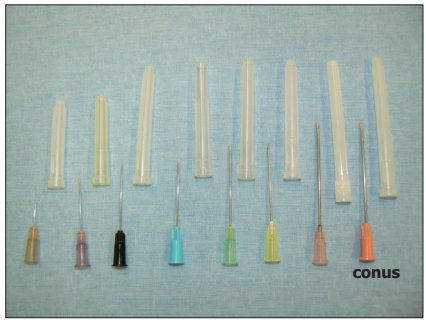
- **keep the steril conditions!**
- **preparation of the tools (syringes, injection needles - sterility)**
- **preparation of the ampoules/drugs ⟶ opening the ampoules ⟶ drug preparation in the syringe**
- **air removal from the liquid in the syringe (air embolism danger!)**
- **after opening the ampoules/vials the drug must be utilised ⟶ changing injection needle in a short time (drug degradation!!! sterility!!!)**
- **check the correct site of the injection**
- **skin disinfection**
- **check the content of the prepared injection!!! (responsibility!!)**
- **injection in intact skin (no injury, no infected skin area)**
- **dry dressing (compression)**

## Indications for injections

- **diagnostic or therapeutic purpose**
- **the patient requires prolonged or faster action (volume correction)**
- **drug delivery through the gastrointestinal (GI) tract is impossible**
- **the drug is altered by ingestion**

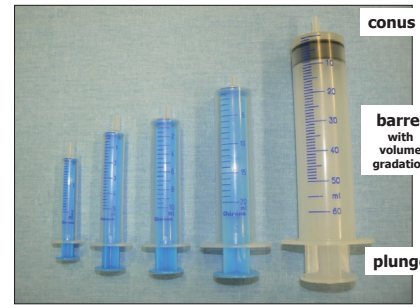
## Tools of injection's techniques

# TOOLS OF INJECTION'S TECHNIQUES




**Hypodermic injection needles**
**single-use Luer needles**
**(metal+plastic)**
**sterile**

**Syringes**
**single-use Luer syringes**
**volume ranges: 1, 2, 5, 10, 20, 50, 60ml**
**(plastic)**
**sterile**



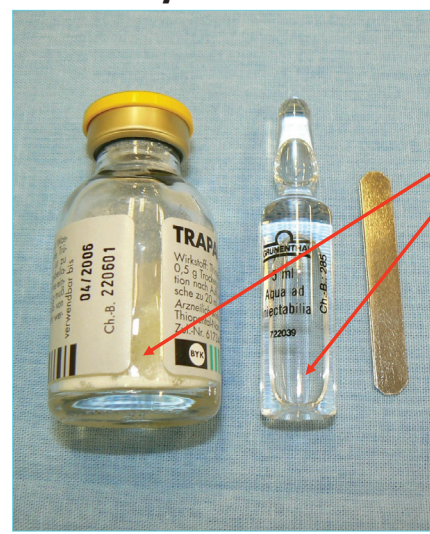

**BUT!!! pre-filled syringe (LMWH)**

# AMPOULES / VIALS



**thinned neck**

**glass ampoule**



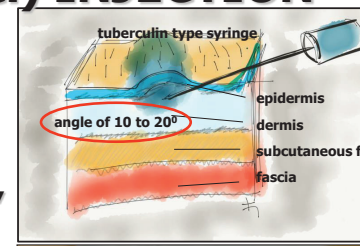

**liquid vials**

**powder vials with diluents**

**(distilled water or physiological salt solution)**

**glass or plastic container**
**closed with a rubber stopper, sealed with an aluminium shield**

# INTRACUTANEOUS (i.c.) INJECTION




## Administration for diagnostic purpose

**cutaneous reactions, allergy testing, tuberculosis screening, local anesthesia** (max. 0.5ml - 1cm needle)



## Contraindication

**serious dermatopathy**
**sensitivity against components**

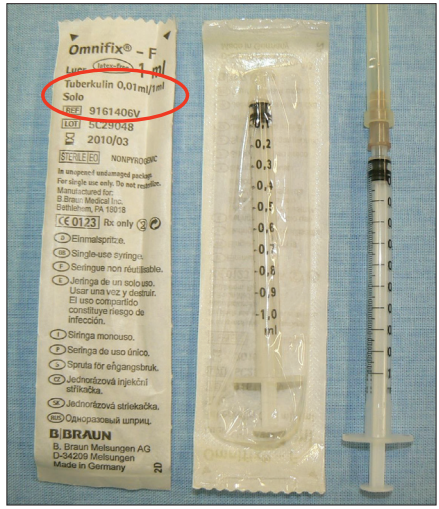
## Complications

**serious local reactions, necrosis**

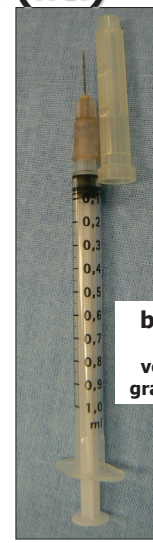
**Sites: inner forearm, posterior of upper arm**

Furka I., Mikó I.: Műtéttani alapismeretek, 2015. évi javított kiadás. Debreceni Egyetemi Kiadó, 2015
(Basic Surgical Techniques, Debrecen University Press)

# TOOLS OF INTRACUTANEOUS (i.c.) INJECTION




**for tuberculosis screening**



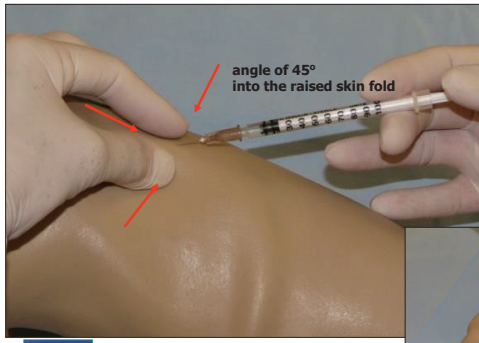
**barrel with volume gradation**

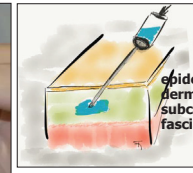
# SUBCUTANEOUS (s.c.) INJECTION

## Administration of slowly absorption drugs for therapeutic purpose

**(max. 1-2ml - 1-1.5 cm needle)**











**insulin, heparin, some vaccinations** (Pneumovax) **Bethaferon®, Copaxon®**

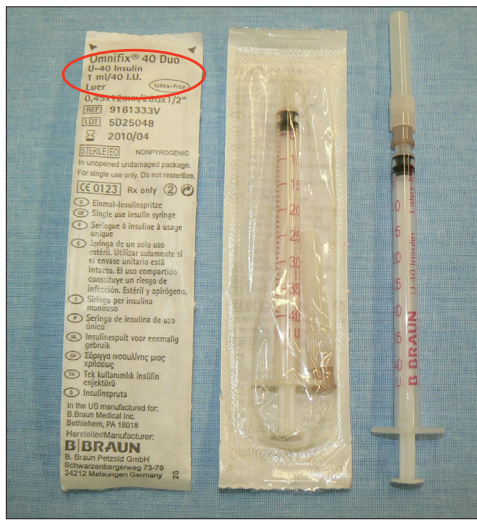
**auto immun diseases, MS - multiple sclerose**



**Furka I., Mikó I.: Műtéttani alapismeretek, 2015. évi javított kiadás. Debreceni Egyetemi Kiadó, 2015**
**(Basic Surgical Techniques, Debrecen University Press)**

# TOOLS OF SUBCUTANEOUS (s.c.) INJECTION

**conventional method**






# INTRAMUSCULAR (i.m.) INJECTION

## Administration of mild-acting effect parenteral drugs for therapeutic purpose

- larger volume

some antibiotics, vaccines, analgetics.

(max. 5ml)

after the puncture it is obligatory to draw back the plunger of the syringe!! (blood control)

| Size of the injection needles | |
|---|---|
| praparation | 18G (1,33mm) |
| injection | 20G (0,9mm) |
| | 21G1 (0,8mm) |
| | 22G (0,7mm) |

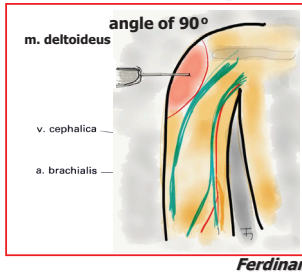
## Contraindication

dermatitis, cellulitis,
congenital or acquired hemorrhagic diathesis diseases,
anticoagulant therapy.

## Complications

vessel lesion, neural lesion/ischiadic nerve injury, break of needle, inflammation, abscess (skin, muscles).

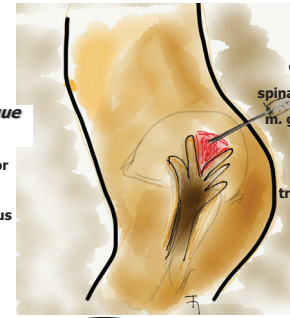
## Safety sites of intramuscular injection



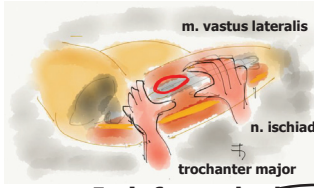

in deltoid region

after the puncture is obligatory to draw back the plunger of the syringe!! (blood control)

*Ferdinand von Hochstetter technique (1829 – 1884)*




in adults in gluteal region



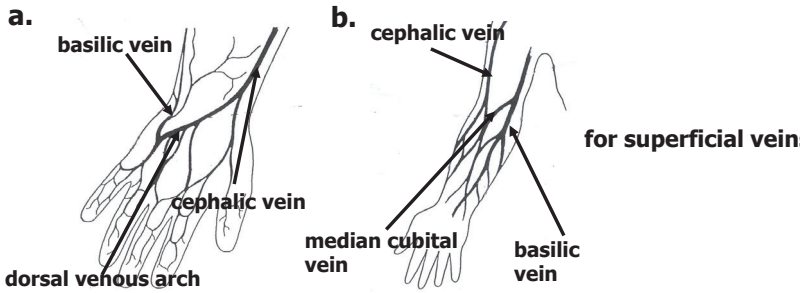

In infants the lateral region of the femoral muscles (thigh)

Furka I., Mikó I.: Műtéttani alapismeretek, 2015. évi javított kiadás. Debreceni Egyetemi Kiadó, 2015
(Basic Surgical Techniques, Debrecen University Press)

# INTRAVENOUS TECHNIQUES

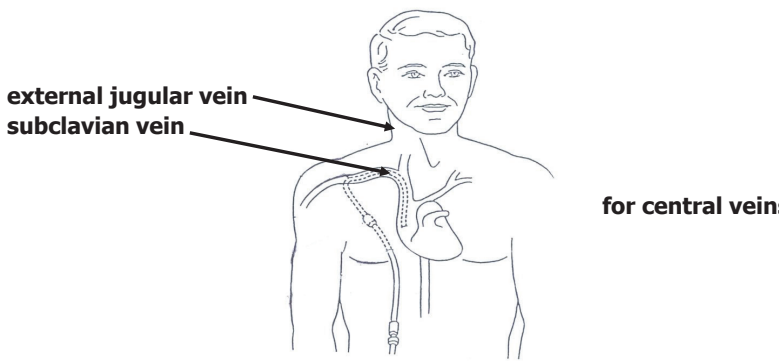
## intravenous (i.v.) injection

- injection - superficial veins
  - a./ dorsal veins of the hand
  - b./ forearm veins
  - c./ head veins (infants)
- percutaneous cannulation
  - superficial veins (braunule)
  - central veins (catheter)




Jeanne C. Scherer: Introductory Medical-Surgical Nursing, 4th edition, J.B. Lippincott Company Philadelphia, 1986

# Venous entrance sites



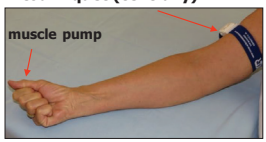

- venous cutdown technique (surgery)

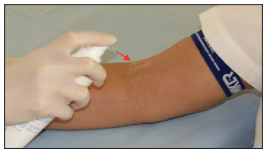
  ext. jugular vein, median cubital vein, saphenous vein

Jeanne C. Scherer: Introductory Medical-Surgical Nursing, 4th edition, J.B. Lippincott Company Philadelphia, 1986

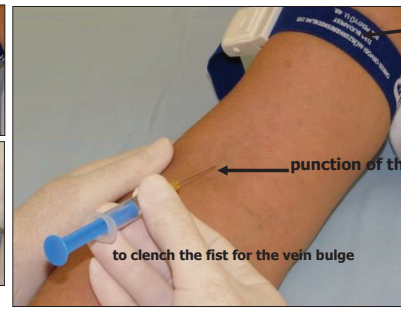
# INTRAVENOUS (i.v.) INJECTION

tourniquet (centrally)



skin disinfection













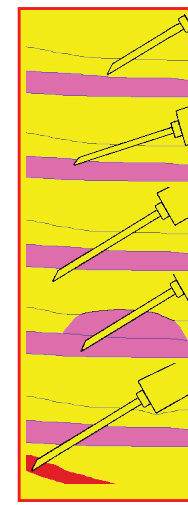


Furka I., Mikó I.: Műtéttani alapismeretek, 2015. évi javított kiadás. Debreceni Egyetemi Kiadó, 2015
(Basic Surgical Techniques, Debrecen University Press)

# INTRAVENOUS (i.v.)INJECTION

## Administration for therapeutic purpose or blood sampling for diagnosis

**Only water soluble solutions!**
**No oily components!**



## Complications, dangers

- skin infection
- haematoma
- extravasation and infiltration
- steril venous inflammation
- thrombophlebitis
- thrombosis, thromboembolism
- clot formation
- air embolism
- intraarterial administration
- fever, toxic reactions

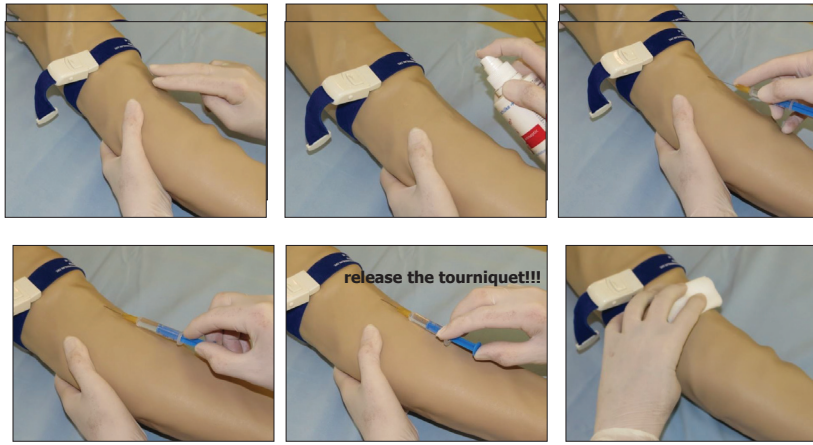
# INTRAVENOUS TECHNIQUES

## intravenous (i.v.) injection on simulation phantom model



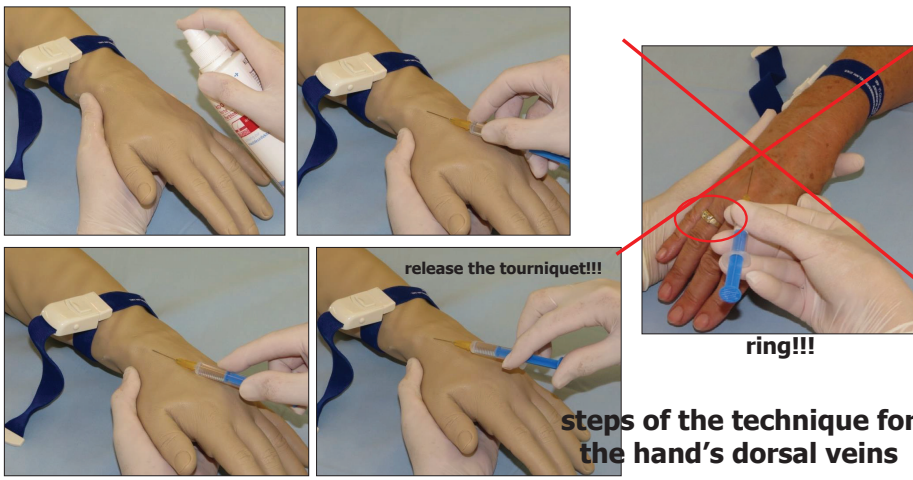

## steps of technique on special injection pad - with three veins

# INTRAVENOUS TECHNIQUES
## intravenous (i.v.) injection on simulation phantom model




steps of technique for forarm's veins

# INTRAVENOUS TECHNIQUES
## intravenous (i.v.) injection on simulation phantom model




ring!!!

steps of the technique for the hand's dorsal veins

Furka I., Mikó I.: Műtéttani alapismeretek, 2015. évi javított kiadás. Debreceni Egyetemi Kiadó, 2015
(Basic Surgical Techniques, Debrecen University Press)

# SECURING THE VEIN WITH CANNULATION

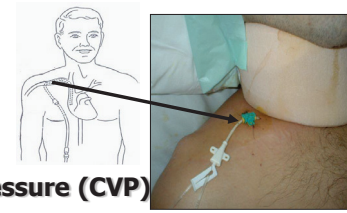
- ***Percutan cannulation***

***- Venous cutdown technique – with cannulation***

## INDICATIONS OF SECURING THE CENTRAL VEINES

***In clinical practice***

**- volume therapy – volume correction**
**- transfusion**
**- total parenteral nutrition (TPN)**
**- inserting transvenous pacemaker**
**- treatment with some cytostatic drugs**
**- measurement of the central venous pressure (CVP)**
**- Swan-Ganz-type catheter**



subclavian vein catheter

***In research***

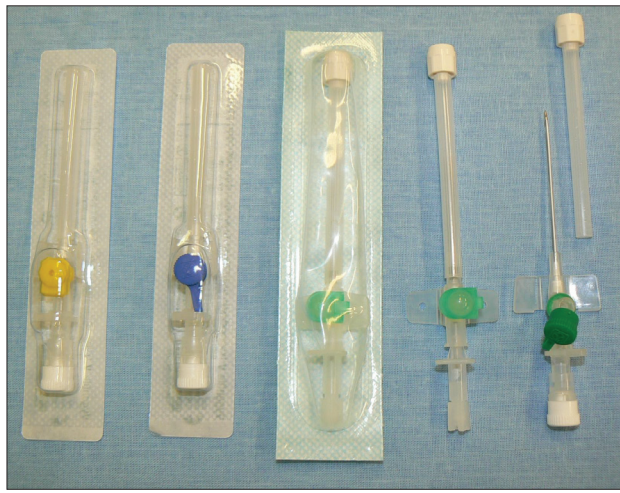
**- volume correction**
**- blood sampling possibilities on the follow-up examination**
**- monitoring the central venous pressure during operation**

# PERCUTAN CANNULATION

## „Butterfly"-needle with catheter and plastic wings



# PERCUTAN CANNULATION
## Braunule-technique



**Parts:**

**plastic catheter**

**facet needle**

**Luer-lock connector**

**select the adequate i.v. cannula!**

## Various lenghts and diameters

**G24-yellow braunule:** **13 ml/min (neonates)**

**G22-blue braunule:** **36 ml/min ( infants)**

**G20-pink braunule:** **61 ml/min (children, thin veins)**

**G18-green braunule:** **90 ml/min (adults)**

**G16-grey braunule:** **196 ml/min (quick volume replacement)**

**G14-orange braunule:** **(massive transfusion)**

# PERCUTAN CANNULATION - Braunule-technique

## steps of the technique - on simulation phantom model



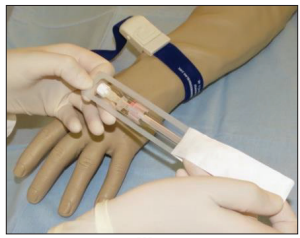
localisation of the vein (palpation)



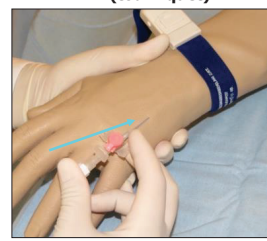
vein compression centrally to the vein (tourniquet)



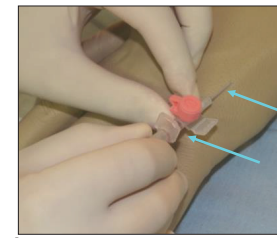
skin disinfection



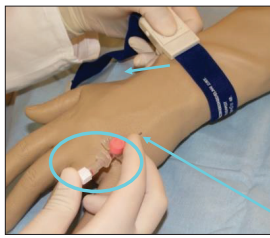
sterility!!!



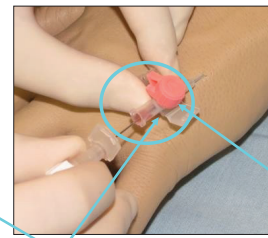
puncture of the vein (angle of 30° to 45°)



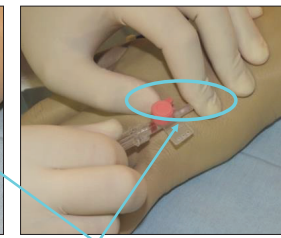
plastic catheter - facet needle



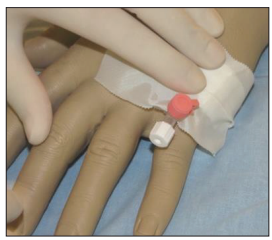
in the vein



plastic catheter



fixing the vein



Luer-lock connector





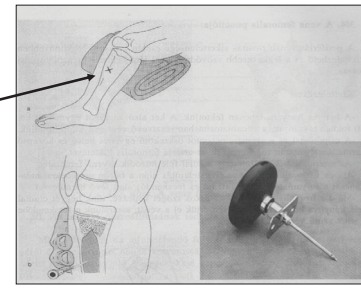
fixation of the braunule

## STERILITY!!!

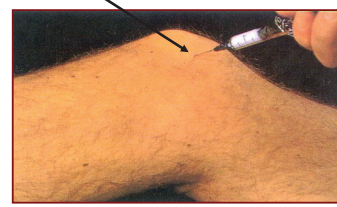
Furka I., Mikó I.: Műtéttani alapismeretek, 2015. évi javított kiadás. Debreceni Egyetemi Kiadó, 2015
(Basic Surgical Techniques, Debrecen University Press)

# OTHER INJECTION POSSIBILITIES

- intra-arterial
- intra-cardial
- intra-osseal
- intra-articular
- intra-thecal
- intra-pleural
- intra-peritoneal



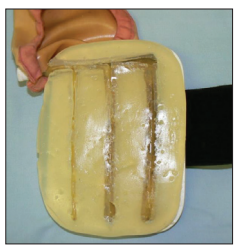
Insertion the 'Cook' - needle into the intraosseal site





animal experiments

## Intravenous injection pad with three veins
### (back of the hand superficial vein)

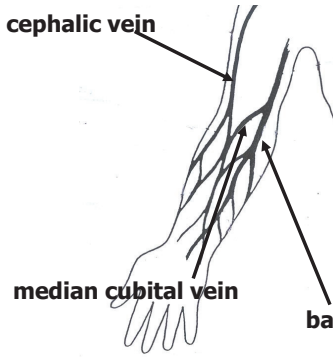






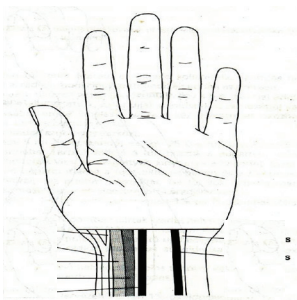
# BLOOD SAMPLING METHODS

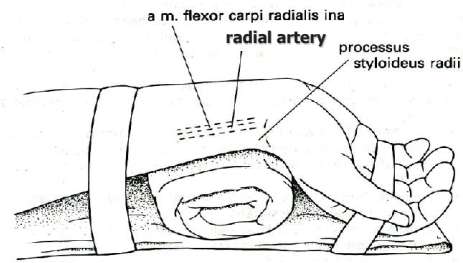
## Venous




- cephalic vein
- basilic vein
- median cubital vein
- dorsal hand veins

## Arterial






- radial artery
- brachial artery
- femoral artery

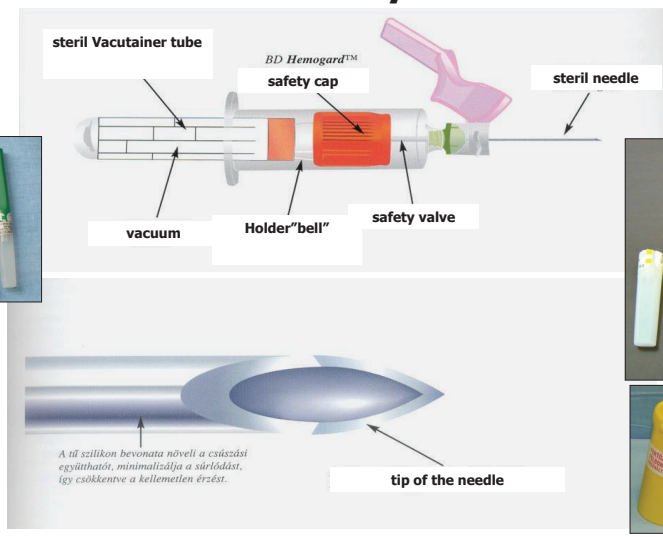
## Capillary

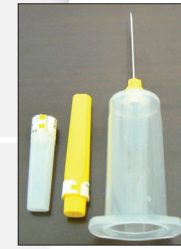
- hematocrit
- hemoglobin
- glucose
- blood gas

Chesnutt M.S.; Dewar T.N.; Locksley R. M.: Az orvosi beavatkozás technikái, pp. 127. Springer, 1995

# TOOLS OF BLOOD SAMPLING
## Vacutainer system







## The most common Vacutainer® tubes used for laboratory tests

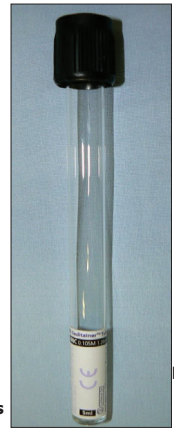
| Test | Cap colour of Vacutainer® tube | Anticoagulant | Required volume |
|---|---|---|---|
| Hematology, We | lilac | K3-EDTA | 5 ml<br>children: 2 ml |
| PT, APTT, TT fibrinogen, other coagulation factors | light blue | citrate buffer | 4.5 ml<br>children: 1.8 ml |
| Electrolits, enzymes, hormones, drug concentration, serology, routine chemistry | red<br>red Microtainer (children) | no anticoagulant | 4 ml<br>children: 0.6 ml |
| Samples for Blood Transfusion Center | orange, green or red | no anticoagulant, silicon gel as clotting accelerator | 10 ml<br>children: 0.6 ml |
| Fibrin degradation products | blue with yellow label | trypsin inhibitor, thrombin | 2 ml |
| Glucose | gray | Na-fluorid, K-oxalate | 7 ml |
| Potassium, rheology | green | Na-heparin | 5, 7, 10 ml |
| Trace elements | dark blue | heparin | 7 ml |
| Trace elements | dark blue | no anticoagulant | 7 ml |

# VACUTAINER TUBES



**Anticoagulant citrate buffer PT, APTT, Fbg, TT,**

**hemostasis examinations**



**Anticoagulant citrate buffer**

**blood sedimentation**



**Anticoagulant $K_3$EDTA**

**haematological examination**



**Anticoagulant Na-heparin rheology**



**Anticoagulant Na-fluorid, K-oxalát glucose**

# VACUTAINER TUBES



**No anticoagulant iron, tumour marker, CRP, prostata hormons, allergy test**

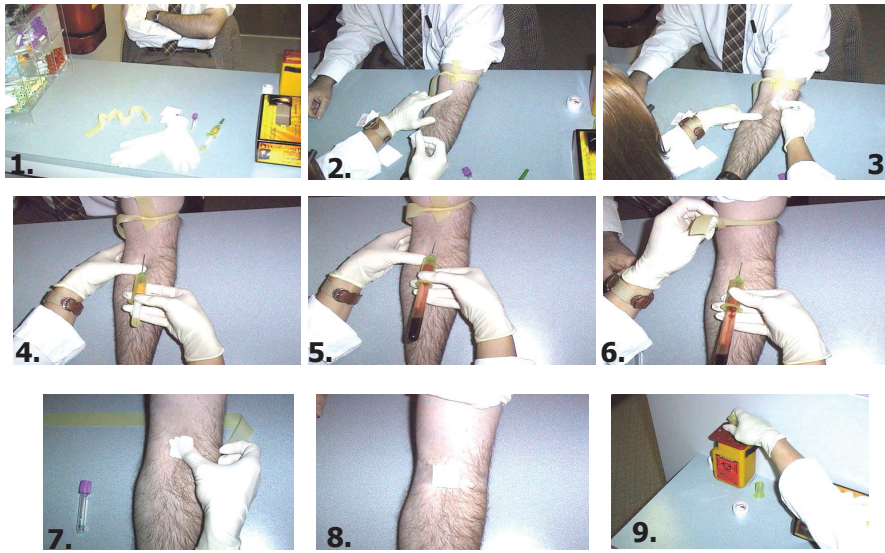


**No anticoagulant thyroid glands hormons**



**No anticoagulant electrolits, liver functions,**

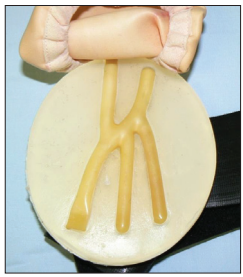
# VENOUS BLOOD SAMPLING

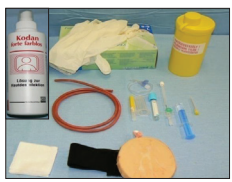



## Technique of blood sampling
### (closed system)

1. **preparations (equipment and gloves!)**
2. **identification of the vein (palpation)**
   **vein compression centrally to the vein (tourniquet)**
3. **skin disinfection**
4. **punction of the vein (angle of 30° to 45°) - needle in a sealed shield, holder**
5. **blood sample - in the evacuated blood sample tubes - Vacutainer system**
6. **tourniquet releasing, pulling of the needle**
7. **presse a steril sponge on the site of the needle**
8. **patient's elbow in a flexed position**
9. **collect the needles in a trash can for dangerous things**

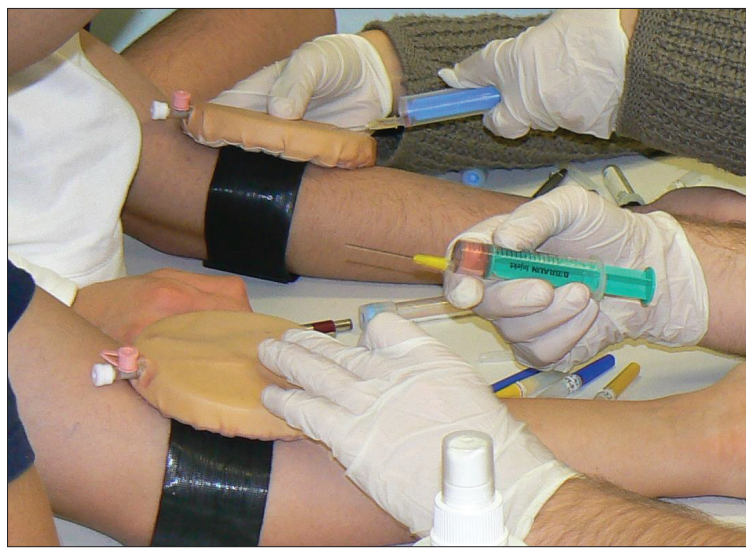
# Blood sampling pad with superficial veins
## (cubital vein system)







## „dry trainings" for the practice



# INFUSIONS

## Tools of infusions

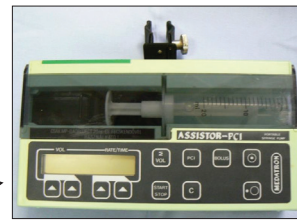


### Steril infusion set

- spike
- drip-chamber
- flexible long tubing with flow regulator
- injection needle with a covering cap

### Infusion bag or infusion glass bottle

- infusion solutions
- drugs'contents of the infusion!
- date!
- signature!





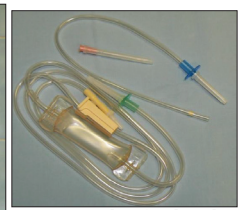

### Infusion-rack

### Infusion-pumps

- syringe infusion-pumps →
- volumetric infusion-pumps →

## Setup of infusion set for bottle or for infusion bag





accessories for bottle

!!! content date signature






accessories for plastic bag

!!! content date signature







# INFUSIONS

**Crystalloids** | **Colloids**

**Natural ~** | **Arteficial ~**

## Crystalloids

**Isotonic:**
**Saline - (0.9% physiological salt) solution**
**Salsol - sodium chloride solution**
**Lactated Ringer's**

***Hypotonic salt solutions:***
**Dextrose 5%**

***Hypertonic salt solutions***

## Colloids

**Natural**
**Albumin** (protein-containing)

**Arteficial**
***Dextran*** (simple-chain carbohydrates of bacterrial origin)

***Hydroxyethil starch (HES)***
**Isooncotic - 6%**
**Hyperoncotic - 10%**

# THE USAGE OF THE INFUSIONS

**- Accidents - traumatic injuries**
**- Burning injuries**
**- Infections (by vomiting and diarrhoea)**
**- Surgical interventions**

**- Shock: vasoconstriction (type)**
**vasodilatation (type)**
**Triggering causes: loss of blood**
**loss of plasma**
**loss of electrolits**
**significant tissue destruction**
**Compensated - Decompensated phase**
**(Shock index: pulse / syst. BP $\geq$ 1)**

**In shock the circulating blood volumen absolutely or relatively decreases!**

**- Osmotherapy - gets fluid from the interstitial space:**
**brain - and lung oedema**
**(e.g. Mannitum Ph.Hg. VII.)**

**The dosage of different medicines by infusion in different diseases:**
**more accurate dosage**
**longer effect**
**safer usage**
**(e.g. cytostatic mixed infusions produced)**

**In surgical interventions**
**the *medical doctor***
***is responsible for the infusion***
**(indication technique, content)**

# APPLICATION OF INFUSIONS

## Volume therapy during the operation

| | | |
|---|---|---|
| **Minor surgical interventions** | → | **1-2 ml/bwkg/hour** |
| **Minimal surgical interventions (hernia, knee surgery)** | → | **3-4 ml/bwkg/hour** |
| **Moderate surgical interventions (abdominal and thoracic surgery)** | → | **5-6 ml/bwkg/hour** |
| **Severe surgical interventions (polytraumatization)** | → | **8-10 ml/bwkg/hour** |

## Blood replacement in case of hemorrhage during surgery

| | | |
|---|---|---|
| **1 ml blood loss** | ⟹ | **3-4 ml cristalloid bwkg/hour** |
| **1 ml blood loss** | ⟹ | **1 ml colloid bwkg/hour** |
| **1 ml blood loss** | ⟹ | **1 ml blood bwkg/hour** |

# HYPERTONIC - HYPERONCOTIC SOLUTIONS

### *Relatively new therapic opportunity*

- **For the treatment of hypovolaemic shock,**
- **For prehospital treatment of polytraumatizated patient:**
  **SVR (Small-Volume Resuscitation)**
  **quick infusion of solutions which has big oncotic and osmotic pressures.**

### *Advantages*

- **elevates the blood-pressure**
- **decreases the heart frequency**
- **quickly decreases the shock-index**

# LAPAROTOMY.
# WOUND HEALING.
# WOUND DRESSINGS.

# 7.

# LAPAROTOMY

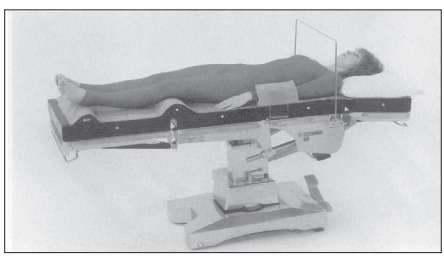
## Surgery that opens the abdomen is called a laparotomy

## BUT NOT A TREATMENT

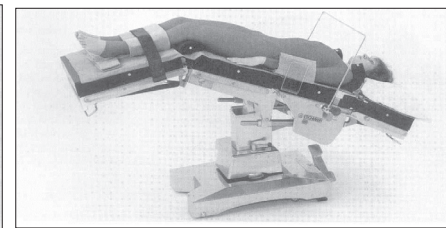
### Why is it important to know about it?

- 55-60% of the surgical interventions start with laparotomy
- to inform the patient
- situation of catastrophes and disasters - to assist
- disability and sick pay/sickness benefit
- for medical intelligence

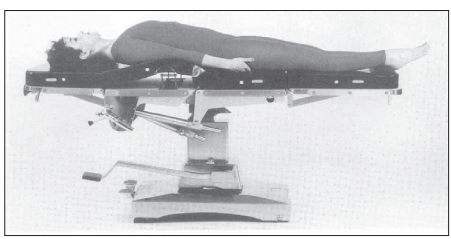
# POSITIONS USED FOR SURGERY



Supine or dorsal recumbent position



Steep Trendelenburg position
Friedrich Trendelenburg(1844 – 1924)



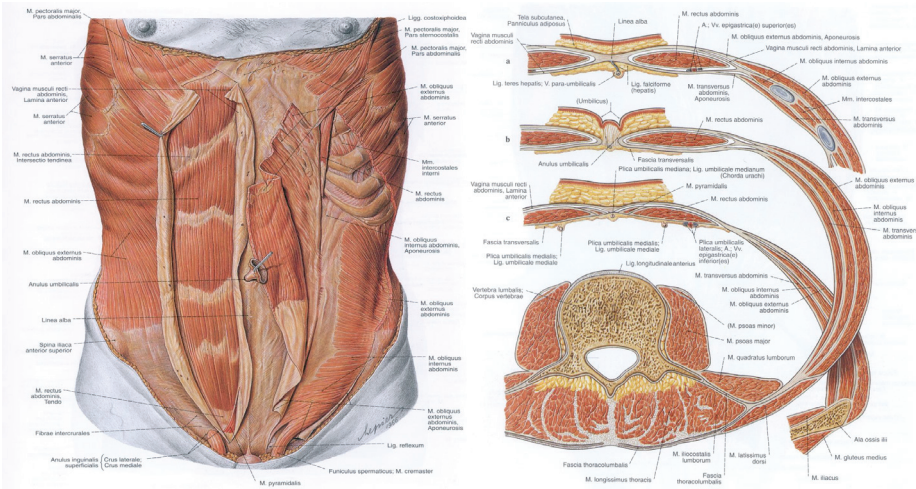
Gall bladder, or liver position



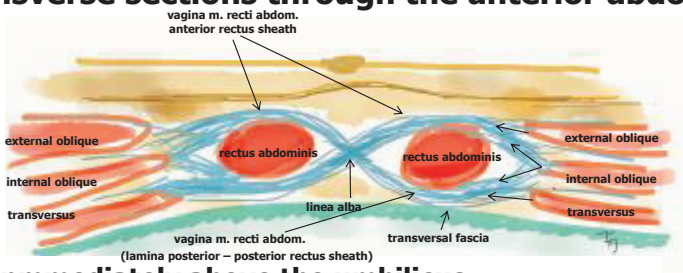
anti-Trendelenburg position

# LAPAROTOMY

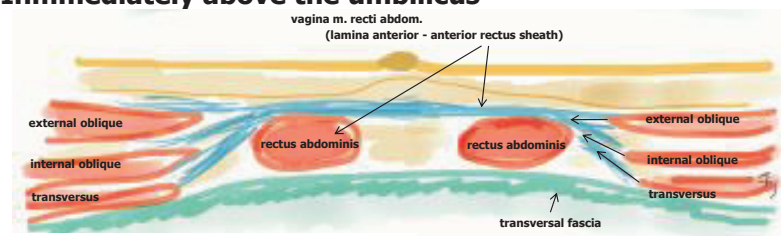
## Anatomy of the abdominal wall




## Transverse sections through the anterior abdominal wall




## Inmmediately above the umbilicus



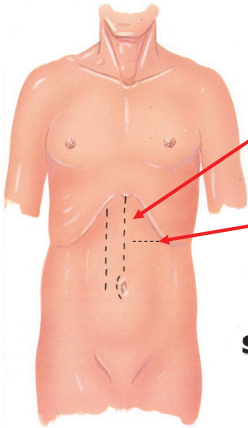

## Below the arcuate line

**Furka I., Mikó I.: Műtéttani alapismeretek, 2015. évi javított kiadás. Debreceni Egyetemi Kiadó, 2015**
**(Basic Surgical Techniques, Debrecen University Press)**



# LAPAROTOMY

## *Incision's directions*



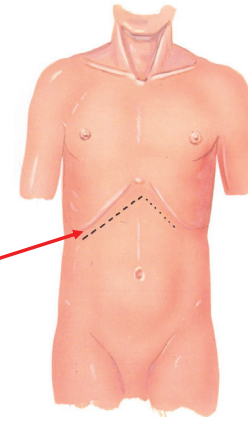
1. Vertical
median (midline)
paramedian
transrectal
pararectal

2. Transverse
transrectal
Pfannenstiel

3. Oblique
subcostal or paracostal
McBurney

4. Combined

5. Laparoscopic



# LAPAROTOMY

## *Incisions not cutting muscles*

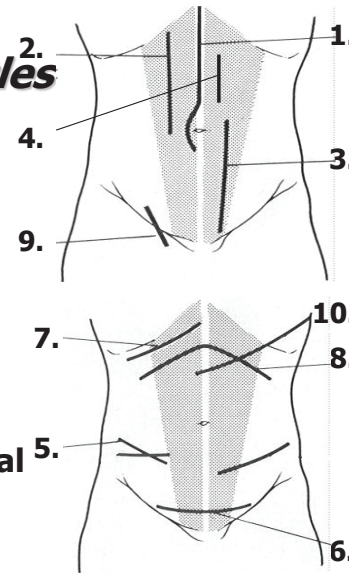
1. median (midline)
2. paramedian
3. pararectal

## *Incisions dividing muscles*

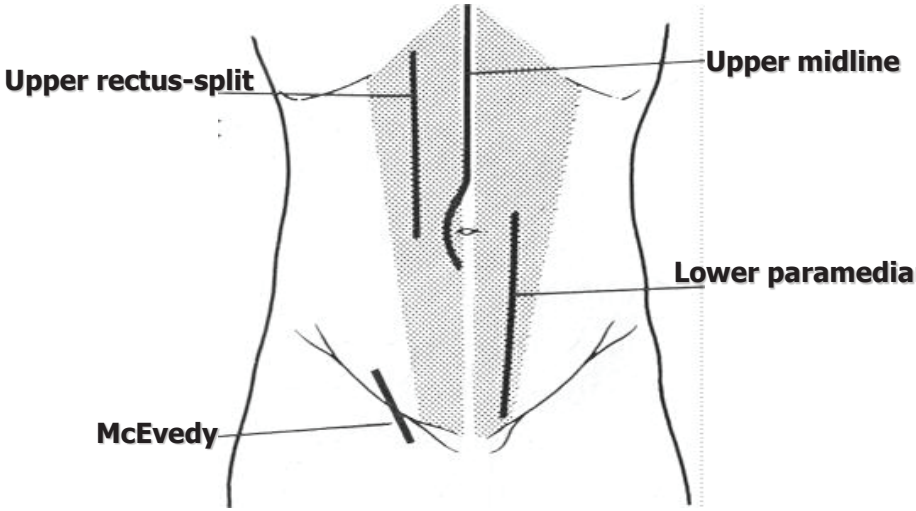
4. vertical transrectal
5. McBurney incision
6. Pfannenstiel incision

## *Incisions cutting muscles*

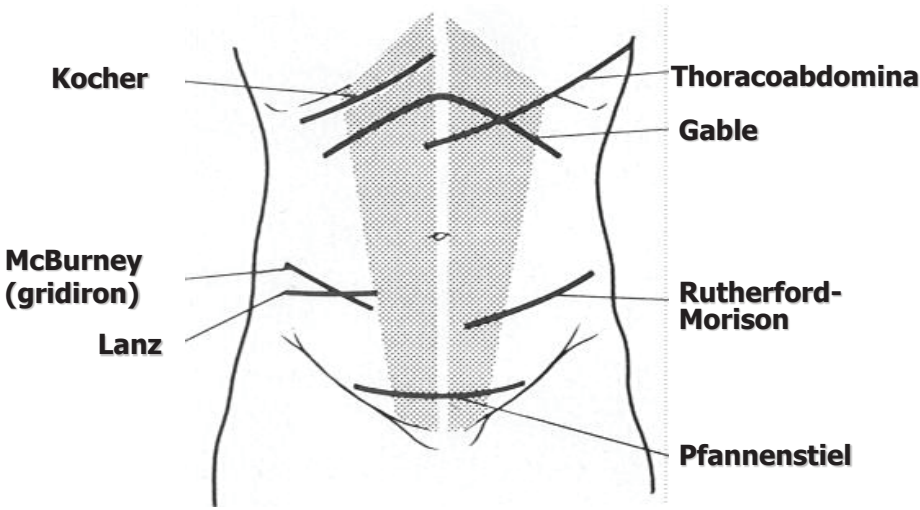
7. paracostal (Kocher) or subcostal
8. transverse transrectal
9. inguinal
10. thoracoabdominal



# LAPAROTOMY



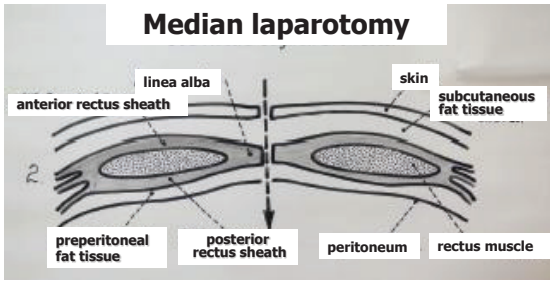

**Incisions I.**




**Incisions II.**

**(Kirk: Basic Operative Techniques, 1998)**

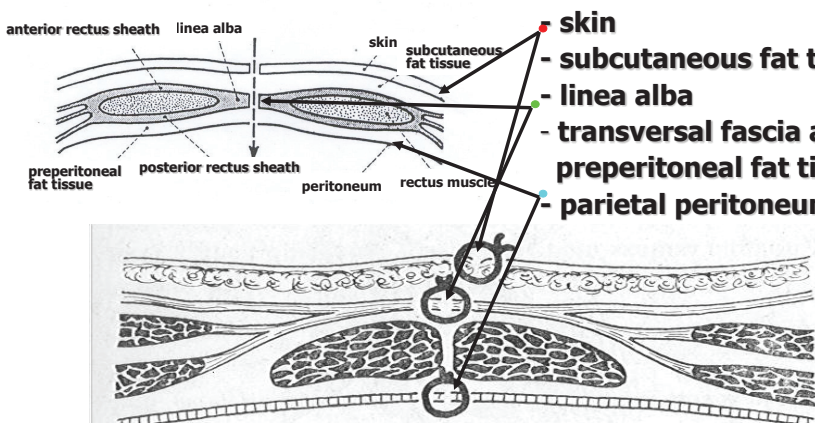
# LAPAROTOMY - *median (midline)*




- skin
- subcutaneous fat tissue
- linea alba
- transversal fascia and preperitoneal fat tissue
- parietal peritoneum

**Anatomy**

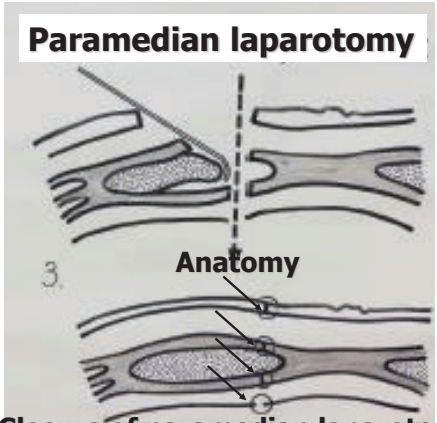
## Closure of median (midline) laparotomy




- skin
- subcutaneous fat tissue
- linea alba
- transversal fascia and preperitoneal fat tissue
- parietal peritoneum

**Advantage: fast** **Disadvantage: herniation**

# LAPAROTOMY - *paramedian*

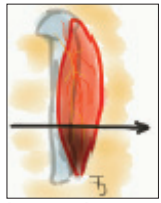



- skin
- subcutaneous fat tissue
- anterior rectus sheath
- rectus displacement or rectus splitting
- posterior rectus sheath
- transversal fascia and preperitoneal fat tissue
- parietal peritoneum

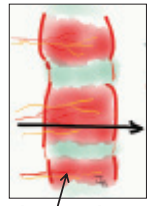
**Closure of paramedian laparotomy**

**Advantage: „strong" no herniation**

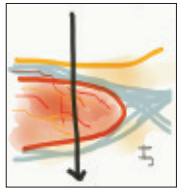
**Disadvantage: slow**



innervation of limb's muscle

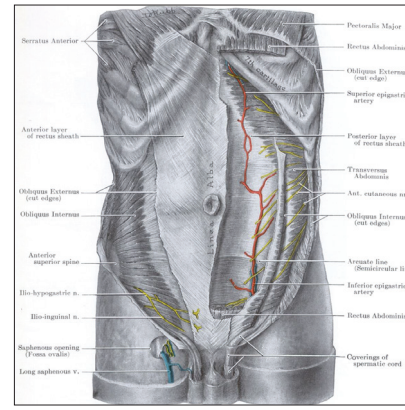


innervation of rectus muscle





atrophy after incorrect cutting



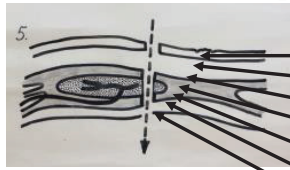

**segmental innervation of rectus muscle**

Furka I., Mikó I.: Műtéttani alapismeretek, 2015. évi javított kiadás. Debreceni Egyetemi Kiadó, 2015
(Basic Surgical Techniques, Debrecen University Press)

# STEPS OF PARAMEDIAN LAPAROTOMY

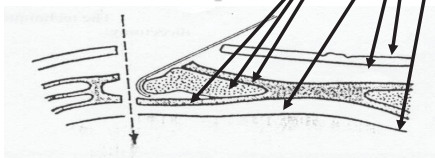
- **patient's position**
- **orientation**
- **skin preparation**
- **isolation of the operation field**
- **skin incision**
- **„first isolation line"**
  **(surgical forceps, Doyens)**
- **stop the bleeding**
  **(Péans, mosquitos)**
- **muscle incision** **(rectus displacement or splitting)**
- **stop the bleeding**
- **„second isolation line"** **(abdominal dressing)**
- **peritoneum incision**
  **(surgical forceps or peritoneal clamps → scalpel → peritoneal scissors)**
- **„second isolation line" fixation**
  **(surgical forceps, peritoneal clamps, 2 towel clamps)**
- **expose the abdominal cavity**
  **(self retaining retractor)**
- **orientation in the abdominal cavity**

# LAPAROTOMY - *paramedian transrectal*

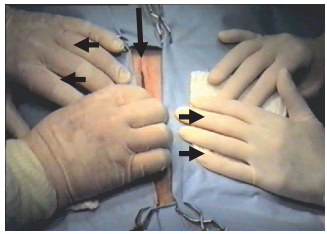


- skin
- subcutaneous tissue
- anterior rectus sheet
- rectus muscle
- posterior rectus sheet
- preperitoneal fat tissue
- parietal peritoneum

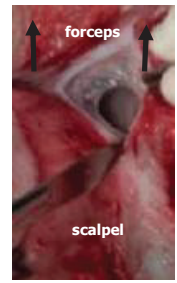
***pararectal incision***

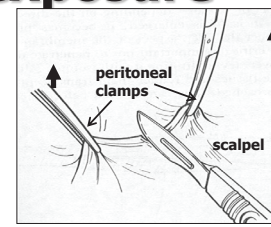


# LAPAROTOMY - exposure

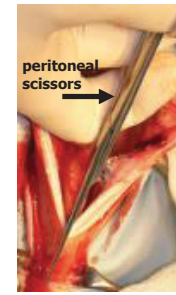


**skin incision with scalpel (stretch and lift the skin)**

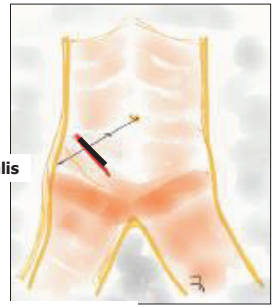


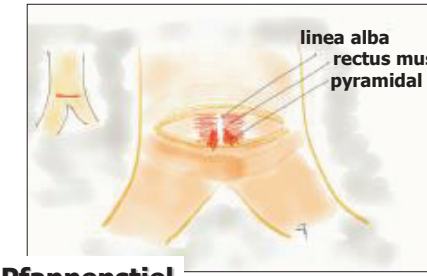

**incision of the parietal peritoneum**



# McBURNEY AND PFANNENSTIEL INCISION




McBurney




Pfannenstiel

muscle splitting

## Classification of the laparotomies
### by incision lenght

**Conventional laparotomy :** >8 cm abdominal incision

**Standard minilaparotomy :** 6-8 cm abdominal incision

**Modern minilaparotomy:** 4-6 cm abdominal incision

**Microlaparotomy:** < 4 cm abdominal incision






ROMICRO- set





special retractors with light source

Minimal invasive surgery (MIS)

# Closure of the abdominal wall

- **closure in two layers**
- **closure in three layers**
- **closure with deep tension sutures**
- **closure with mesh**

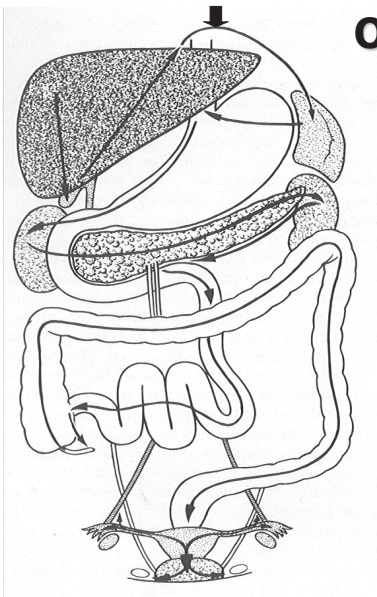
# Wound healing complications' possibilities after closing the abdominal wall

1. **hematoma**
2. **seroma**
3. **wound infection (nosocomial infection)**
4. **wound disruption**

**chronic: incisional or scar herniation**

**acute: partial - superficial (skin, fascia) – dehiscence**
**total - without peritoneum – disruption**
**total - with peritoneum – „Platzbauch"**

**Therapy: only surgical in narcosis, NOT ambulanter!**



# Order of the examinations during exploratory laparotomy

**Don't be uncertain after the examination !!!!!**

**and neither before the abdominal closure !!!**

# WOUND HEALING.
# WOUND DRESSINGS.

# BASIC PRINCIPLES OF THE WOUND TREATMENT

## DEFINITION OF WOUND

**The wound is a pathological state:**
**a break in the integrity of the skin;**
**an injury to the body which causes a disruption**
**of the normal continuity of the tissues and structures**
**by external damage or spontaneously.**

**The wound can be:**
- **superficial**
- **medium deep**
- **deep**

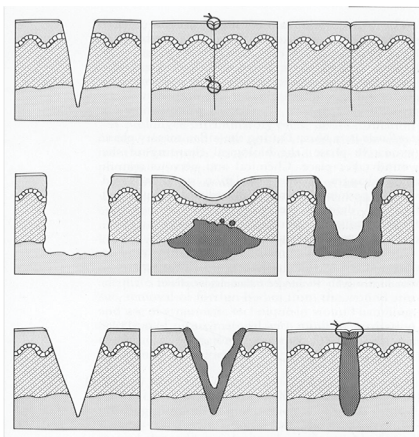
## ETHIOLOGICAL CLASSIFICATION OF THE WOUNDS

**1. incised wound**
**vulnus scissum**
**2. cut wound**
**vulnus caesum**
**3. punctured wound**
**vulnus punctum**
**4. torn wound**
**vulnus lacerum**
**5. crushed wound**
**vulnus contusum**
**6. shot wound**
**vulnus sclopetarium**
**7. bit wound**
**vulnus morsum**
**8. burnt wound**
**vulnus combustium**

# ASPECTS OF CLASSIFICATION OF THE WOUND

- **Types of wounds**
- **Position of the wound: localization on the body**
- **Number of wounds**
- **Volume of wound secretion: minimal, mild, large quantity**
- **Types of secretion: serosus, purulent, haemo-serosus, odourless, putrid**
- **Characteristics of the wound edges: underexpanded, edema, cavity formation, ekzema, laceration, dry, wet**
- **Wound pain: yes, no**
- **The state of the wound determines its characteristics: necrotic, coated, granulant, epithelisant**

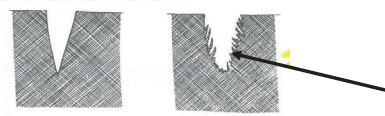
# WOUND HEALING



**- by first intention primary healing**

**- by second intention secondary healing**

**- by third intention tertiary healing**



# PHASES OF WOUND HEALING

**INFLAMMATORY PHASE:**

**(tumor, calor, dolor, edema, functio laesa)**
**degenerative process (eg. necrosis, secretion)**
**necrobiosis** - ***black wound***
**heavily exudating, infected, putrid wound**
- ***yellow wound***

**GRANULATION PHASE:**

**proliferative process (eg. angiogenesis)**
- ***red wound***

**EPITHELIZATION PHASE:**

**regenerative process**
**(epithel formation – re-epithelization)**
- ***pink wound***

# PHYSIOLOGICAL PATHWAYS TAKING PART IN WOUND HEALING

- **Coagulation system, platelets**
- **Immune system**
- **Circulation**
- **Metabolism**

# BASIS PRINCIPLES OF WOUND CARE TREATMENT

- **Careful examination, skin disinfection, wound toilet**
- **Local anesthetic drug -allow a deeper examination of the wound**
- **Debridement - medical removal of a patient's necrotic, damaged, or infected tissue to improve the healing potential of the remaining healthy tissue**
- **Wound closure:**
  - **1./ Primary < 6 hour**
  - **2./ Delayed primary < 3-8 days**
  - **3./ Early secondary > 2 weeks**
  - **4./ Late secondary > 4-6 weeks**
- **Bandage**
- **Antibiotic therapy/ tetanus prophylaxis if necessary**



**Paul Leopold Friedrich**
**1864-1916**

# TREATMENT OF THE CHRONIC WOUNDS

- **The current state of the patient's wound determines the optimal quality and quantity of the required dressings.**
- **The application of the optimal bandage combination helps the faster wound healing.**
- **The selection of the optimal dressings guarantees economical and cost-benefit wound dressing.**
- **The frequency of bandage change is determined by the state of wound.**
- **The systematic control helps the optimal usage of the dressings - according to the patient's condition.**

# DEFINITION OF WOUND DRESSING

**The wound dressing is a basic group of the medical aids, which we use in wound care, during surgical interventions and for the fixation of wounded, broken extremities. So they are the medical aids of skin damages.**

## TYPES OF WOUND DRESSINGS

- **wound-cover**
- **adhesive**
- **pressure**
- **compressive**
- **fixative (retention)**

# CLASSIFICATIONS OF WOUND COVER DRESSING

- **film dressing**
- **polymer dressing**
- **foam dressing**
- **hydrocolloids**
- **hydrogels**
- **hydrofibers**
- **alginates**
- **stench-trap activated charcoal dressing**
- **impregnated dressing (silver)**
- **adjective impregnated dressing**
- **active dressing**
- **super/absorbent wound pads**
- **wound strips**

# COMPARATIVE TABLE OF WOUND COVER DRESSINGS

| Dressing properties | Folias, films | Polymer dressing | Foam dressing | Hydro-colloids | Hydro-gels | Alginates |
|---|---|---|---|---|---|---|
| Semi-permeable | + | + | + | + | + | - |
| Keep the wound moist | - | - | + | + | + | + |
| Transparent/ translucent | + | - | - | - | + | - |
| Adsorb wound secretion | - | + | + | + | + | + |
| No adhesion into wounds | - | + | + | + | + | + |
| Help the epithelisation | - | - | - | + | - | - |
| Moderate keloid formation | - | - | - | + | - | - |
| Painless bandage change | - | + | + | + | + | + |
| Peel off the wound, need fixation | - | - | - | - | + | + |
| Help blood coagulation | - | - | - | + | - | + |

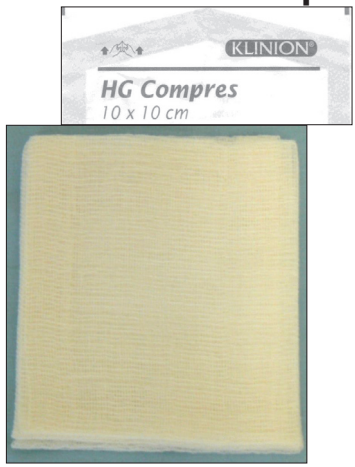
Szabó Gy.: Az emberi test funkcionális anatómiája és gyógyászati segédeszközökkel enyhíthető károsodásai. Semmelweis Kiadó, Budapest, 2005

# ADVANTAGES OF MOIST WOUND CARE

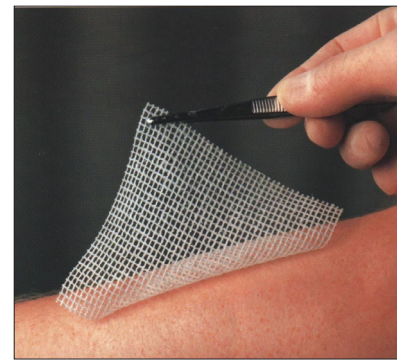
- they support optimal temperature, and moist wound environment
- increase the enzymatic proteolysis
- the low oxygen tension detains the growth of bacterias
- the risk of infection is lower
- adsorb the wound secretion, no adhesion into wounds
- decrease pain, wound treatment time and the number of bandage change

# WOUND DRESSINGS

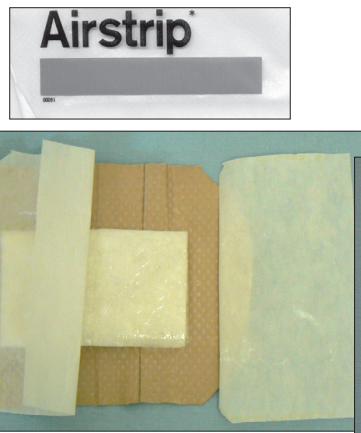
## Post-operative dressing




Gauze swab, 12 ply conventional



Gauze impregnated with vaseline

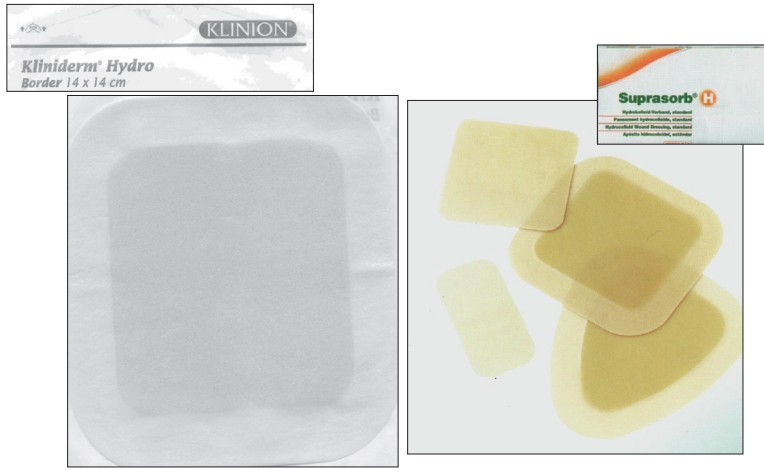



Semi-permeable waterproof plastic wound dressing




Absorbent vapour-permeable adhesive film dressing

# MOIST WOUND DRESSING




**Hydrocolloid bandage**




**Polyuretane vehicle and polyuretane foam**
**double-layer dressing for mild wet, non-infected wounds**

# MOIST WOUND DRESSING




Alginate bandage




Calcium - alginate bandage

# MOIST WOUND DRESSING

## Hydroalginate dressing with Silver

**Broad spectrum - effective against wide range of microorganisms including:**




- **Pseudomonas aeruginosa**
- **Escherichia coli**
- **Streptococcus pyogenes**
- **Staphylococcus aureus**
- **Staphylococcus epidermidis**
- **Klebsiella pneumoniae**
- **Candida albicans**

# BASIC PRINCIPLES
# OF
# SMALL BOWEL SURGERY.
## TECHNIQUE OF ONE LAYER END-TO-END INTESTINAL ANASTOMOSIS.

**8.**

# BOWEL SURGERY

## Why is it important to know about it?

- **65-70% of the abdominal operations are on the GI tract**
- **to inform the patient**
- **to inform the doctor**
- **for the rehabilitation**
- **situation of catastrophes and disasters - to assist**
- **for medical intelligence**

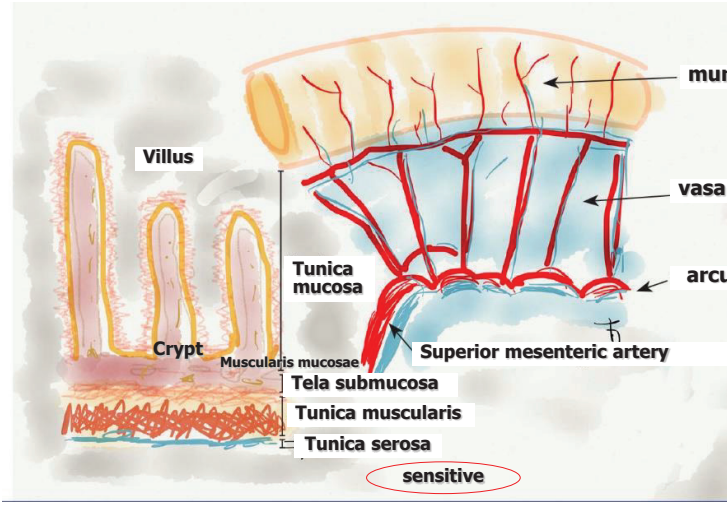
# SMALL BOWEL SURGERY
# „decathlon”

1. **atraumatic work (anteposition)**
2. **wet**
3. **clear**

   } **adhesion**

4. **opening of the bowel (gas)**
5. **anatomy**
6. **suturing techniques**
   **types of sutures (Lembert, Albert, Schmieden,...)**
   **serosa to serosa, inverting sutures**
   **surgical suture materials, needles, surgical staplers**
7. **types of anastomosis**
8. **waterproof anastomosis (leakage)**
9. **count (dressings, instruments)**
10. **sure**

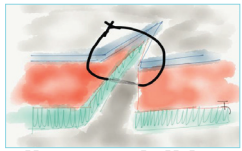
# ANATOMY OF THE SMALL BOWEL
## blood supply

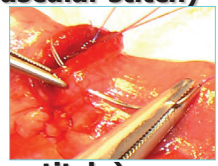




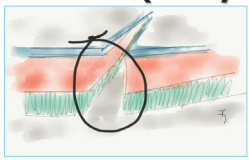

# SUTURING TECHNIQUES
## *Types of sutures*

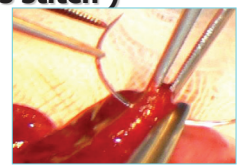
**Lembert - (seromuscular stitch)**





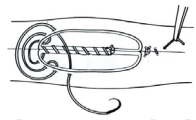
**Albert - (all layers stitch )**



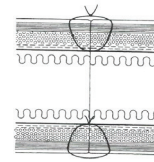


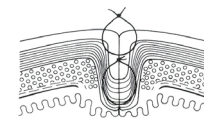


Antoine Lembert
1802-1851

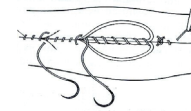


**two layers technique**



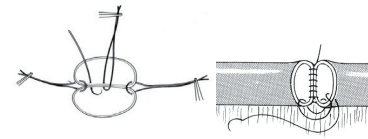


**interrupted or**



**continuous suture line**

**serosa to serosa inverting sutures**



**one layer technique**

# SUTURING TECHNIQUES

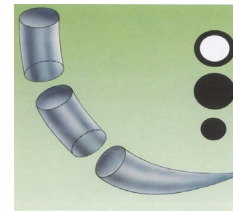
## *Suture materials*

absorbable
or
nonabsorbable

monofilament
or
pseudomonofilament

size
3/0, 4/0

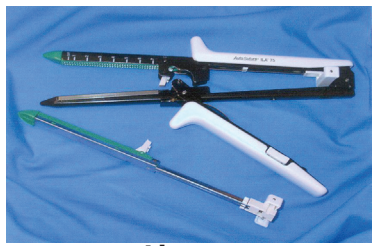
## *Needles*



round bodied
1/2 circle
atraumatic

**Depth and distance of sutures: 3 - 5mm**

# STAPLERS



**Linear**
**side-to-side anastomosis**

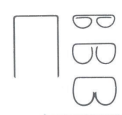


**Petz, Aladár**
**1888-1956**



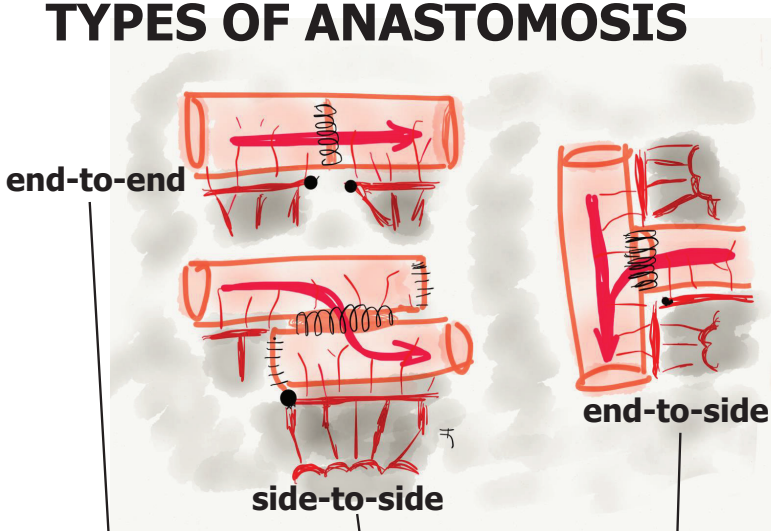
**Circular**
**end-to-side anastomosis**

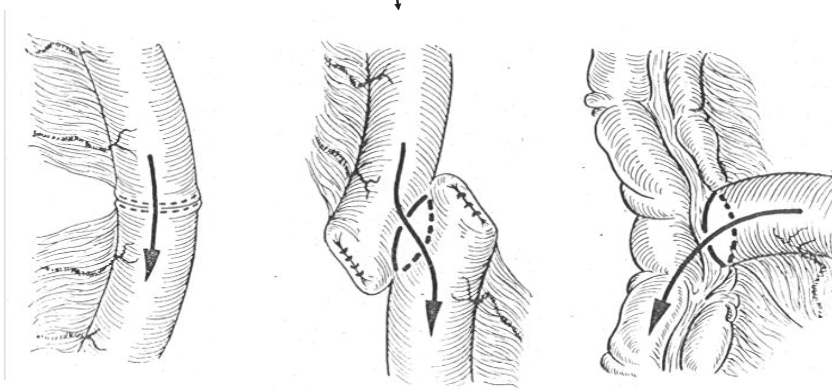
**absorbable clips**
**nonabsorbable clips**



**paperclip-theory**

# TYPES OF ANASTOMOSIS



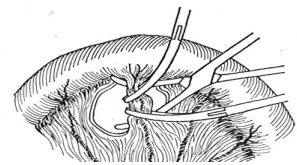


circular stapler

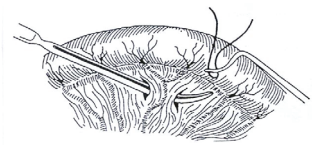


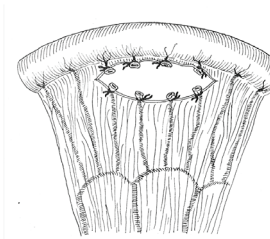
linear stapler

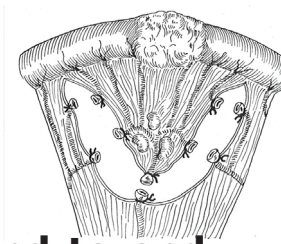
# TECHNIQUE OF ONE LAYER END-TO-END INTESTINAL ANASTOMOSIS I.









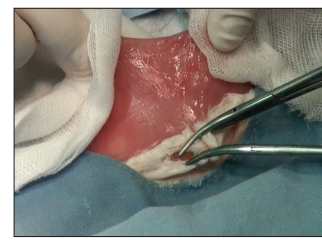


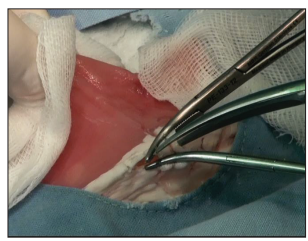
**sceletization**

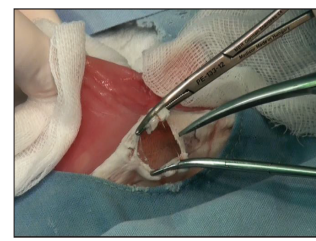
## Technique of one layer end-to-end intestinal anastomosis I. - on biomodell

**sceletization**

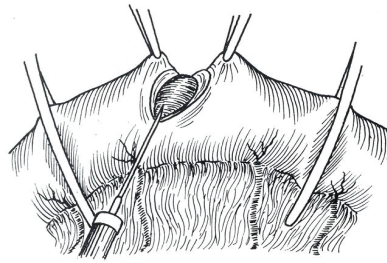








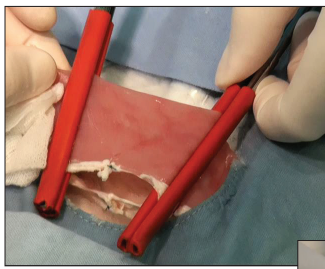
# TECHNIQUE OF ONE LAYER END-TO-END INTESTINAL ANASTOMOSIS II.a.

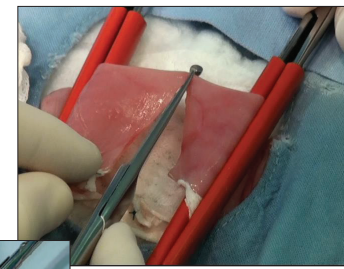


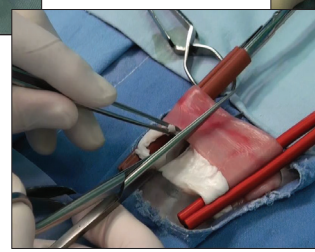
**opening of small intestine**

## Technique of one layer end-to-end intestinal anastomosis II.a. - on biomodell

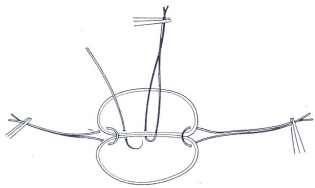
**opening the small intestine**



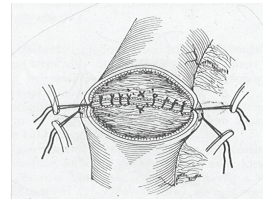




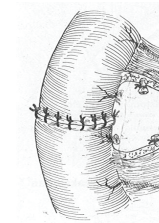
# TECHNIQUE OF ONE LAYER END-TO-END INTESTINAL ANASTOMOSIS II.b.



two stay stitches



posterior wall

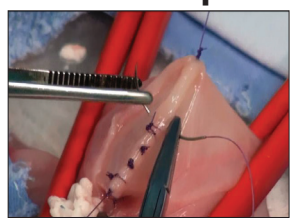


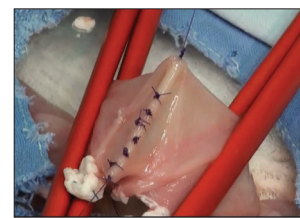
anterior wall

## steps of the anastomosis

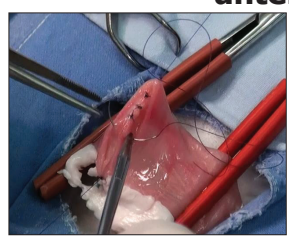
## Technique of one layer end-to-end intestinal anastomosis II.b. - on biomodell

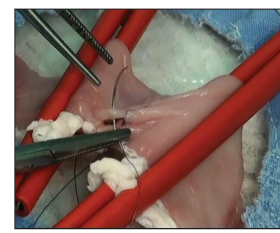
posterior wall



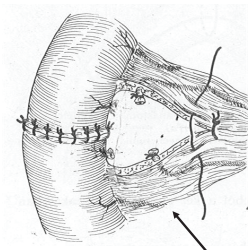


anterior wall

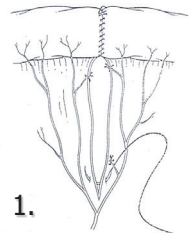




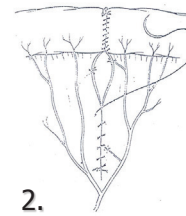
# TECHNIQUE OF ONE LAYER END-TO-END INTESTINAL ANASTOMOSIS III.

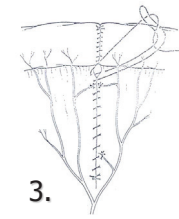


interrupted stitches




continuous stitches

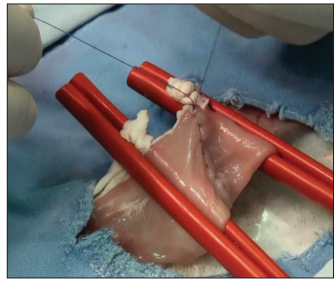


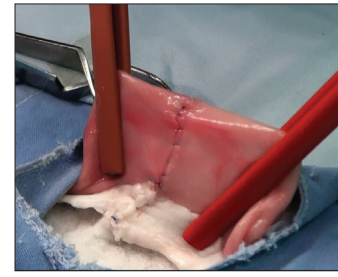




closure of mesentery

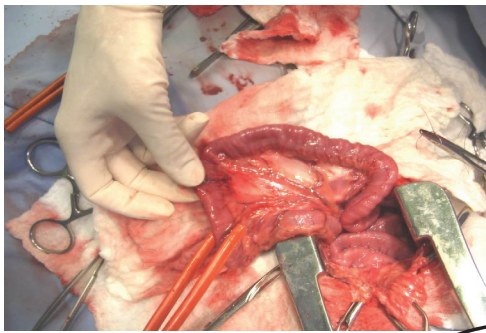
## Technique of one layer end-to-end intestinal anastomosis III. - on biomodell

### closure of mesentery





# One layer end-to-end small bowel anastomosis





before operation

COUNT

SURE

!

control

CONTROL

„FOREIGN BODIES”



after operation

# ADHESION FORMATION

ATRAUMATIC WORK

CLEAR WORK

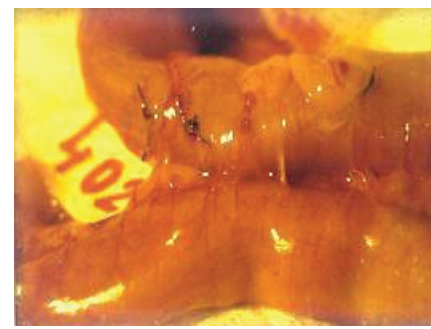
WET SURFACE

BODY TEMPERATURE

SEROSA PROBLEM

ASSISTANT’S WORK

„FOREIGN BODIES”



# CATHETERS AND DRAINS.

# 9.

# CATHETERS

## *DEFINITION*

**Catheter is a tube that can be inserted into a body cavity, duct or vessel. Catheters thereby allow drainage or injection of fluids or access by surgical instruments. The process of inserting a catheter is catheterization.**

## *DIAMETER OF THE CATHETERS*

**The external diamater of catheters is given in French (F) or Charrière (Char/Ch),**

**0.33 mm = 1 French (F)**
**= 1 Charrière (Char, Ch)**

# PROPERTY OF THE CATHETERS

- **shape**
- **thickness**
- **material**
- **number of the lumens**
- **holding in position**

**Catheter: longer, flexible**

**Cannula: shorter, rigid**

# THE MOST FREQUENT PLACES FOR CATHETERIZATION I.

## *Vessels*

- external jugular vein
- internal jugular vein
- subclavian vein
- femoral vein

- radial artery
- femoral artery
- pulmonary artery
  (Swan-Ganz catheter)

# THE MOST FREQUENT PLACES FOR CATHETERIZATION II.

## *In childhood (newborns)*

**„spaghetti" catheter**
**catheterization of the umbilical vessels**

## *Gastrointestinal tract*

**peritoneal lavage**

## *Urogenital tract*

**catheterization of the urinary bladder**

# URINARY CATHETERS



1. 2. 3. 4. 5. 6. 7.

**1. catheter 2. Nelaton catheter 3. Foley with ballon 4. Thiemann with ballon 5. irrigating catheter 6. Tiemann with ballon and irrigating function 7. Pezzer catheter**

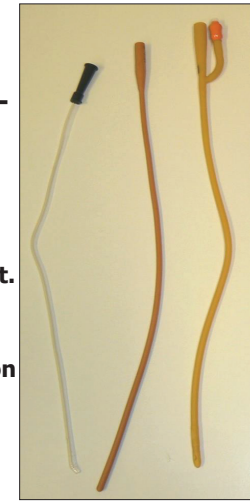
# DEVICES FOR URINARY CATHETERIZATION

- **sterile gloves**
- **sterile drapes (e.g.”incised” drap)**
- **sterile forceps**
- **a catheter of appropriate size (14–24 F)**
- **cotton swab with which to clean the genital area**
- **disinfectant**
- **a sterile lubricating material or gel**
- **a syringe filled with sterile fluid e.g. distilled water (if a Foley catheter is used)**
- **an urine collection bag**

# DIFFERENT TYPES OF URINARY CATHETERS

## Soft catheters

**rubber, latex** (for short-therm usage: max. 4 weeks), **silicone** (for long-therm usage: max. 12 weeks), **silicone-coated latex, hydrogel-coated latex...**



1. 2. 3.

## 1. Conventional catheter

## 2. The Nélaton catheter

**(after Auguste Nélaton (1807–1873)- a French urologist. A straight tube with a blunt end and an oval window.**

## 3. The Foley catheter

**(designed by Frederick E.B. Foley (1891–1966), a Boston medical student. It is a frequently used soft catheter. A balloon is situated at its end in order to fixate the catheter in the bladder. The balloon must be filled with sterile fluid to avoid infection in the event of balloon injury.**

# DIFFERENT TYPES OF URINARY CATHETERS

## 4. The Thiemann catheter

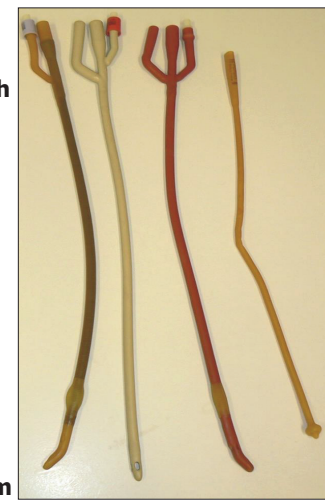
**(a sub-type of the Foley catheter, "coudé", French for elbowed) has a tip 1–1.5 cm long; it is curved at 45°. During insertion, the tip should be set toward the patient's face. A small fin on the external end of the catheter can help to indicate the right direction for the tip.**

## 5. Irrigating catheter

## 6. Tiemann-with balloon and irrigating function

## 5. The Pezzer catheter

**It is made of latex. The end is round and flat (it looks like a mushroom) with a few windows. This device was earlier placed into the urethra after urological operations. At present it is seldom applied.**



4. 5. 6. 7.

# LUBRICATING MATERIALS AND GELS FOR URINARY CATHETERIZATION



**Mucilago ad catheterem Formulae Normales VII. (hungarian official perscription collection)**

**Lubricating**
**+ local anesthetic effect**



**Instillagel ®**




**Aqua Touch Jelly®**

**Lubricating and local anesthetic effect + antibacterial effect**

**after five minutes**

## AQUA TOUCH Jelly
## LUBRICATING MATERIAL / GEL

- **Water soluiable sterile lubricating gel**
- **Anesthetic effectiveness**
- **Antibacterial**
- **Soft instillation prevents patient irritation**
- **Prevents pain**



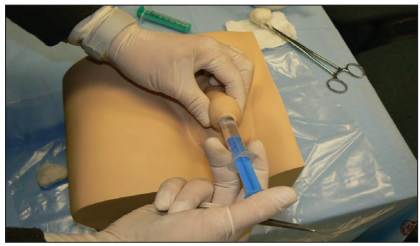

**Aqua TOUCH jelly is a sterile aqueous product that contains a local anesthetic and antiseptic agent which is used when putting a tube or instrument into a body cavity.**

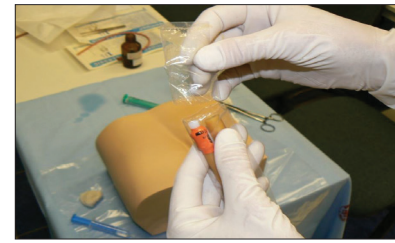
**It contains a local anesthetic to prevent pain and antiseptics to reduce the risk of infection getting in, while lubricating to make the process smooth.**

**http://www.istemmedikal.com**

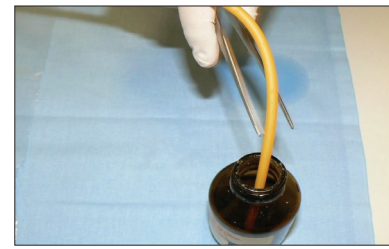
# CATHETERISATION OF URINARY BLADDER

# CATHETERIZATION OF URINARY BLADDER ON A PHANTOM MODEL I.



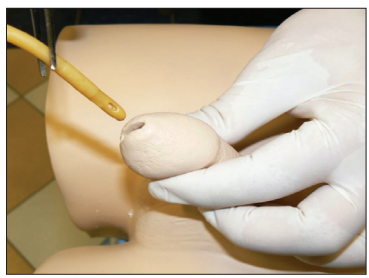


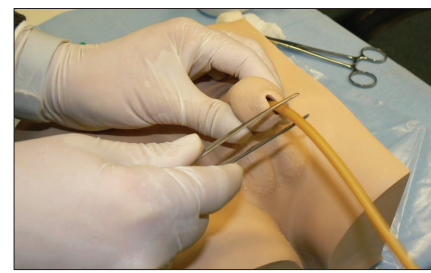




**Foley catheter**





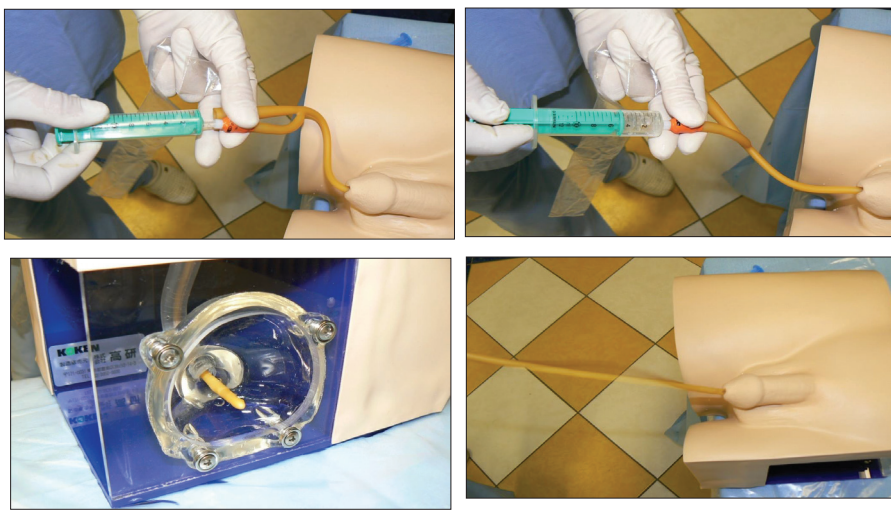


**Insertion of Foley catheter**

# CATHETERIZATION OF URINARY BLADDER ON A PHANTOM MODEL II.



**Foley catheter fixation by the balloon**



**Removing the Foley catheter**

# DRAINS

**Surgical drains are inserted to empty existing fluids and those that might collect later.**

## *Through the drain we can collect*

- **blood**
- **pus**
- **body secretions**
- **air**
- **introduced fluids**

## *Types*

- **gauze packs**
- **gauze wick**
- **tube drain**

# PRINCIPLES OF DRAINAGE

**When we use the drainage in a correct way, we minimize the postoperative complications and help the healing process of the patients.**

**But if we use the drainage in a bad way we probably cause septic complications to the patients.**

# POSITIONS OF THE DRAINS

- subcutaneous
- subfascial and intramuscular
- extraperitoneal
- intraperitoneal
- pleural cavity
- in abcess, cysts and fistulas

# THE ADVANTAGES AND DISADVANTAGES OF THE DRAINAGE

### *Advantages*

- reduces the number of the postoperative complications
- reduces the infection of the wound
- remove the pus, blood or other fluids from a wound
- help the process of the wound healing

### *Disadvantages*

- cause tissue irritation or necrosis
- blood clots may obstruct the drain
- infection
- perforation, bleeding
- foreign body feeling

# SURGERY
# OF PARENCHYMAL ORGANS.
# ORGAN SAVING METHODS.

## 10.

# INCIDENCE OF PARENCHYMAL ORGANS' TRAUMA

| *Blunt trauma* | | *Open trauma* | |
|---|---|---|---|
| liver | 15% | liver | 16% |
| spleen | 25% | spleen | 7% |
| kidney | 12% | kidney | 6% |
| pancreas | 3% | pancreas | 3% |
| retroperitoneal bleeding | 13% | retroperitoneal bleeding | 3% |

**lungs** **15% - thoracic surgery**

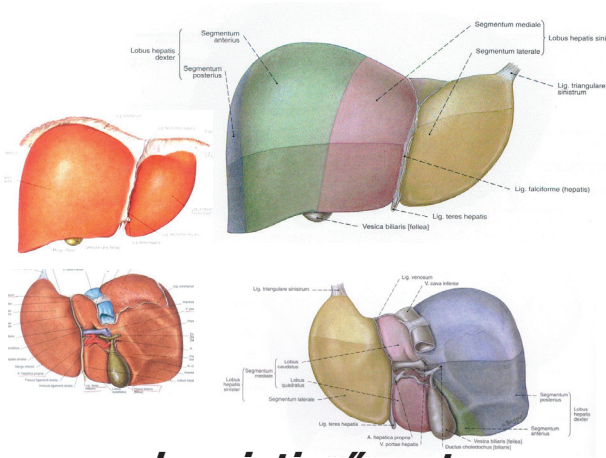
# PARENCHYMAL ORGANS' SURGERY „decathlon"

**(LIVER, PANCREAS, SPLEEN, KIDNEY)**

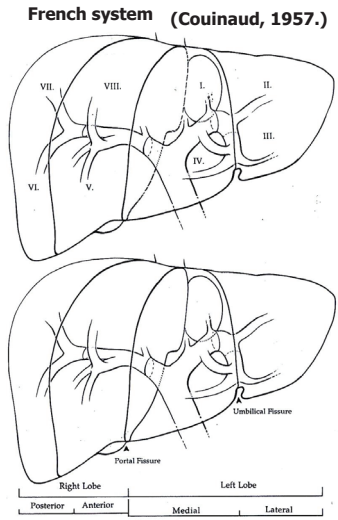
1. products of parenchymal organs
2. capsule
3. anatomy - segments (border) and blood supply
4. atraumatic work
5. moving and holding relation of the traction and BP
6. suture types, suture materials, needles
7. surgical techniques
8. bioplasts
9. surgical tissue adhesives
10. transplantation of parenchymal organs

# ANATOMY OF THE LIVER

## *„segments", blood supply*

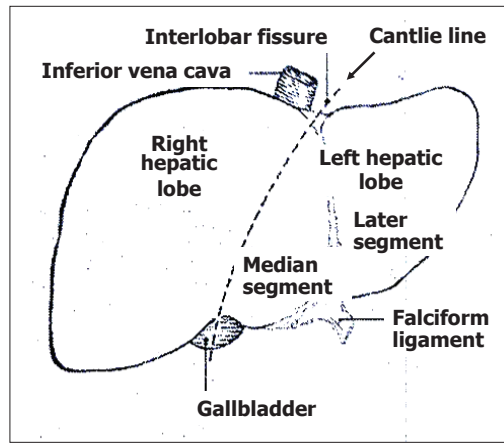



## *„descriptive" anatomy*

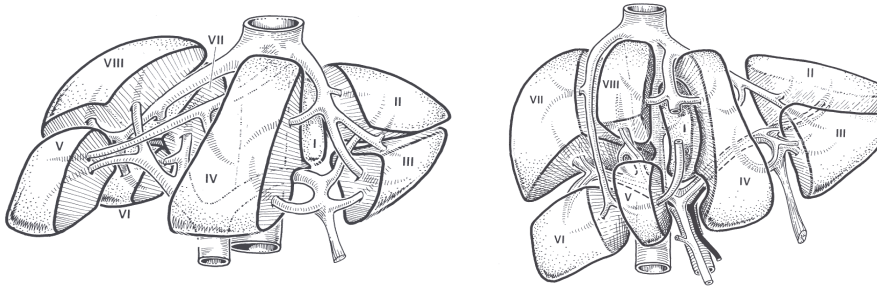



## *„surgical" anatomy*

# ANATOMY OF THE LIVER
## *„segments", blood supply*




## *„surgical" anatomy*




**The surgical anatomy of the liver-segments in vivo and ex vivo (autopsy table) position**

**Jakab F.: A máj sebészete. In: Kiss J.: Gastroenterológiai sebészet, pp. 642. Medicina, Budapest, 2002**

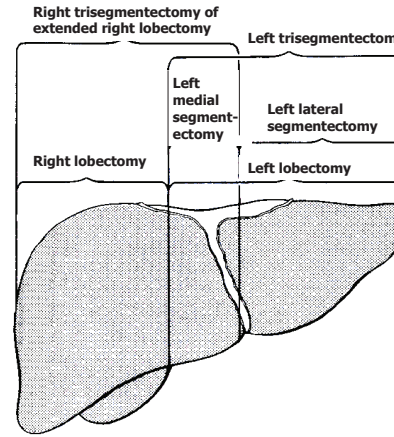
# TERMINOLOGY OF VARIOUS SEGMENT RESECTIONS OF THE LIVER

**Segmentectomy**

**Bisegmentectomy**

**Trisegmentectomy**

**Lobectomy - hemihepatectomy**
**(right lobectomy**
**left lobectomy)**




**Mesohepatectomy**
**(IV.a. IV.b. V. VIII. segments)**

**residual liver capacity: 20%**
**CT volumetry**

**Open surgery**
**Laparoscopic surgery (lately)**

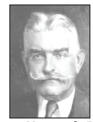
**trauma, tumor surgery (primary, metastatic)**

| Couinaud 1957 | Goldsmith and Woodburne 1957 | Starzl et al. 1982 |
|---|---|---|
| hepatectomy right side (segment V.VI.VII.VII.) | hepatic lobectomy right side | lobectomy right side |
| hepatectomy left side (segment II.III.IV.) | hepatic lobectomy left side | lobectomy left side |
| lobectomy right side (segment IV.V.VI.VII.VIII.) | extended hepatic lobectomy left side | hepatic trisegmentectomy right side |
| lobectomy left side (segment II.III.) | lateral segmentectomy left side | lateral segmentectomy left side |
| extended hepatectomy left side (segment II.III.IV.V.) | extended lobectomy left side | hepatic trisegmentectomy left side |

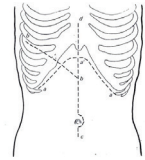
# SURGICAL TECHNIQUES IN LIVER SURGERY



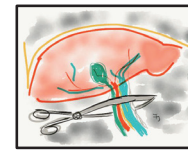
Baron, Jónás
1845 - 1911



James Hogarth Pringle
1863 - 1941

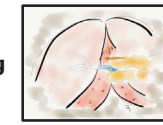


laparotomy
thoracolaparotomy



Pringle's manoeuvre
Baron's manoeuvre



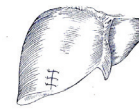


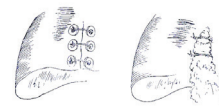
„finger fracture"

- Baron's manoeuvre
- Pringle's manoeuvre
- new suturing techniques
- new suture materials
- „finger fracture technique"
- ultra sound (Ultracision, CUSA, Harmonic ACE+7, Thunderbeat US+bipol.)
- argon plasma coagulator
- hydrodissection (Water-Jet)
- laser
- staplers
- cryosurgery
- radio frequency intervention
- bioplasts
- surgical tissue adhesives
- surgical meshes

- liver transplantation

ishemic preconditioning
manoeuvres





new suturing techniques

***Argon-plasma***



***CUSA***



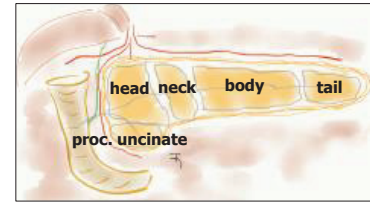

Cavitron Ultrasonic Surgical Aspirator

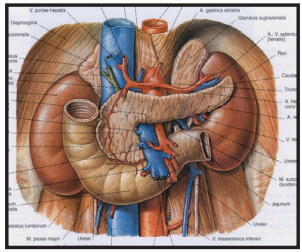
***Ultracision***

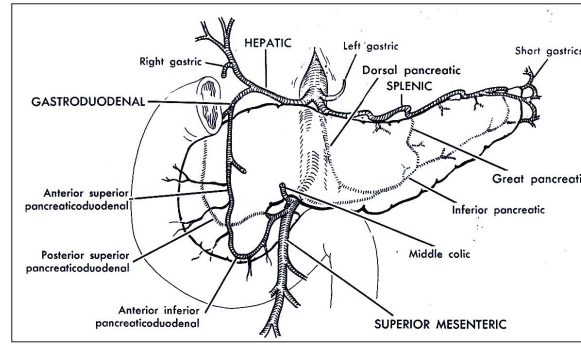


# ANATOMY OF THE PANCREAS

***„segments", blood supply***






# OPERATIVE TERMINOLOGY

- **pancreas decompression operations**

- **pancreas resections:**

  **pancreatoduodenectomy - Whipple**
  **(pancreas head+duodenum removal)**

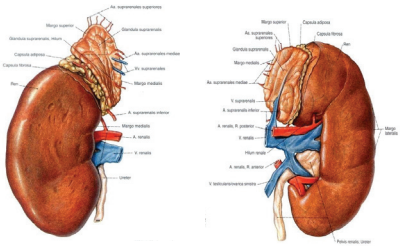
  **total pancreatoduodenectomy**

  **distal (or subtotal) pancreatectomy**

  **(pancreas body, tail or subtotal resection)**

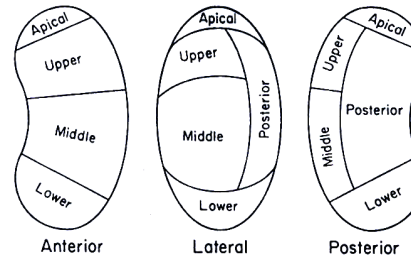
  **Open surgery**
  **Laparoscopic surgery (lately)**

# ANATOMY OF THE KIDNEYS
## *„segments", blood supply*



**right kidney** **left kidney**

**segmental arterial blood supply**
**venous blood supply network**




**Fascial relations:**
**proper capsule**
**fatty capsule**
**renal fascia**

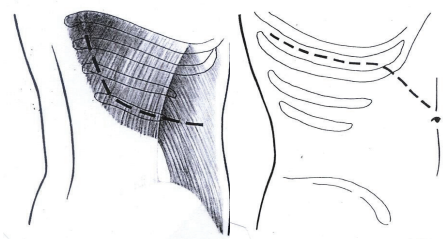
**apical**
**upper**
**middle**
**posterior**
**lower**
} **segment**

# OPERATIVE TERMINOLOGY

**nephropexy**
**nephrectomy**
**nephrotomy**
**longitudinal nephrotomy**
**nephrostomy**

**pole resection:**
**wedge resection**
**linear resection**

**heminephrectomy**

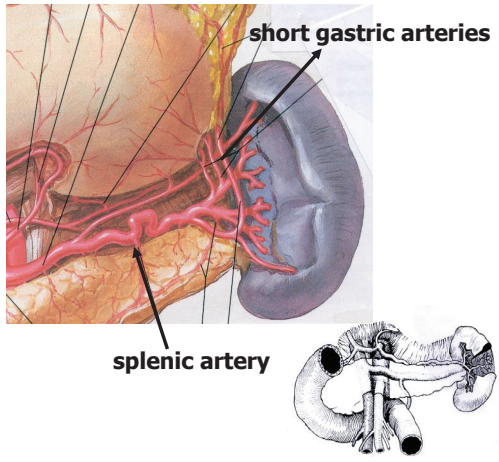


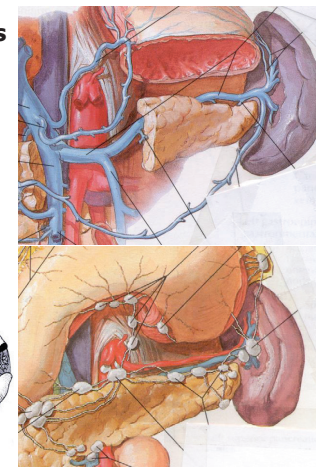
**possible entrance sites for open surgery**

**BUT**

**laparoscopic surgery (lately)**

# ANATOMY OF THE SPLEEN
## *„segments", blood supply*



**Spleen rupture in two phases or delayed splenic rupture**

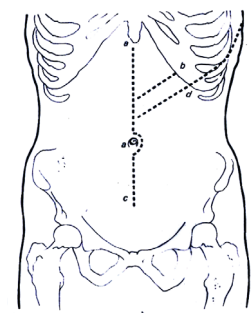
# FUNCTION OF THE SPLEEN

**Immunological function:**
- **cellular immunity (RES)**
- **humoral immunity (opsonisation, properdin, tuftsin, IgM)**

**Filtration function**

**Storage function**

**Hematopoiesis**



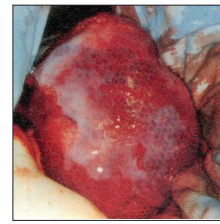
**possible entrance sites for open surgery - laparotomy,**

**BUT**

**laparoscopy (lately)**

# SURGICAL TECHNIQUES IN SPLENIC SURGERY

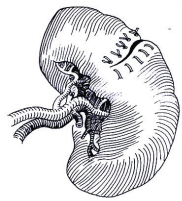
**coagulation (infrared, laser, US)**
**new suturing techniques**
**new suture materials**
**bioplasts**
**surgical tissue adhesives**
**surgical mesh**



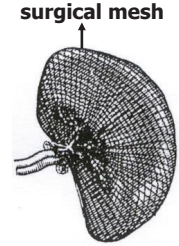


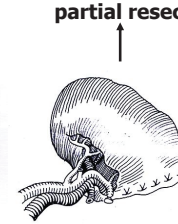
***partial resection of the spleen***

***autotransplantation of the spleen***

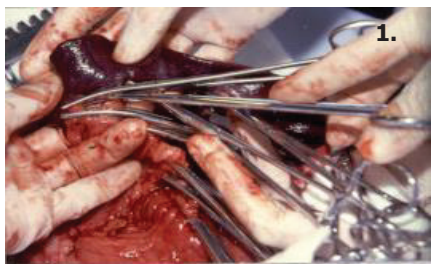






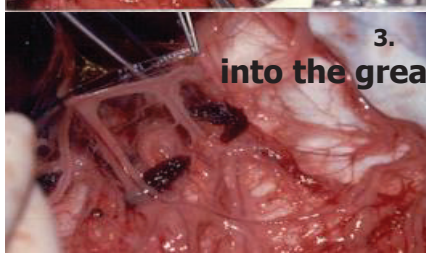



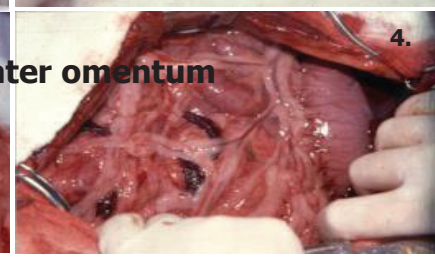

# SPLEEN AUTOTRANSPLANTATION
## without vessel anastomosis










**Furka's spleen „chip" technique**

# SUTURE TYPES, SUTURE MATERIALS, NEEDLES

## *Interrupted sutures*

**simple**

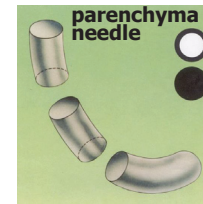
**special**

**„mattress" sutures:**

**vertical**

**horizontal**

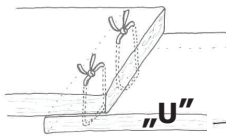


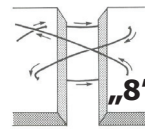


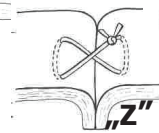


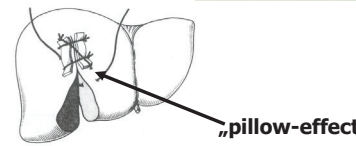


## parenchyma sutures (U, X, Z, 8)




# TRANSPLANTATION OF PARENCHYMAL ORGANS with vessel anastomosis



Emerich Ullmann (1861 – 1937)

### KIDNEY

**1902** Wien, Emerich Ullmann (dog) - anastomoses with silver ring
**1954** USA, John Merril, Joseph Murray (identical twins) - Nobel-prize 1990
**1962** Szeged, András Németh (living donor - brother)
**1973** Miskolc, József Pintér (living donor - relative)
**1991** Debrecen, László Asztalos



John P. Merrill



Joseph Murray



András Németh

### LIVER

**1963** USA, Thomas Starzl
**1967** USA Thomas Starzl (first successful - cadaver)
**1967** Europe, Sir Roy Calne (cadaver)
**1984** Budapest, Andor Szécsény - I[st] Department of Surgery, Semmelweis University (cadaver)
**1995** Budapest, Ferenc Perner - Department of Transplantation, Semmelweis University
„split-liver" transplantation - lob
„segment" transplantation - newborn babies
living donor transplantation - partial liver graft



Thomas Starzl



Sir Roy Yorke Calne

### PANCREAS

**1966** USA, Kelly co-workers.
**1998** Pécs, Károly Kalmár-Nagy (uremic and diabetic patients)
**2004** Budapest

**IMMUNSUPRESSION!!!**

# BIOPLASTS AND TISSUE ADHESIVES.

11.

# SURGICAL BIOMATERIALS

**Absorbable or non-absorbable materials that contribute wound healing and improve function failure.**

**Implanting into the organism they create favourable situation without tissue damage.**

**They are not medicines.**

**suture materials**

**clips**

**bioplasts**

**tissue adhesives**

**surgical meshes**

# BIOPLASTS

## Bioplasts are preparations made of natural materials arteficially.

## Implanted in the body they absorb completely causing minimal or no damage to tissues.

**Saving of functioning parenchyma**

**ORGAN-SPARING SURGERY**

# BIOPLASTS

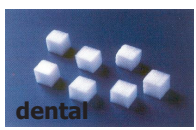
| Basic material | Name | Form |
|---|---|---|
| fibrin | SEVAC | spongious |
| gelatine | GELASPON | spongious |
| | GELITA-TAMPON | spongious |
| | SPONGOSTAN | „standard"film, spongious |
| | GELFOAM | spongious |
| oxidized cellulose | SURGICEL | mesh, spongious |
| | NU-KNIT | rolled,flap microfiber |
| collagen | COLLAGEN IMPLANT | spongious |
| | LYOSTYPT | spongious |
| | GARAMYCIN | spongious |
| | AVITENE | microfiber |
| | ACTIFOAM, HELISTAT, INSTAT, HEMOSTAGEN | spongious |
| collagen + fibrin | TACHOCOMB | spongious |
| | TACHOSIL | spongious |

## Application forms of bioplast

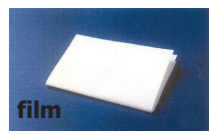









(gelatine)







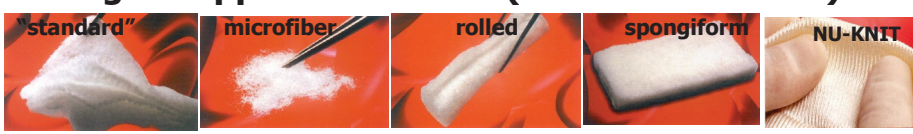
Tachosil
Tachocomb
application forms
(collagen+fibrin)



TachoSil




## Surgicel application forms (oxidized cellulose)



# ADVANTAGES OF BIOPLASTS

**good haemostatic effect**
**absorbable**
**minimal tissue reaction**
**no antigen effect**
**no toxic effect**
**easy to form or cut**
**easy to handle**
**good conditions for wound healing**

**Saving of functioning parenchyma**

**ORGAN-SPARING SURGERY**

# GENERAL APPLICATION OF BIOPLASTS IN SURGICAL INTERVENTIONS

***Surgery of parenchymal organs***
**management of venous and/or capillary oozing bleeding**
**securing of sutures**
**covering of resection surface**
***Secure of anastomoses***
**vascular surgery**
**gastrointestinal (GI) surgery**

***Neurosurgery***

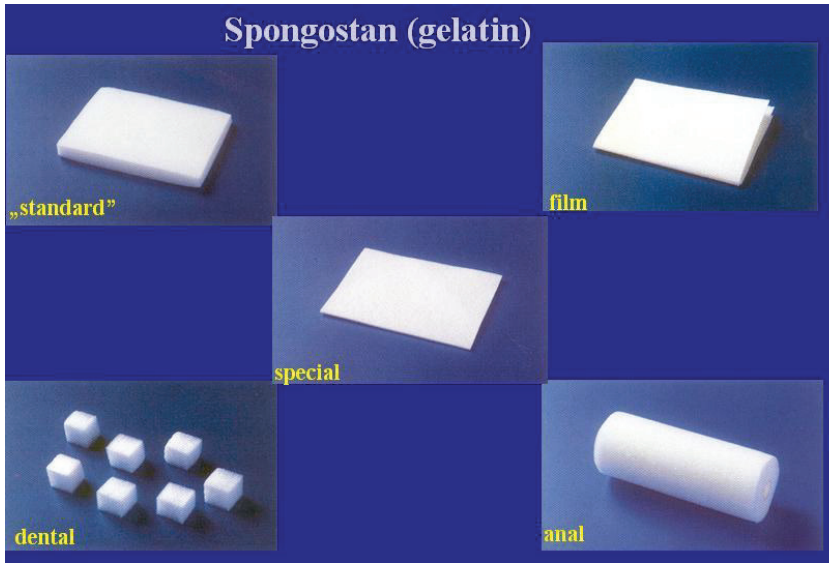
**intracranial aneurysma operation**

***Dental interventions, Oral surgery***

***Local hemostasis***

**AIM: SAFETY OF THE SURGICAL INTERVENTION!!!**

# GELATIN BIOPLAST




# SPECIAL APPLICATIONS OF GELATIN BIOPLASTS

**preoperative percutaneous transcatheter arterial embolization**

**(before removing kidney or liver tumors in case of intracranial meningeoma)**

**Research work: for adhesiveness of tumor cell lines**

## *Complications*

**Gelfilm may provoke fibrosis in middle ear**

## *Contraindications*

**in case of local infection**

# SURGICEL - OXIDIZED CELLULOSE BIOPLAST




# DIFFERENTIAL DIAGNOSTIC PROBLEMS FOLLOWING APPLICATION OF SURGICEL

***Formation of „Surgiceloma"***

**shape of pseudotumor during radiological examinations:**

**„tumor-mimicri"**

**shape of hepatoblastoma**

***Pressing symptoms following neurosurgical operations***

**after spinal fusion operation**

**after removing intracranial meningeomas**

**ROLE OF DOCUMENTATION → OPERATION REPORT!**

# SPECIAL APPLICATIONS OF COLLAGEN BIOPLASTS

## *Covering of resection surfaces*

**parenchymal organs**
**(for formation of „capsule-like" structure)**

## *Application as a „sandwich" function*

**combined with synthetic meshes**
**for replacement of defects in abdominal wall**

## *Organ specific indication*

**rupture of transplanted kidney,**
**solely or combined**
**with fibrin tissue adhesive or Vicryl mesh**

# POSSIBLE COMPLICATION AFTER USING OF COLLAGEN BIOPLASTS

## *Contraindications*

**infected wounds**
**Bone surgery: decreases adhesion time of metyl-metacrylate**

## *Possible complications*

***„tumor mimicri"***
**formation of foreign body type granuloma**
**shape of recidive tumor after removing retinoblastoma**

**ROLE OF DOCUMENTATION → OPERATION REPORT!**

# SURGICAL TISSUE ADHESIVES

**Materials that make**
**„immediate" and permanent connection**
**between the wound edges**

**time of polymerisation!**
**paradox rule!**

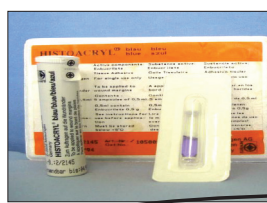
**gelatine-resorcine-formaldehyde (GRF)**
**cyanoacrylate (Histoacryl Blue)**
**fibrin (Tissucol, Beriplast)**

**Saving of functioning parenchyma**

**ORGANSPARING SURGERY**

# ADVANTAGES OF SURGICAL TISSUE ADHESIVES

**secure joint of wound edges application,**
**good conditions for wound healing,**
**good hemostatic effect,**
**absorbable,**
**minimal tissue reaction,**
**minimal functional parenchymal loss.**





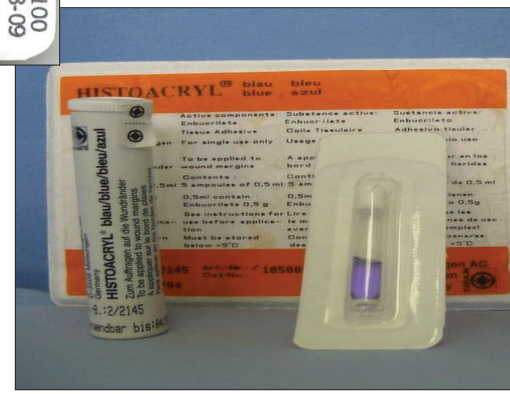



**ORGAN-SPARING SURGERY**

**AIM: SAFETY OF THE SURGICAL INTERVENTION!!!**

# CYANOACRYLATE
## Surgical Tissue Adhesives




**time of polymerisation!**
**1-2 mins**





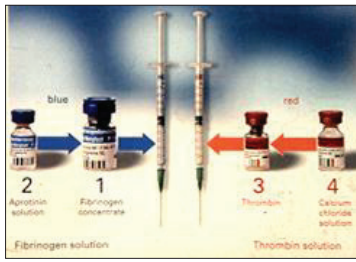





**time of polymerisation!**
**1-2 mins**

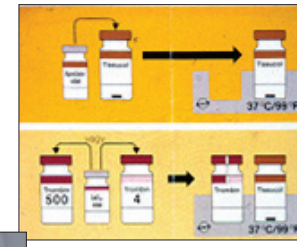
**storage in refrigerator**

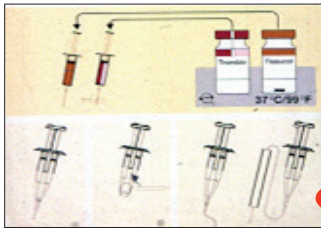
# COMPONENTS OF FIBRIN SURGICAL TISSUE ADHESIVES



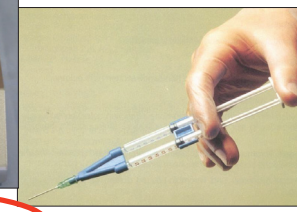

**Tissucol**

**37⁰C**





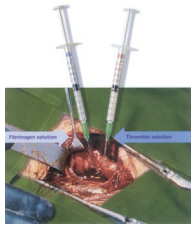


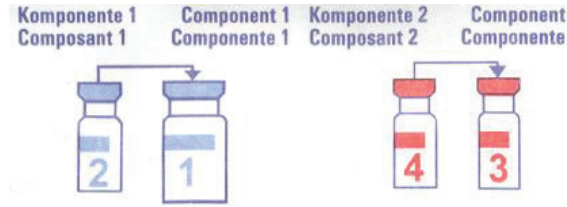



**body temperature**

**time of polymerisation!**
**5-6 mins**

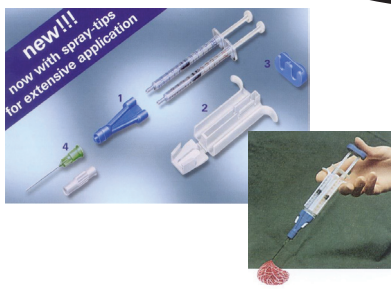
**Beriplast**

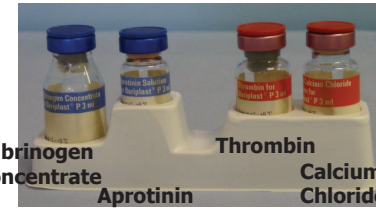





**Room temperature**

**time of polymerisation!**
**5-6 mins**



**Fibrinogen Concentrate**

**Aprotinin Solution**

**Thrombin**

**Calcium Chloride Solution**

# SPECIAL COMBINED BIOPLAST

## *Composition of TachoSil and TachoComb*




**TachoComb**

**bovine collagen**
**human fibrinogen**
**bovine thrombin**
**bovine aprotinin**
**riboflavine**



**TachoSil**

**horse collagen**
**human fibrinogen**
**human thrombin**
**riboflavine**
**sodium chlorid**
**trisodium-citrate**
**L-arginin-hydrochlorid**

# APPLICATION POSSIBILITIES OF TACHOCOMB/TACHOSIL

***local hemostasis***
**in all the organs**
**following lymphadenectomy**
**after laparoscopic operations**

***securing anastomoses***
**vascular surgery, surgery of GI tract**

***securing sutures***
**in parenchymal organs**
**for closing bronchial trunk**

***closing of resection surfaces***
**in parenchymal organs**

***closing of fistulas – leakage probleme***
**pancreas juice** (necrosis), **bile** (peritonitis)

# CONICOTOMY, TRACHEOSTOMY.

# 12.

**Life-saving method!!!!!**

**CONICOTOMY**
**(cricothyroidotomy)**

**emergency operation**

**TRACHEOSTOMY**

**elective operation**

**Cause:** **upper airway obstruction**

**trauma, foreign body, malignant tumor, allergic reactions (drugs, bee sting)**

**Symptoms:** **dyspnoe**
**inspiratory stridor**
**cyanosis**
**unconsciousness**

**Brain damage occurs in 4 minutes!**

# PRIORITIES

1. mechanical cleaning
2. pharyngeal airway (pipe)
3. endotracheal tube
4. needle cricothyroidotomy
5. conicotomy or tracheostomy

1.



2.



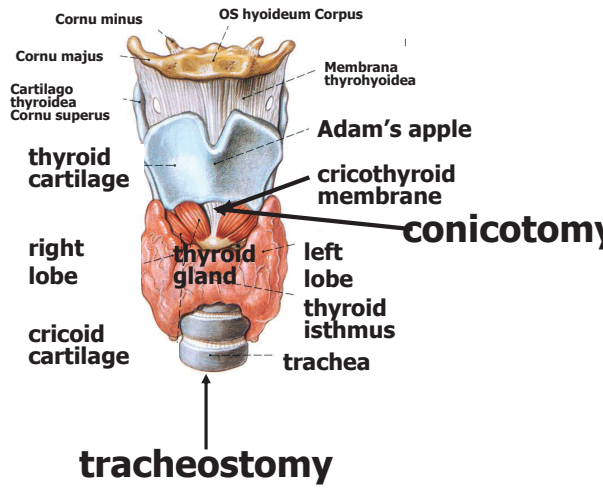
3.





4.

# ANATOMY



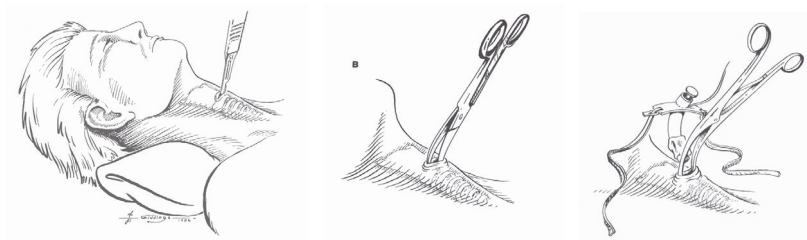

(R. Putz, R. Pabst: Sobotta J.: Az ember anatómiájának atlasza (Atlas of Human Anatomy I.-II.)
Translation: Hadházy Cs., Lévai G., Módis L., Semmelweis Kiadó, Budapest, 1994. ISBN 963 8154 276)



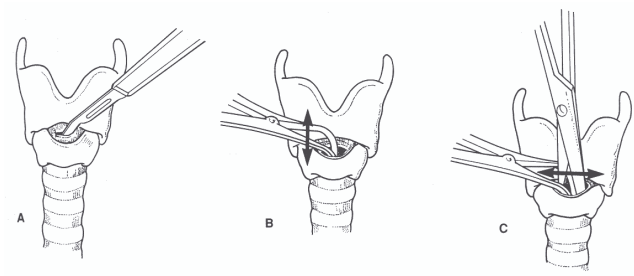
emergency operation!

# CONICOTOMY
## (cricothyroidotomy)

- **patient's position (pillow!)**
- **orientation**
- **skin incision**
- **cut the cricothyroid membrane**
- **keep the hole open**




C.W.Van Way, C.A. Buerk: Pocket manual of basic surgical skills, pp. 194-195. 1986



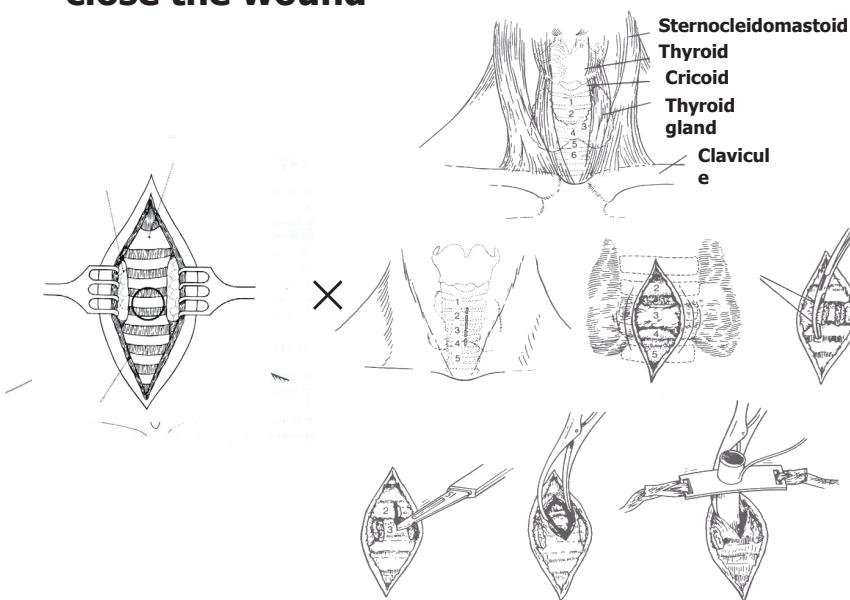

L.W. Way: CURRENT Surgical Diagnosis & Treatment, pp. 219. 1994



# TRACHEOSTOMY

**elective operation**

- **patient' position (pillow!)**
- **orientation**
- **skin disinfection and isolation**
- **skin incision**
- **divide the muscles at the median line (sternohyoid and sternothyroid muscles)**
- **cut the pretracheal fascia**
- **cut between 2-3 or 3-4 „C" cartilages**
- **cut 3rd or 4th „C" ring at the median line (T shape incision or „window" on the trachea)**
- **insert the tube (Luer)**
- **close the wound**




**(C.W.Van Way, C.A. Buerk: Pocket manual of basic surgical skills, pp. 194-195, 1986)**

# COMPLICATION'S POSSIBILITIES

## *Intraoperative*

**injury of nerves**
- **vagus nerve**
- **recurrent laryngeal nerve**

**injury of vessels**
- **common carotid artery**
- **jugular vein**
- **a. thyroidea inferior**
- **plexus thyroideus**

**injury of oesophagus**

**"fosse à route"**

## *Postoperative*

### *early*

**haematoma**
**bleeding**
**subcutaneous emphysema**

### *late*

**laryngitis sicca**
**stenosis**
**stricture**
**arrosive bleeding**
**chondromalacia**

# POSTOPERATIVE TREATMENT

## *Care of the patient*

- **humidity and warm air**
- **suck the secretion through the tube**
- **keep the wound sterile**

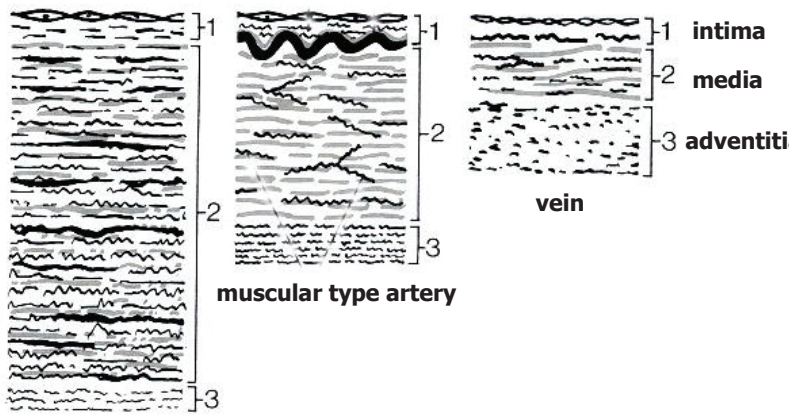
# BASIC PRINCIPLES
# OF
# VASCULAR SURGERY.

## 13.

# „DECATHLON" OF VASCULAR SURGERY

1. arterial, venous and lymphatic surgery
2. anatomy (intima, media, adventitia)
3. sutures
   intima to intima (everting sutures)
   interrupted or continuous
4. suture materials (non-absorbable, monofilament)
5. needles (atraumatic, round bodied, serosa, ½ circle)
6. vascular clamps - „atraugrip"
   (temporary, atraumatic, non-crushing)
7. anastomosis types
8. operative technique (Alexis Carrel)
9. grafts, prosthesis, stent grafts
10. anticoagulant therapy (local or systematic)

# ANATOMY



# LYMPHATIC SURGERY



- lymphadenectomy
- restoration of lymph flow, treatment of lymphedemas





elephantiasis

Special microsurgical techniques:
lymph vessel transposition
lymphatic-venous anastomoses

LYMPHA
(LYmphatic Microsurgical
Preventive Healing Approach) procedure

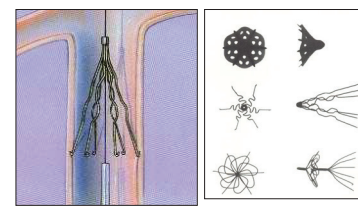


breast cancer related lymphedema following axillary dissection

# SURGERY OF THE VENOUS SYSTEM



Varices of the superficial veins



Filters in inferior caval vein preventing emboli from deep vein thromboses

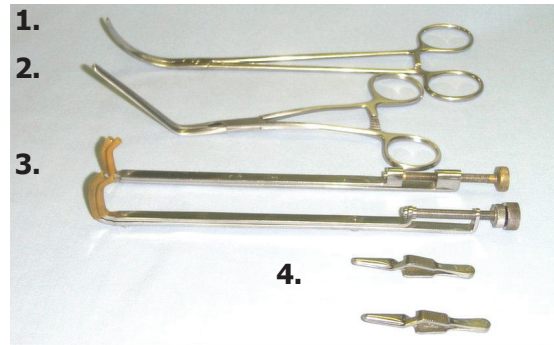
## Possible therapies

1. Conservative therapy (compressional therapy, physical excercise, medicaments)
2. Sclerotherapy
3. Surgical procedures
   crossectomy – removal of the great saphenous trunk
   stripping
   varicectomy
4. Cryo-varicectomy (-80 °C, -85 °C)
5. Endoluminal laser therapy
6. Radiofrequency therapy (80 °C, 90 °C)

} BUT!!! color-Doppler control examinations

# VASCULAR CLAMPS

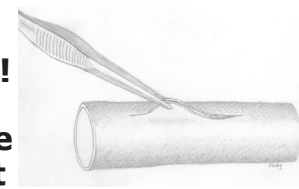
1. Satinsky
2. De Bakey
3. Blalock
4. bulldog




temporary use
„atraumatic" - „atraugrip"
non-crushing to the intima

# SUTURES, SUTURE MATERIALS, NEEDLES

intima to intima - everting sutures!!



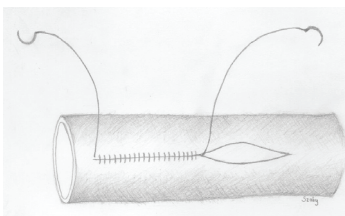
interrupted
continuous
↓
(in childhood NOT!)

nonabsorbable
monofilament
5/0 – 8/0

atraumatic
round bodied
(serosa)
½ circle

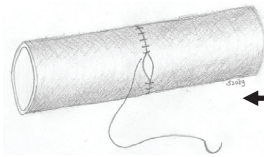



„double armamentarium"

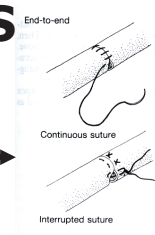


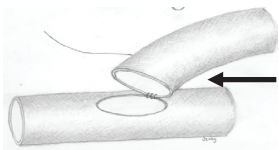


# ANASTOMOSIS TYPES



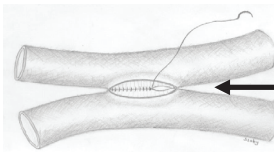
**end-to-end**



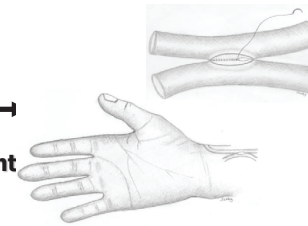
**end-to-side**

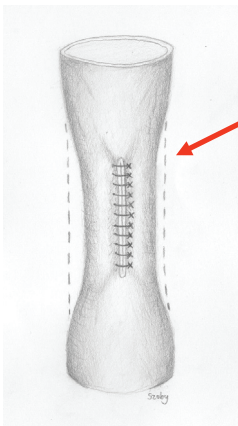




**side-to-side**

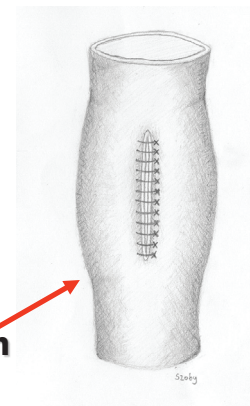
**Cimino fistule**
**arterio-venous shunt**





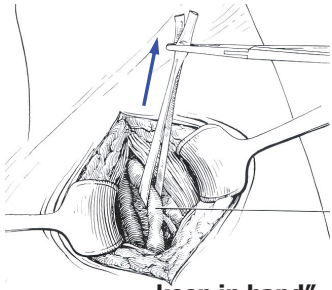
**negative disproportion**

**isodimensional**

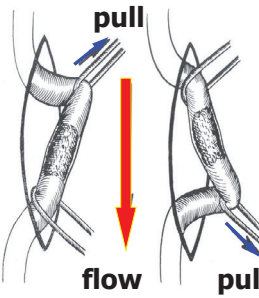


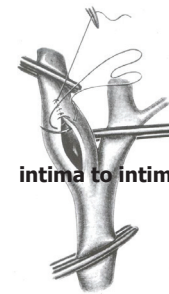
**positive disproportion**

# OPERATIVE TECHNIQUES I.

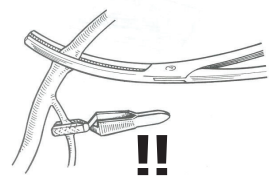


„keep in hand”



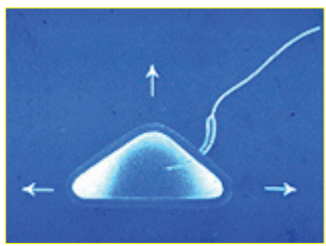



intima to intima



!!

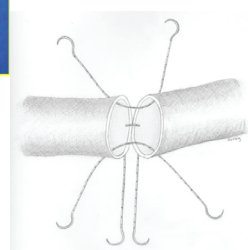
# OPERATIVE TECHNIQUES II.

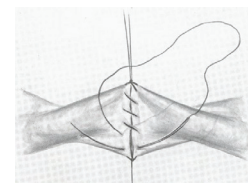


triangular technique

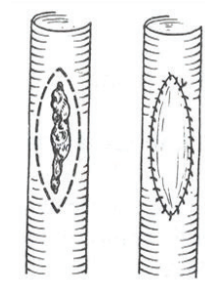


Alexis Carrel (1874-1944)
Nobel-prize in 1912

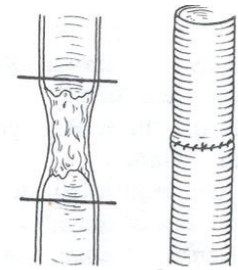




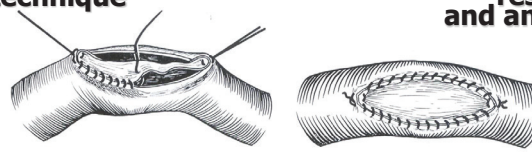
# OPERATIVE TECHNIQUES III.



patch-technique



resection
and anastomosis



patch-technique

## GRAFTS AND PROSTHESIS



vein graft
„arterilization"



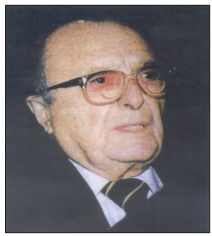
graft
or prosthesis



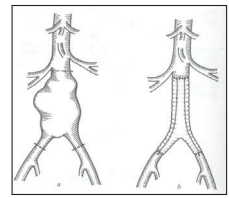
bypass

vein
artery
xenograft

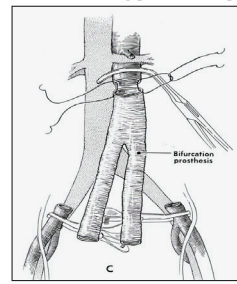
# PROSTHESES



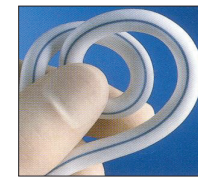
Prof. Dr. Szilágyi, Imre
(Emericus Szilágyi)
1910 -2009

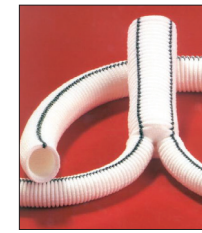


aorta aneurysm resection+prosthesis
Prof. Dr. Szilágyi, Imre (1952)



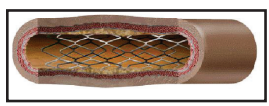

bifurcation prosthesis





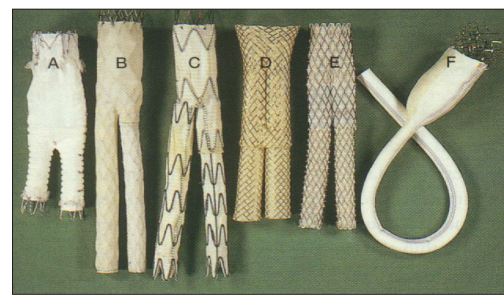
synthetic prosthesis

# THE HISTORY OF CLINICAL USE OF STENTS-GRAFTS





1964:
Charles Theodore Dotter




1986:
Nicholas Volodos



1990:
Juan C. Parodi

# NEW SURGICAL TECHNIQUES, PROCEDURES. MICROSURGERY. LAPAROSCOPIC SURGERY. NOTES. DA VINCI SURGICAL SYSTEM.

# 14.

# MICROSURGERY

**Microsurgical procedures are defined as surgical interventions performed under optical magnification - loupe or operating microscope - with special instruments, armamentarium, microsurgical suture materials and needles in order to cure or research.**

# REQUIRED TOOLS

- **operating microscope**
- **microsurgical instruments**
- **microsurgical suture materials and needles**

**It is important to adapt to the operating microscope using different magnifications and the harmonization between eyes and hands.**

# MICROSURGICAL INSTRUMENTS



Leica Wild M650
teaching - research microscope



different types
of microsurgical forceps



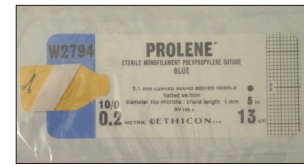
different types
of microsurgical needle holders



different types
of microsurgical scissors



microsurgical clip - applying forceps,
approximators, clip




microsurgical
suture materials

**patience - enthusiasm - endurance**

Furka I., Mikó I.: Mikrosebészeti alapismeretek, Debrecen University Press, 2011 (Introduction to Microsurgery)

# MICROSURGICAL EDUCATION AND TRAINING CENTER



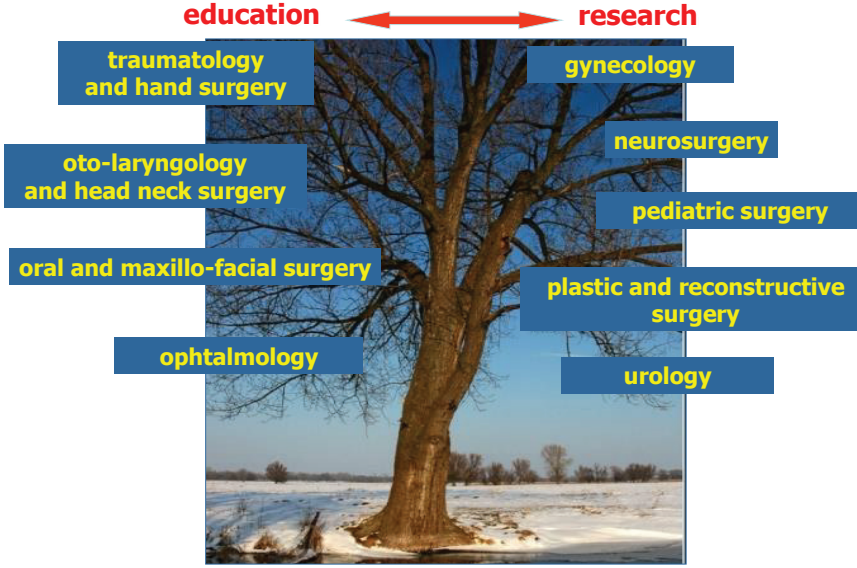
# APPLICATION FIELDS OF MICROSURGERY

education ⟷ research

traumatology
oto-rhino-laryngology
oral and maxillofacial surgery
ophthalmology
neurosurgery
plastic and reconstructive surgery
urology
gynecology

# APPLICATION FIELDS OF MICROSURGERY

education ⟷ research



# SUN LEE MICROSURGICAL MUSEUM





**Department of Operative Techniques and Surgical Research**
**University of Debrecen**

# LAPAROSCOPIC SURGERY

**Advantages**

- **minimal postoperative pain**
- **smaller scar**
- **short nursing period**
- **early rehabilitation**

**Diagnostic laparoscopy**

**Therapeutic laparoscopy**

# What is new for the surgeon?

- **pneumoperitoneum**
- **trocar insertion through the abdominal wall**
- **manipulation with long and fine instruments**
- **lost of palpation**
- **operation in two dimensions**
- **no big retractors……**

# LAPAROSCOPIC INSTRUMENTARIUM



**Monitor**
**Insufflator**

**Videocamera**
**Telescope**
**Light cable**
**Light source**

**Elektrocoagulator**

**Irrigation-aspiration system**

**Other special in and outputs**

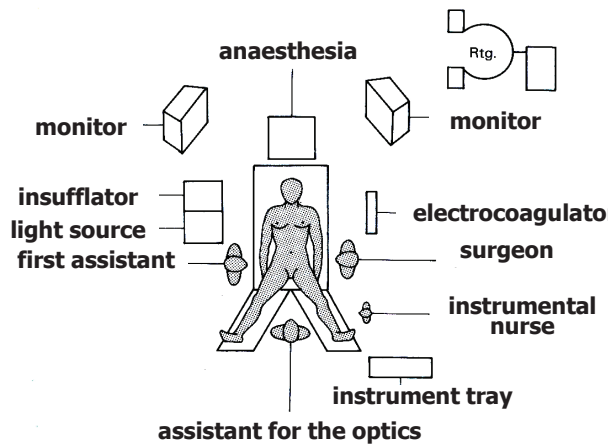


# Operating team



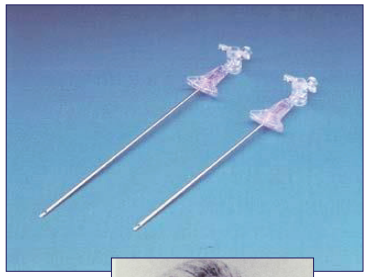


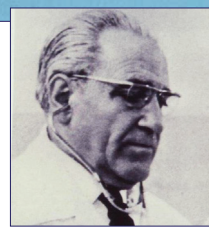




# LAPAROSCOPIC INSTRUMENTS I.

## Veres needle





Veres, János
1909-1979






Lumniczer Hospital, Kapuvár, Hungary

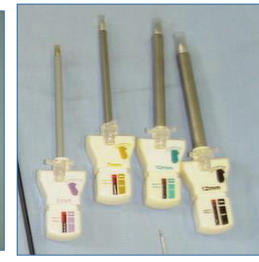
# Trocars

## Technique of trocars introduction

**Minimal trauma to the abdominal wall with the help of rotation movement**

**Safe introduction of trocars garantee prevention of internal visceral injury, especially in the presence of adhesions**

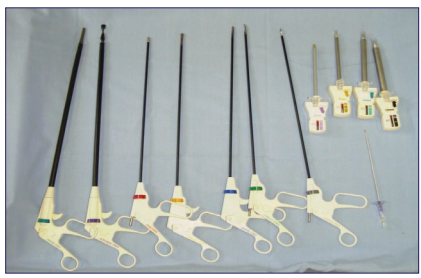


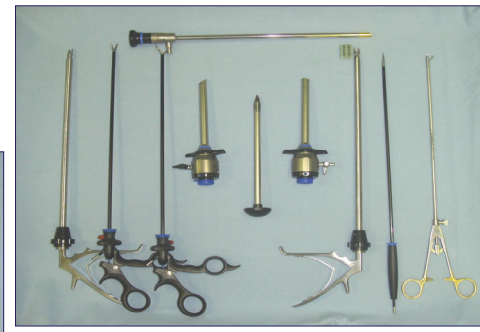


# LAPAROSCOPIC INSTRUMENTS II.

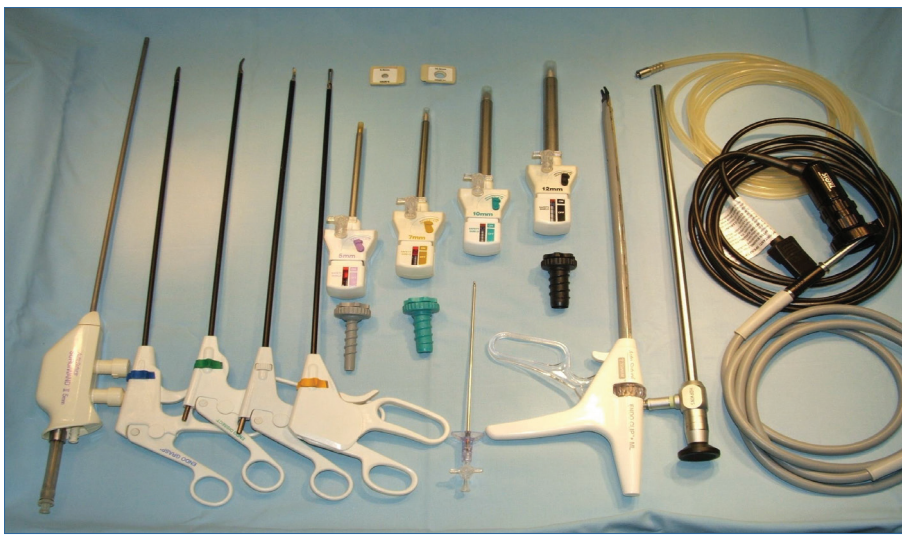
## Special instruments

- clamps
- dissectors
- scissors
- hook
- clip applying forceps...

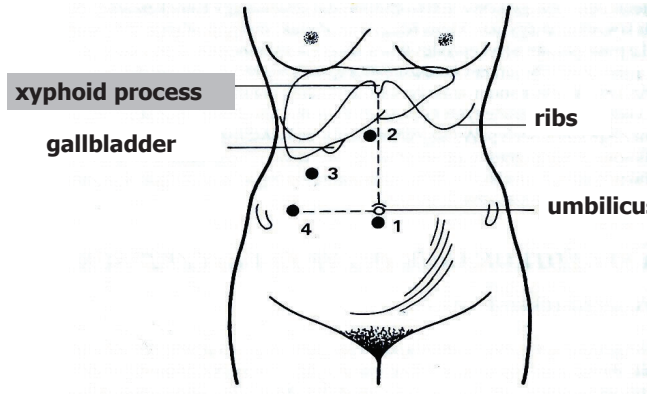




# LAPAROSCOPIC INSTRUMENTS



# Laparoscopic insertion points for cholecystectomy




# APPLICATION FIELDS OF LAPAROSCOPY

**Diagnostic laparoscopy**

**Therapeutic laparoscopy**

**General surgery:**
**cholecystectomy**
**hernioplastica (inguinal, abdominal)**
**appendectomy**
**adrenalectomy**
**hiatus hernia operation by fundoplication**
**focal benign diseases of the liver**
**splenectomy**
**operations on the large bowel**

**Gynecology, Urology…**

# JÁNOS VERES MEMORIAL PLACE






**Department of Operative Techniques and Surgical Research**
**University of Debrecen**





**Department of Operative Techniques and Surgical Research**
**University of Debrecen**

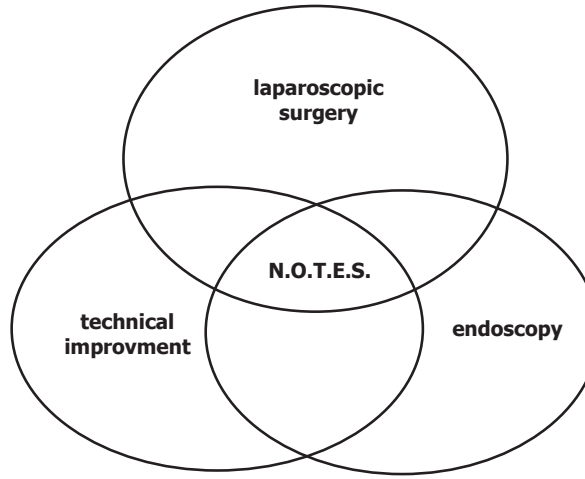




**University of Debrecen, Kenézy Medical History Collection**

# N.O.T.E.S.

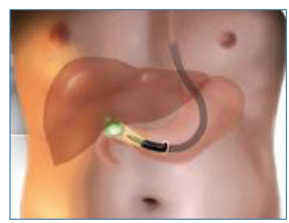
**Natural**
**Orifice**
**Translumenal**
**Endoscopic**
**Surgery**




## N.O.T.E.S.

### for cholecystectomy

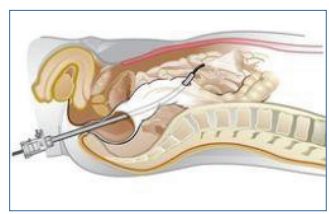
**Natural**
**Orifice**
**Translumenal**
**Endoscopic**
**Surgery**



transgastric



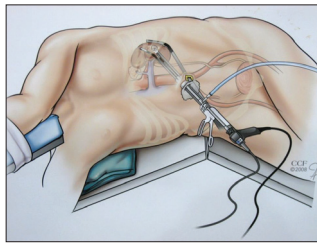
transvaginal



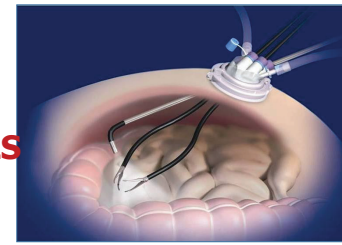
transanal

***„scarless" (?) surgery…***

# SINGLE PORT TECHNIQUES

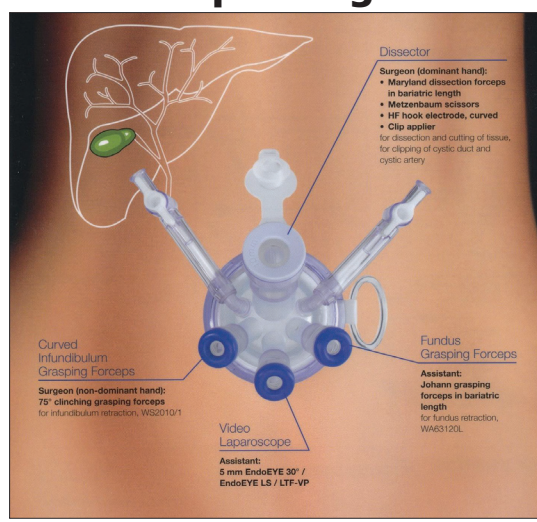


SILS



**S**ingle-**P**ort **L**aparoscopy (**SPL**)
**S**ingle-**P**ort **A**ccess **S**urgery (**SPA**)
**S**ingle-**P**ort **I**ncisionless **C**onventional **E**quipment-utilizing **S**urgery (**SPICES**)
**S**ingle-**I**ncision **L**aparoscopic **S**urgery (**SILS**)
**S**ingle-**A**ccess **E**ndoscopic **S**urgery (**SAES**)
**L**aparo-**E**ndoscopic **S**ingle-site **S**urgery (**LESS**)
**O**ne-**P**ort **U**mbilical **S**urgery (**OPUS**)

# LESS
## Laparo-Endoscopic Single-site Surgery



# Da Vinci Surgical System









ISBN 978 963 615 483 7