# Introduction of Traumatology. Social and economic impact of injuries. Wound and wound treatment.

Norbert Wiegand M.D.,Ph.D, Med.Habil.

# Basic information and requirements

- Attending regularly to lectures and seminars
- Maximum allowed absence: 2 seminars / semester
- Attending to another group's classes / supplement classes: limited to 2 students / class
- Mandatory practice in duty time (4 hrs)
- Course material: lectures (website), ATLS Students Course manual, AOTrauma Homepage, Lecture Notes Orthopaedics and Fractures (T. Duckworth)
- Focus on manual skills
- Regular feedback

# Practical skills oriented education

**Saw bone practice**

# Practical skills oriented education



**Treatment of severely injured patients**

# Your Professors:

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# Definition of trauma: WHO

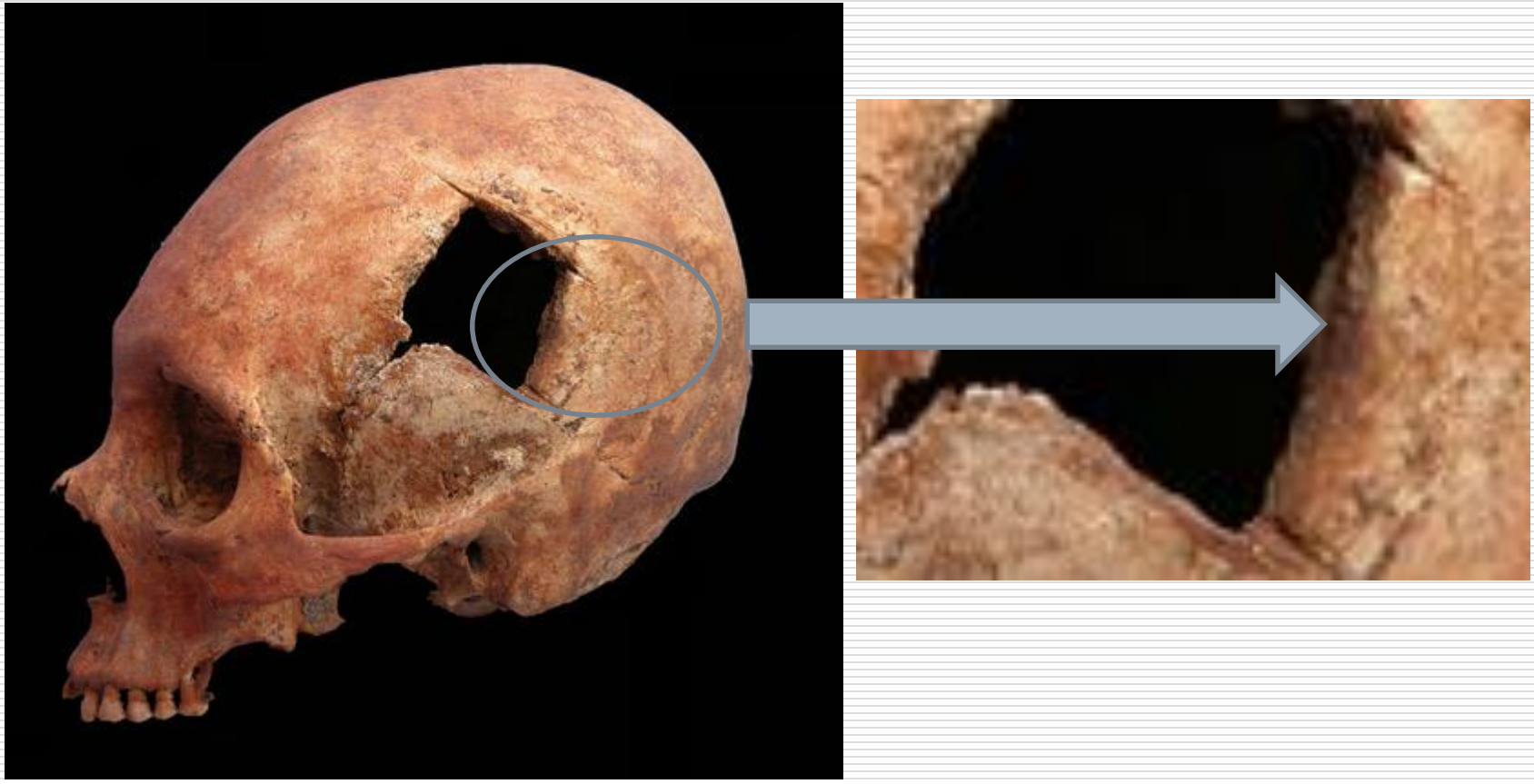
- Trauma is the organical injury of the body caused by acute outer energy (mechanical, thermal, electrical, chemical, radiation), when if it is passed  the normal toleration of the human body.

# Milestones of trauma surgery (knowledge of our past…)

# Main periods of surgery:

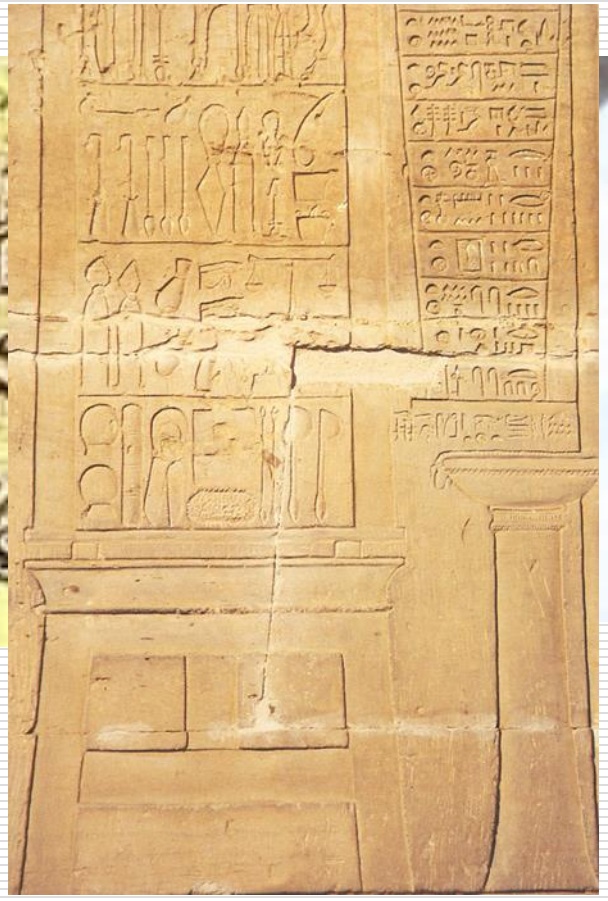
1. From the ancient age till the end of XVIII th. century
   - Ablation of body parts
2. From the first narcosis (1846) till 1960:
   - ablation, reconstruction, asepsis, antisepsis, X-ry,…
3. From 1960:
   - Technical progress: diagnostic, computer,, endoscopy, laparoscopy, invasive radiology

# Stone age

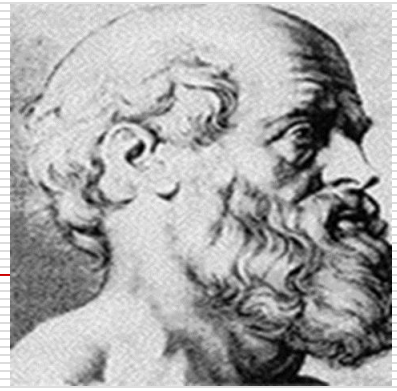


# Babylon (Mezopothamy): Hammurapi's laws 1760 BC

# Egypt BC 1550



# Ancient Greece
# Hipocrates (BC 460-377)



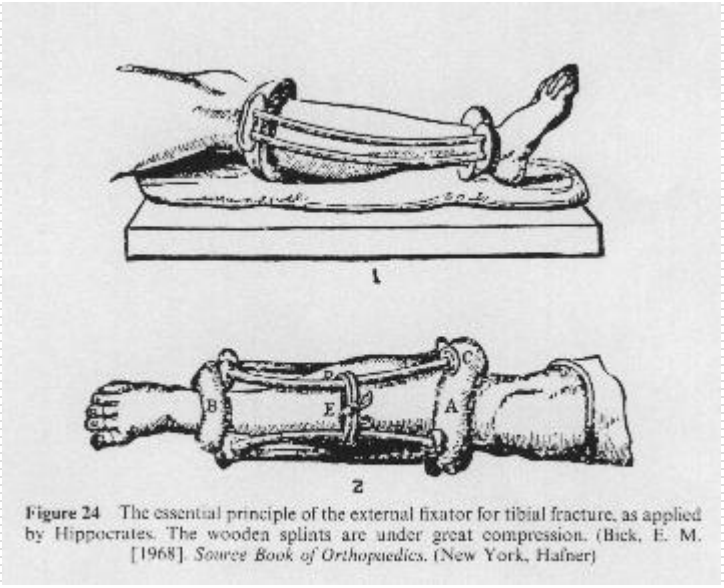
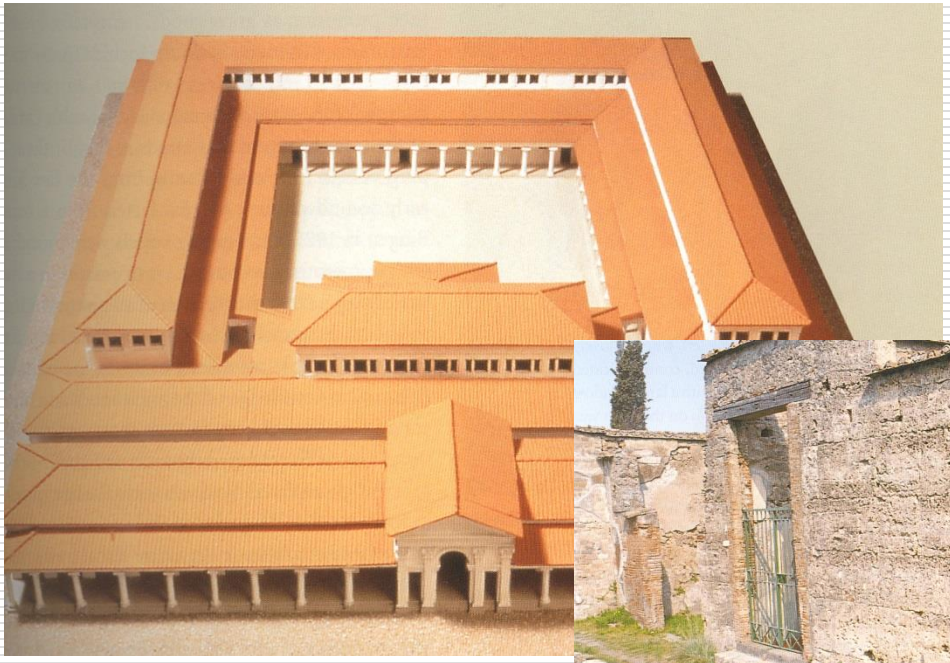
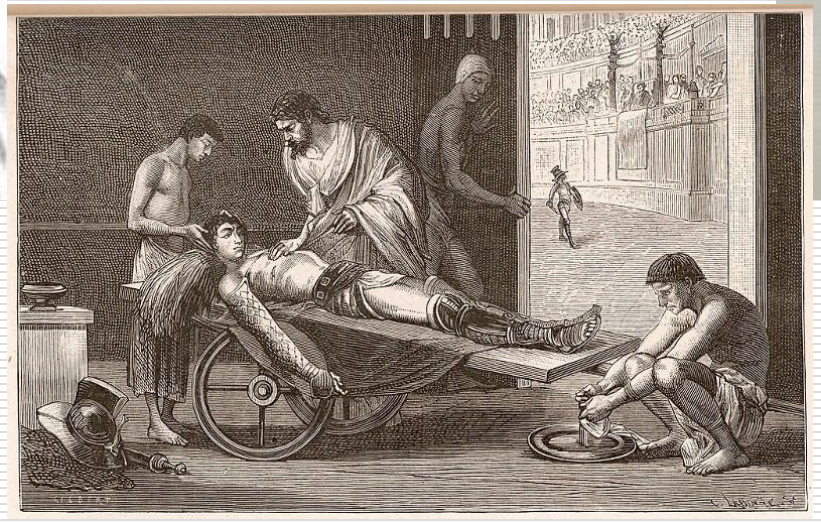


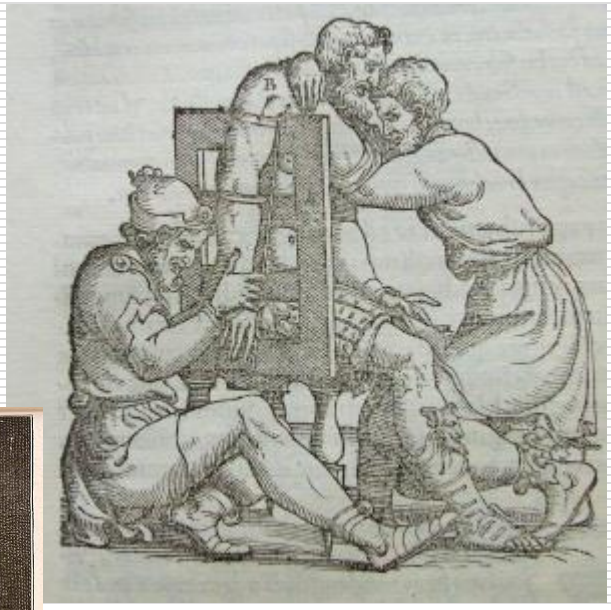

Figure 24 The essential principle of the external fixator for tibial fracture, as applied by Hippocrates. The wooden splints are under great compression. (Bick, E. M. [1968]. *Source Book of Orthopaedics*. (New York, Hafner)

# Rome: house of surgeon in Pompei



# Galenus





# First hospitals

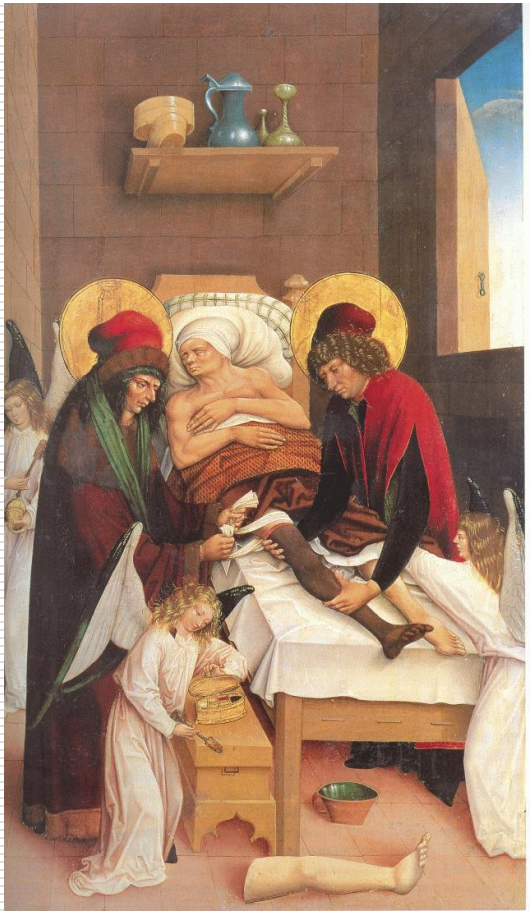
- 500 B.C.: Sri Lanka
- 260B.C.: India
- 300 B.C.: Rome
- 542: Hotels Dieu – Lyon
- 800: Bagdad – Harun Al Rasid Hospital (16 hospitals !)
- England 1123 Saint Bartholomeus – London, St. Thomas – London
- 1283: Al Mansur - Cairo

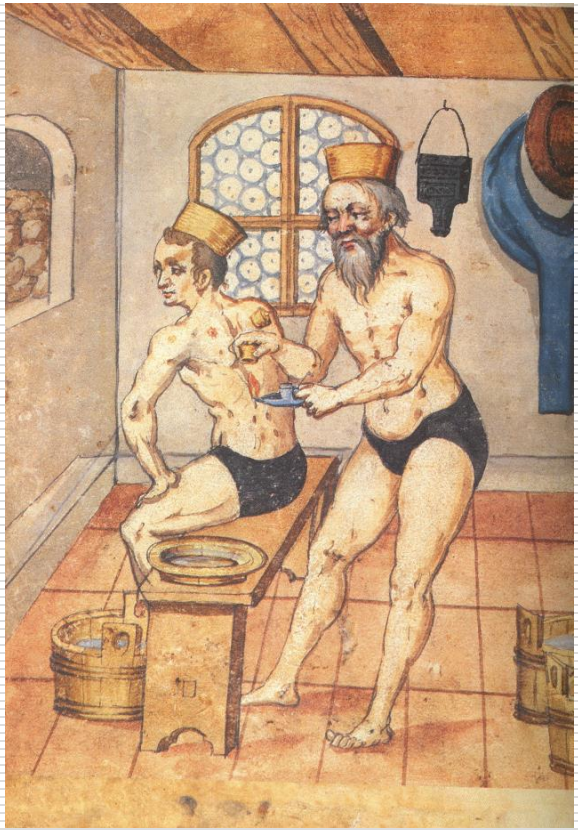
# Middle age

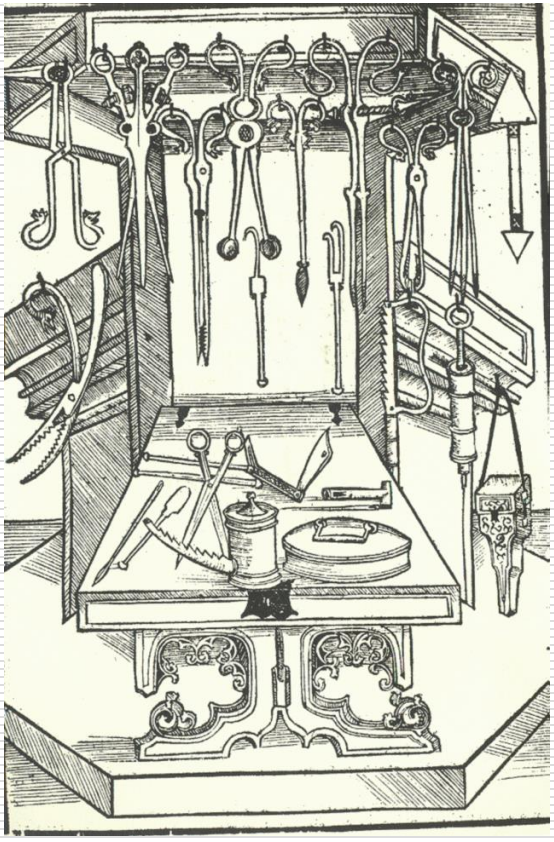
- cups
- phlebotomies
- epidemic
- amputations
- enema

# 14th century

# 15th century

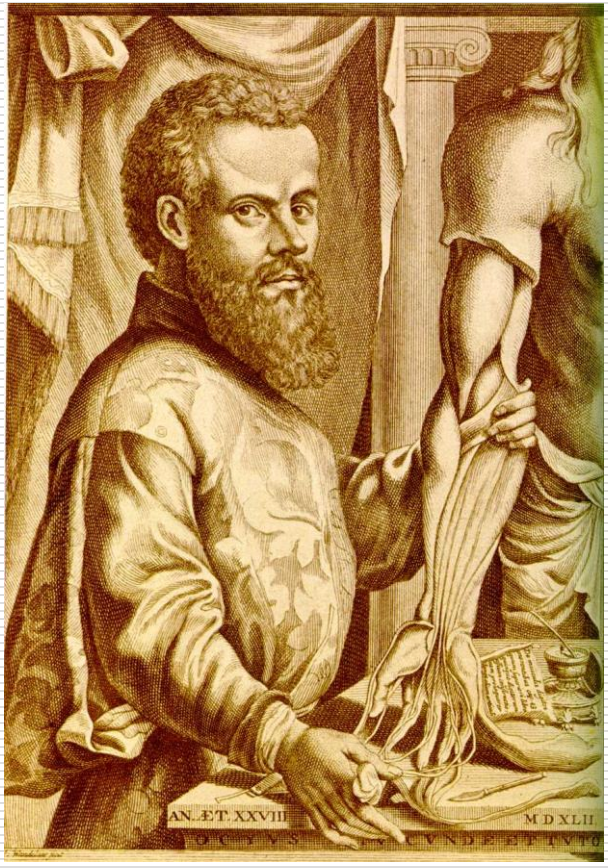


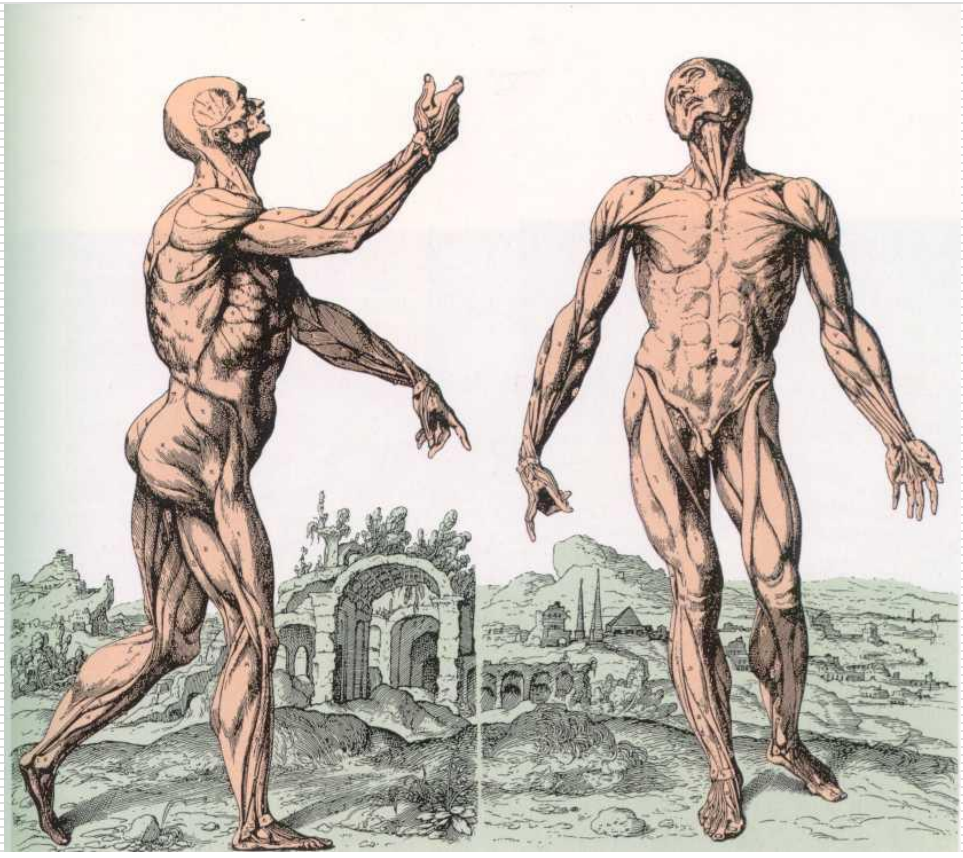




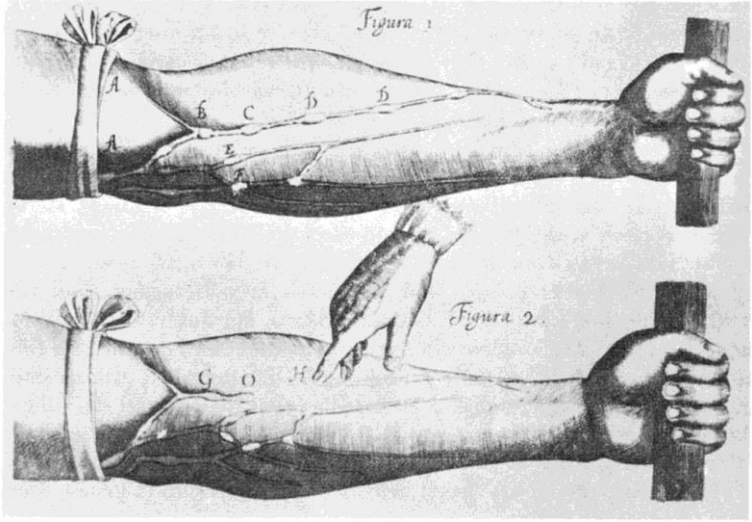
# 16th century: The barber

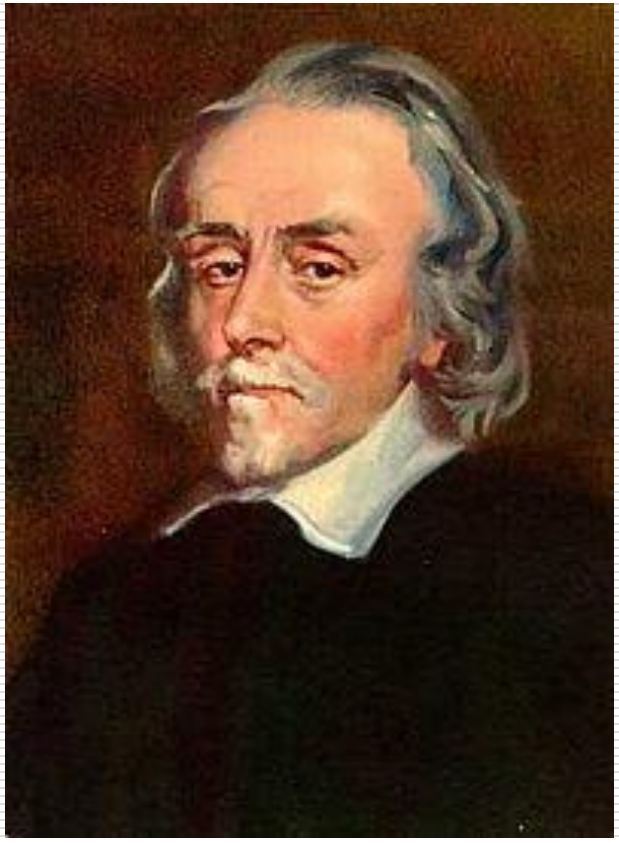
# 16th century:Andreas Vesalius



# 17th century: William Harvey: vascular system



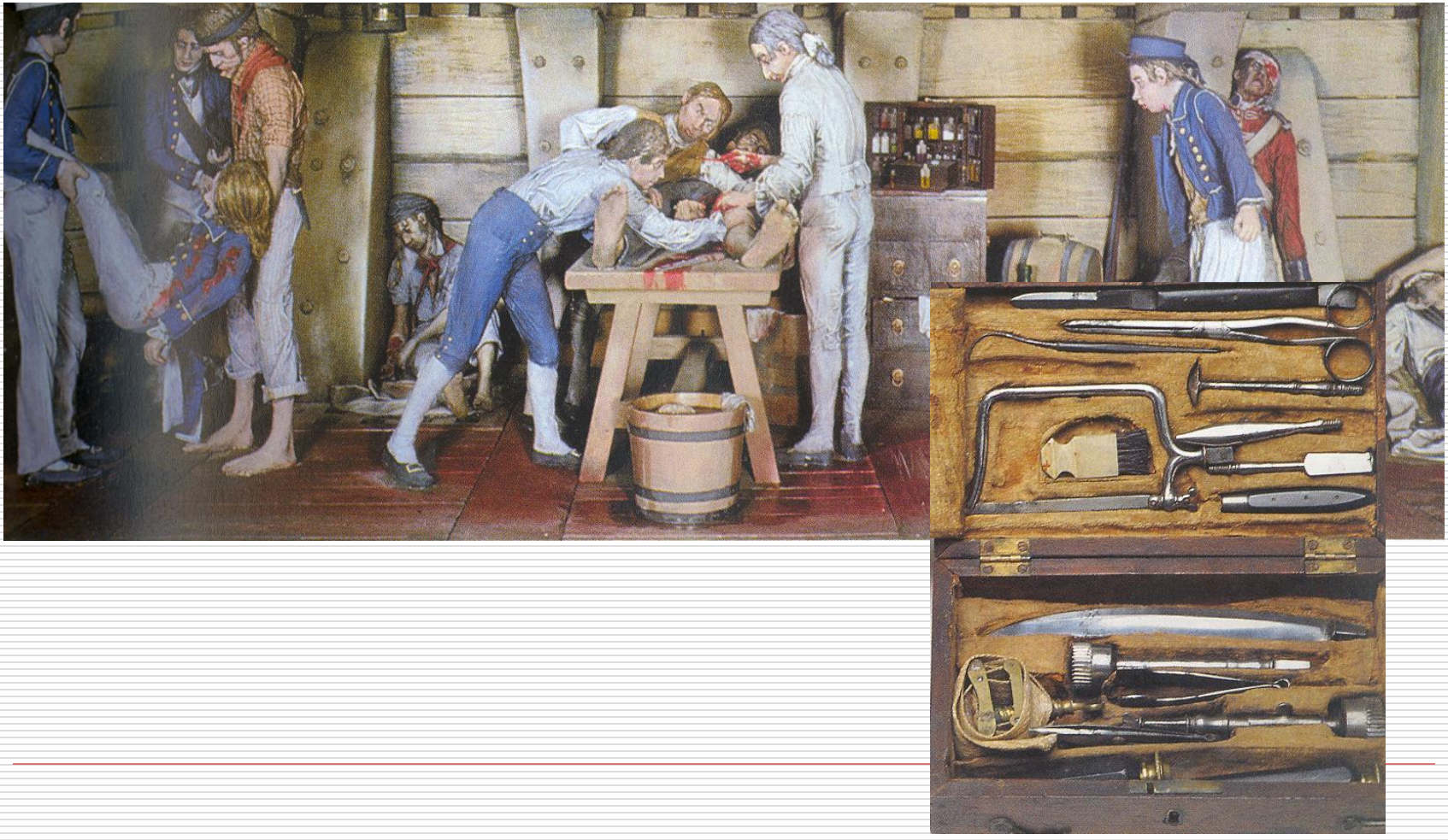
# Ambroise Pare: vascular ligation

# New age: war surgery

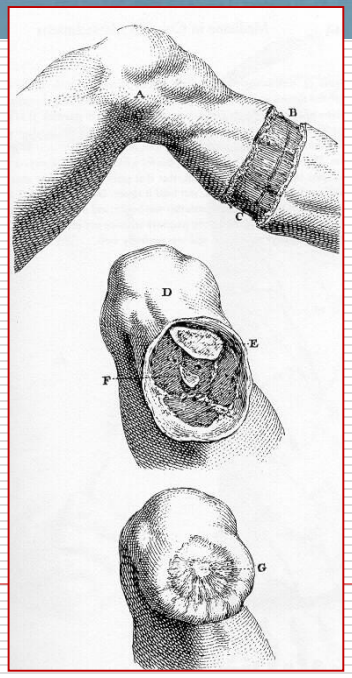
- Larray – in 1812 Borogino 200 amputations/day
- Liston needed 25 seconds for femoral amputation
- Nissen: The war is smaller danger than the surgery itself.

# Tools of leech /paramedic/ in 16th century

# O.R. of an English battleship in 1800



# 1840's amputation set by Wiegand and Snowden of Philadelphia



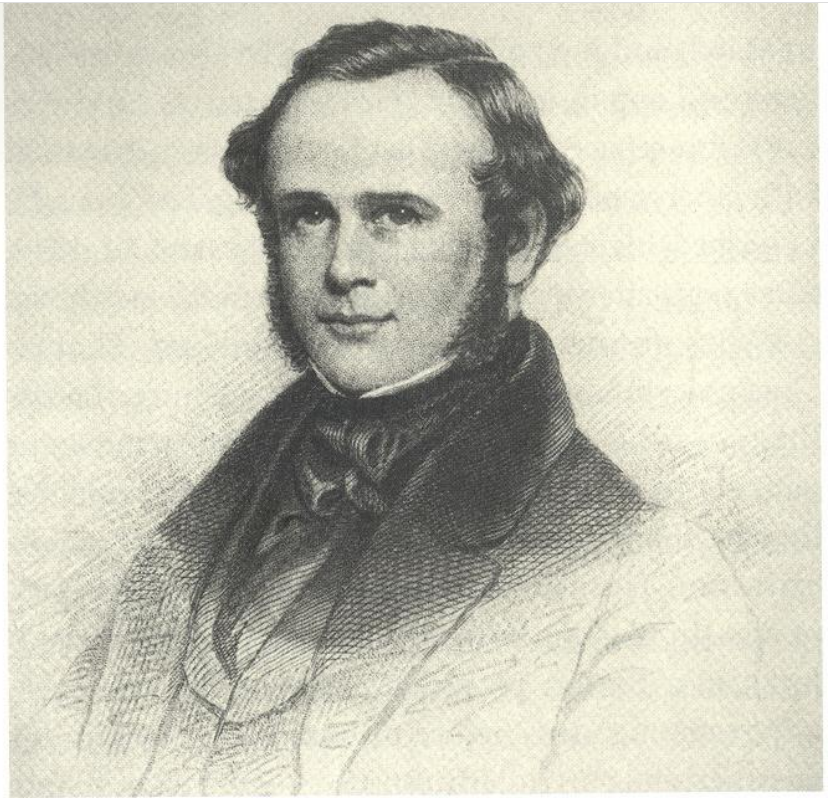

# OR in Würzburg 1804

# Pain management

- Hashish, mandragora, opiate
- 1885. – Cairo: 758 pharmacy
- Peru (Inca): plants, scull trepanation, scopolamine, animal drugs
- Alcohol – Navy
- Ambroise Pare: half „suffocate” hanged up patient

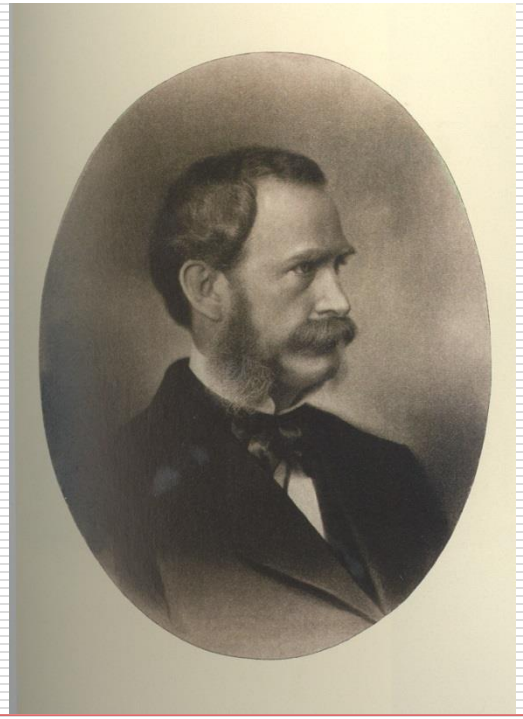
# Horace Wells 1845 (nitrogen oxidul)

- 10. Dec.1844 Hartford circus show
- 12. Dec. self experiment
- 15. Jan. 1845 Boston failed tooth extraction
- 1848 suicide



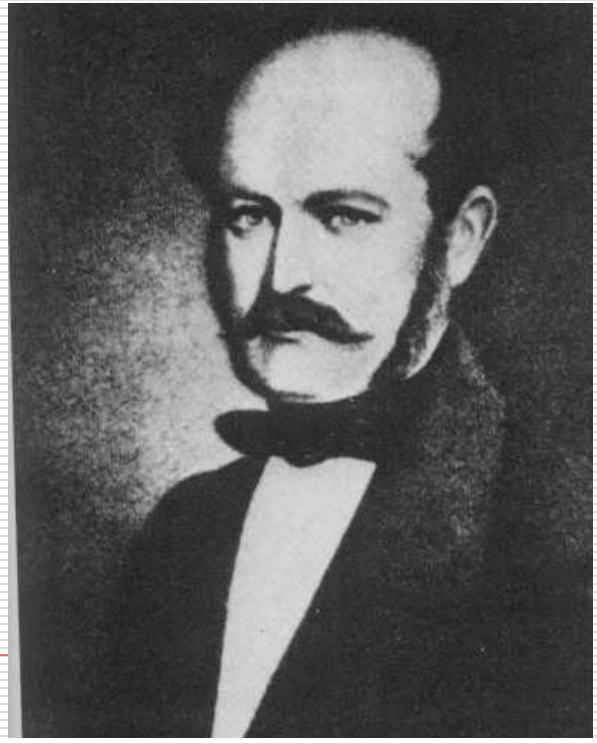
# William Thomas Green Morton (1819-1868)

- The first anesthesia with ether Boston 16. Okt.1846 (Friday 10 a.m.)

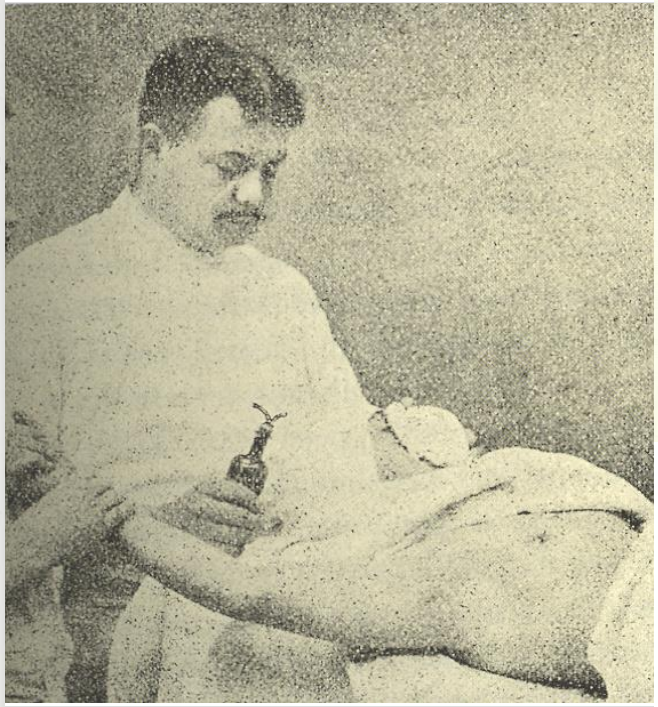


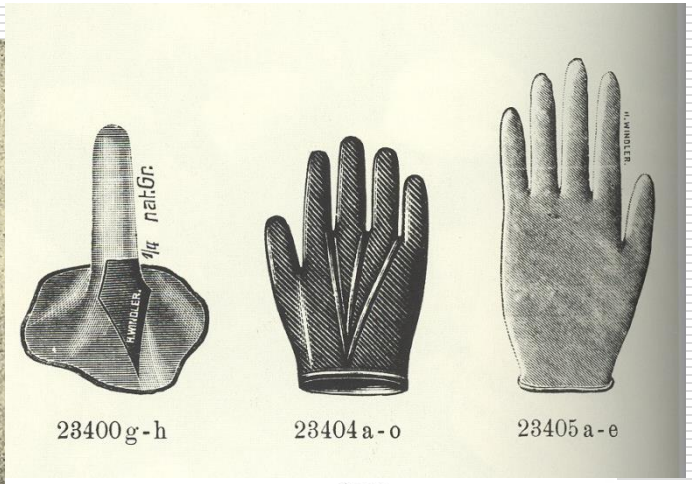
# Antisepsis – war against infection

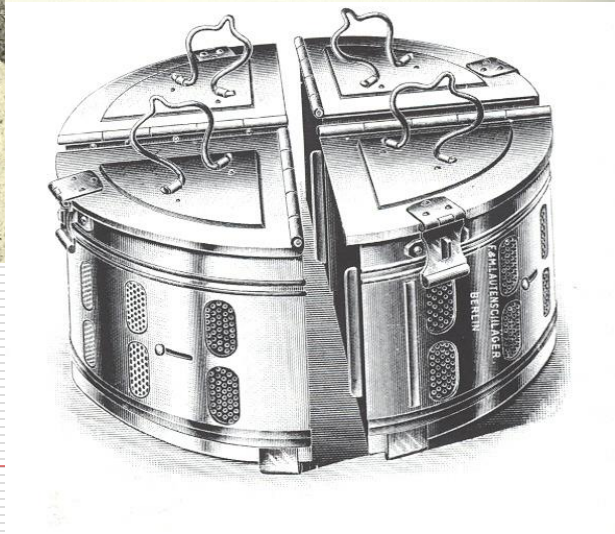
- Semmelweis 1860
- Pasteur 1851 (aerobe – anaerobe fermentation)
- Lister 1867 (carbolic acid)
- Koch 1877 (bacillus)



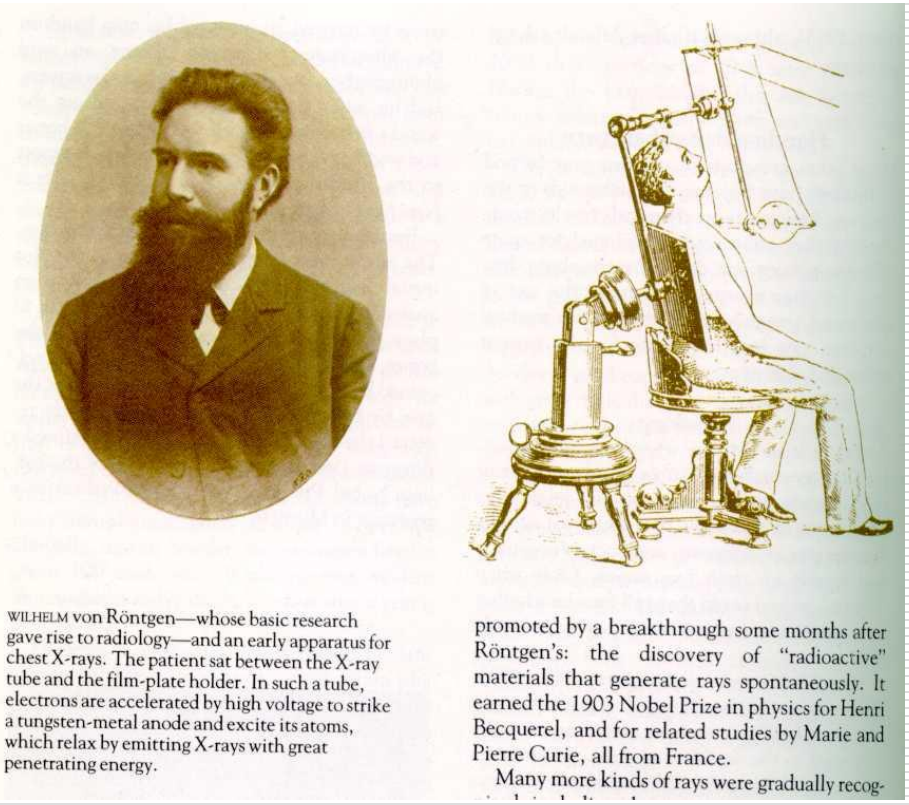
# Asepsis – prevention of wound infection: Curt Schimmelbusch 1892





# Wilhelm Conrad Röntgen 1896

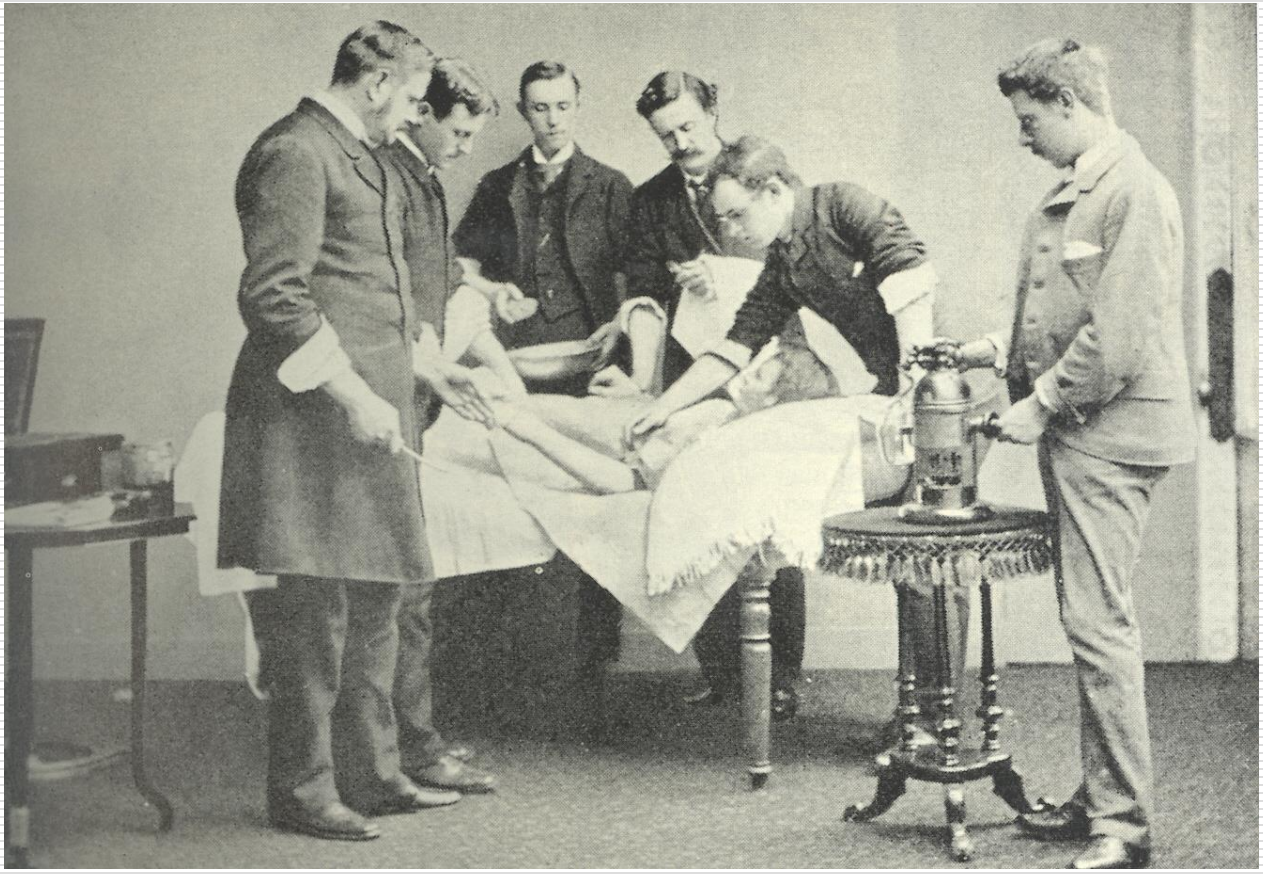


WILHELM von Röntgen—whose basic research gave rise to radiology—and an early apparatus for chest X-rays. The patient sat between the X-ray tube and the film-plate holder. In such a tube, electrons are accelerated by high voltage to strike a tungsten-metal anode and excite its atoms, which relax by emitting X-rays with great penetrating energy.

promoted by a breakthrough some months after Röntgen's: the discovery of "radioactive" materials that generate rays spontaneously. It earned the 1903 Nobel Prize in physics for Henri Becquerel, and for related studies by Marie and Pierre Curie, all from France.

Many more kinds of rays were gradually recog-

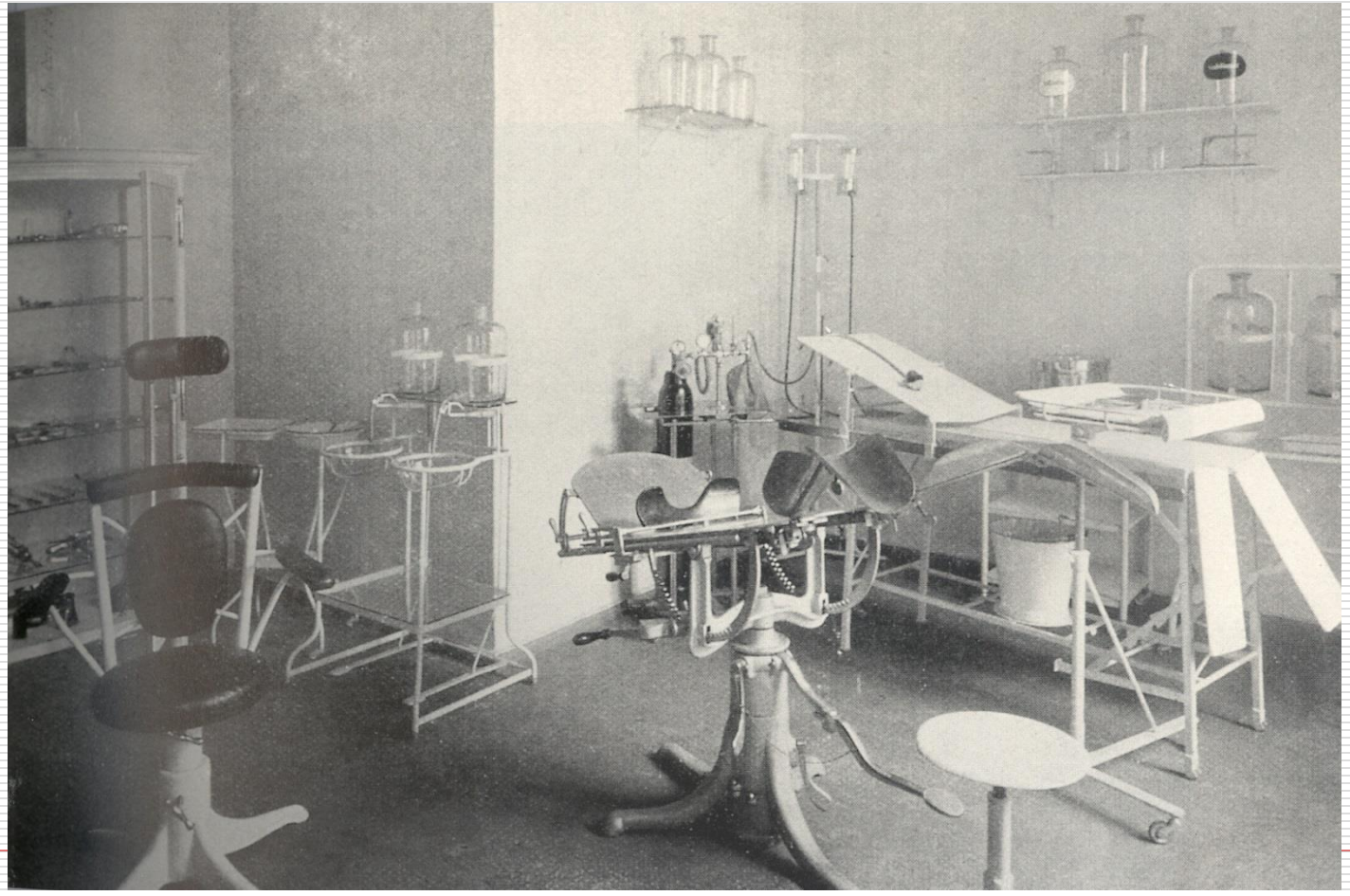
# 1880 Aberdeen: Surgery
# Sir Alexander Ogston – Sta.aureus



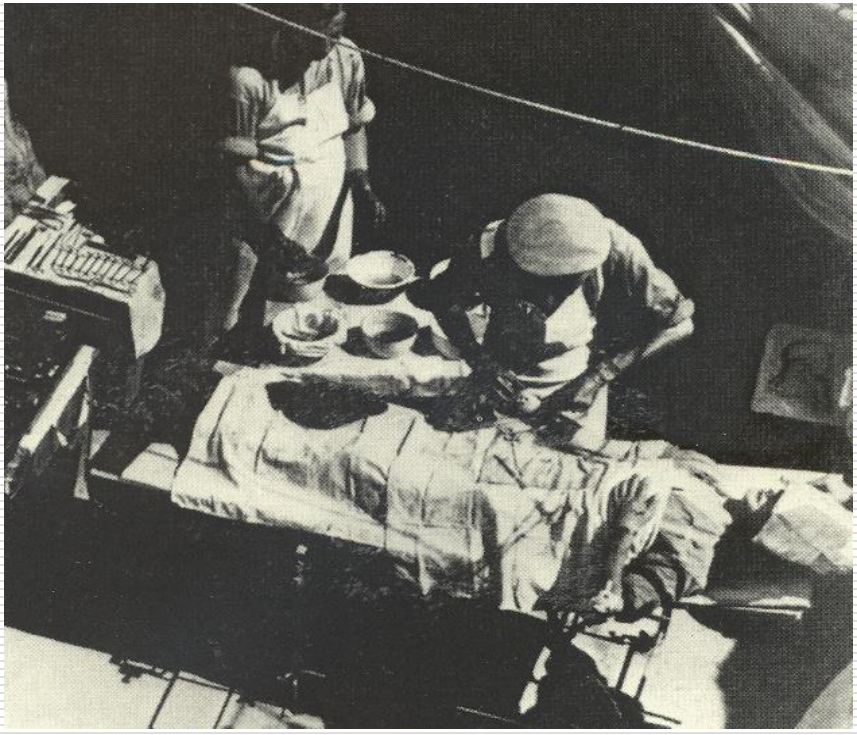
# 20th Century

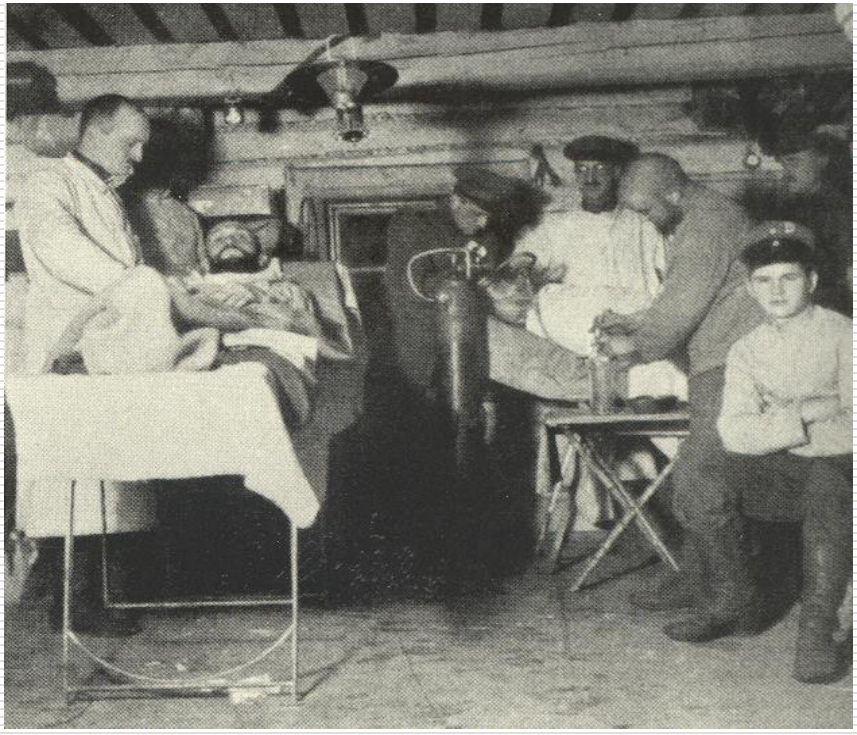
- 1909: narcosis with intubation– Meltzer, Auer
- 1920: surgical stapling device – Petz Aladár
- 1942: curare - Griffith
- 1943: dialysis – Kollf
- 1950: transplantation
- 1952: microsurgery
- 1953: heart-lung pump – Gibbon
- 1958: osteosynthesis - Allgöwer
- 1973: CT
- 1992: Endoscopic surgery

# 1912 Berlin O.R.



# Military hospital 1915





# 1st W.W.


corb
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ISSUED BY THE CORPORATION OF BRIGHTON
9.
ROYAL PAVILION
WARD 5. MUSIC ROOM.
A. H. FRY, PHOTO,
BRIGHTON.

# 2nd W.W 1943

# Vietnam, Korea

# Facts

# Socio-economic importance of traumatology

- Traumatic injury is the leading cause of death in the first four decades of life. (mortality)
- Trauma typically involves young adults and results in the loss of more productive work years than both cancer and heart disease combined.

- Each year more than 140 000 Americans die and approximately 80 000 are permanently disabled as a result of injury.

- The loss of productivity and health care costs account for 100 billions dollars annually.

# Burden of trauma– international data

- Trauma is the 4th cause of death among EU-15 countries and among the new countries is on the third place
- Concerning about the years of life lost (YLL) the trauma is in the second place in the EU.

- The death of men because of trauma is doubled , compared to women.
- The trauma is the leading cause of death among the 1-24 years age group in the EU.

- 20% of the population are 65 or older in average, suffering 40% of the accidents.
- 45 Billion Euro is the estimated expense caused by trauma in the EU.
- 8-10% of in-patient and 40-50% of emergency treatment are assembled for trauma care.

# Etiology

Old population

Young population

# Cost of trauma care– Hungarian

- Trauma wards 97
- Number of beds 2584
- Hospital days 640.064
- Charged capacity fee/year 10.000.000.Euro
- Hospital days/case 5.84

# Cost of trauma care– E.R. data

- Monthly number of patients: 100.000
- Monthly interventions: 128.000
- Cases/hour: 3.59

# Aging of the population- osteoporosis

# What the patient wants?

Such a treatment which provides the possible earliest return to the quality of life, before the trauma!

# What the doctor wants?

- Immediate full weightbearing
- Such an implant which is able to provide it
- Easy and fast surgery
- Forgiving implant

# Different type of wounds, principles of wound treatment

# Skin injuries

- wounds
- burn
- chemical injuries
- contusion
- necrosis

# Types of wounds

- abrasum /abrasion, scratch/
- scissum /cut/
- caesum /cut/
- contusum /contusion,ruptured/
- lacerum /lacerated/
- punctum /stab/
- sclopetarium /gun-shot/
- morsum /bite/

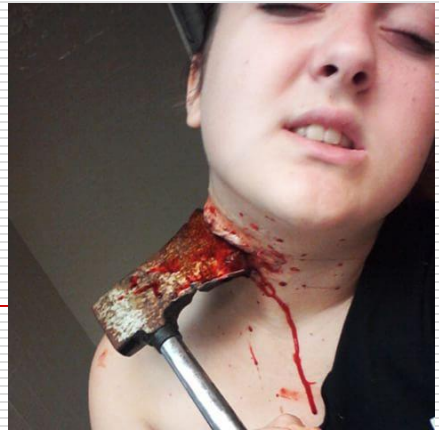
# Vulnus abrasum - scratched

- Superfitial
- Parallel with the surface

# Vulnus scissum - cutted

- The direction of the force is parallel with the surface

# Vulnus caesum - cutted

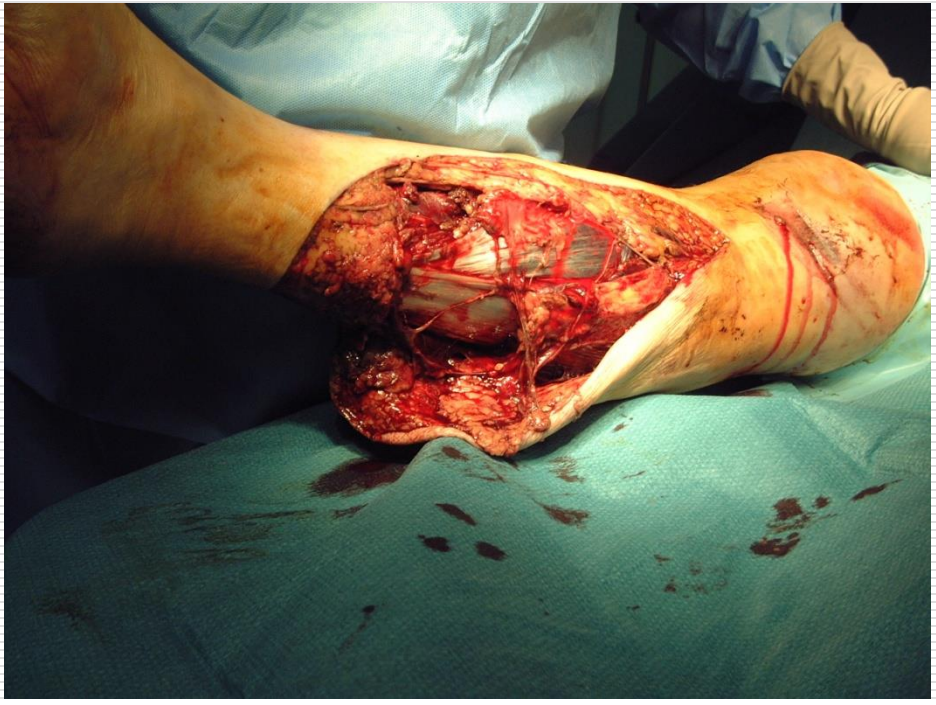


The direction of the force is perpendicular with the surface

# Vulnus contusum - ruptured

- Tipical wound shape

# Vulnus lacerum - lacerated



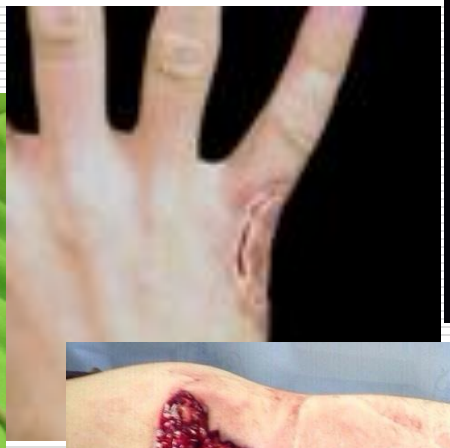
# Vulnus punctum - stab

# Vulnus sclopetarium – gun-shot

- Low energy

- High energy
  - Cavitation zone

# Vulnus morsum - bitten

# Wound care – Friedrich 1886

- Close within 6 hours
- Careful debridement
- Drainage
- Open body cavities!
- Delayed primary treatment

# Wound treatment I.

- Disinfection

# Wound treatment II.

- Draping, Isolation

# Wound treatment III.

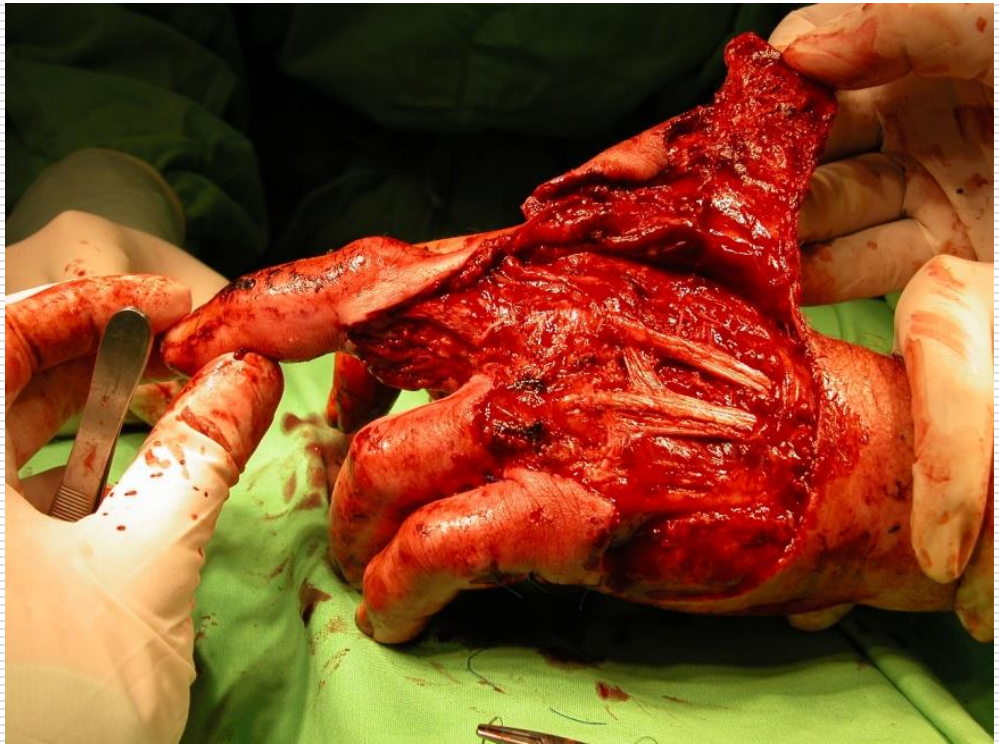
- Anesthesia

# Wound treatment IV.

- Cleaning
- Necrectomy

# Wound treatment V.

- Debridement



# Wound treatment VI.

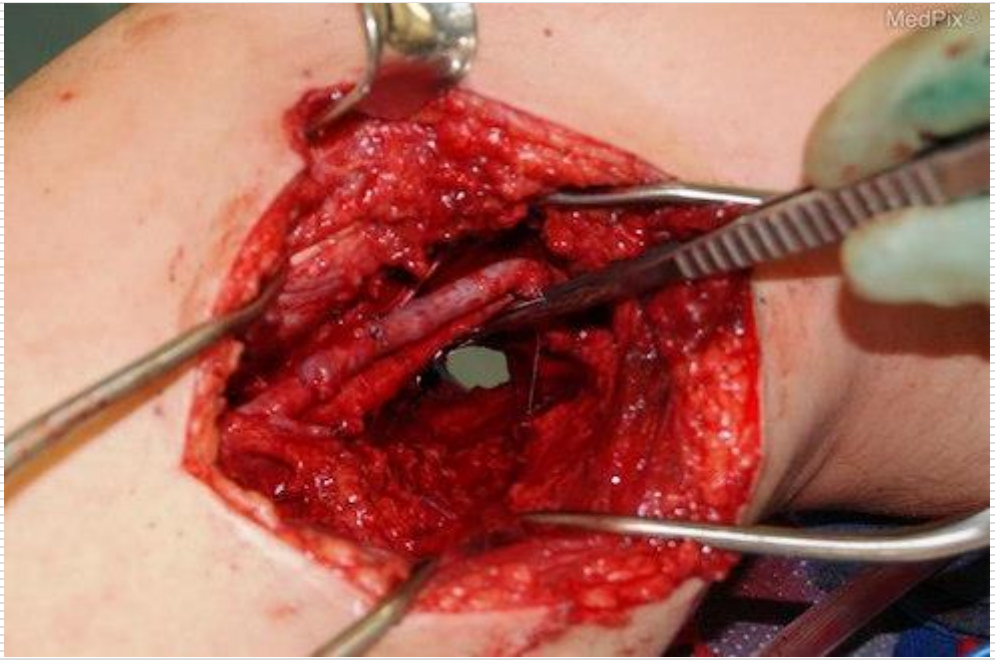
- Drainage
- Closure
- Dressing

# Delayed primary treatment

- Destructed, infected wounds
- Delayed definitive treatment:
  - 2-3 days
  - No sign of infection, necrosis
  - Minimal risk of complications

# Closing is prohibited!!!!!!!

- Gun-shot
- Stab
- Bitten
- Infected

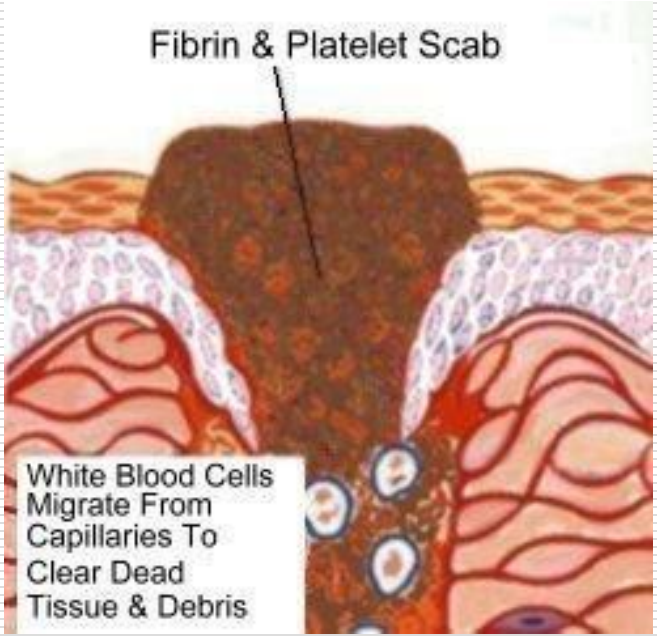


# Tetanus prophylaxis

- Born after 01.01. 1941.: AT
- Actively immunisated: AT
- Any other case: AT+antitoxin (TETIG)

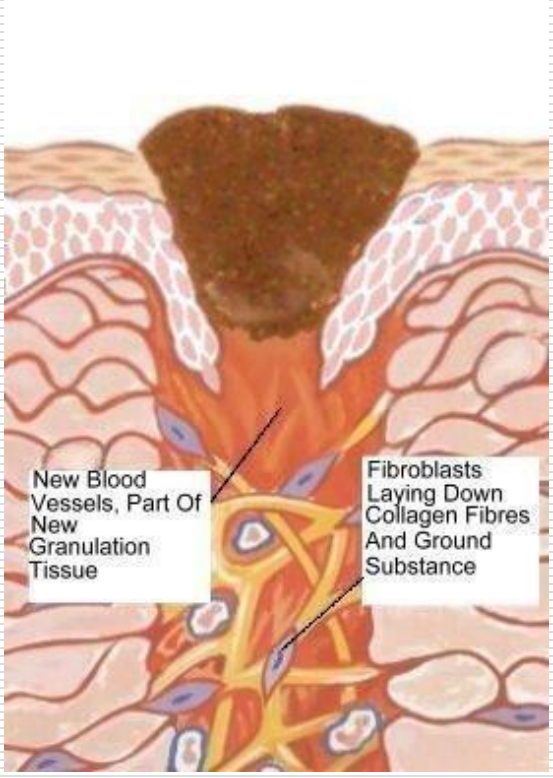
# Wound healing I.

- I. Inflammation (2-3 day): hyperemia – macrophages coagulum-fibrin net-capillarisation starts



# Wound healing II.

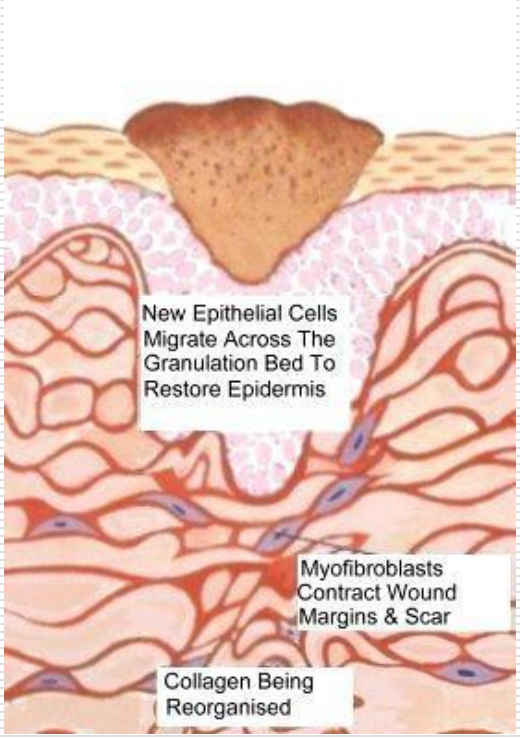
- II. Proliferation (4-7.day): fibroblasts, granulation tissue-capillars



# Wound healing

- III. Scar:

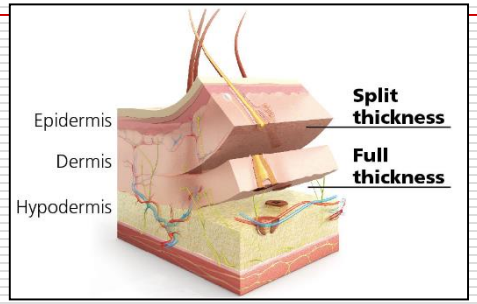
  8. day < epitelisation

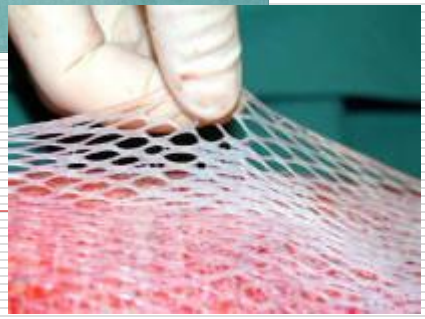


# Coverage of soft tissue defects

# Reconstruction of soft tissue defects

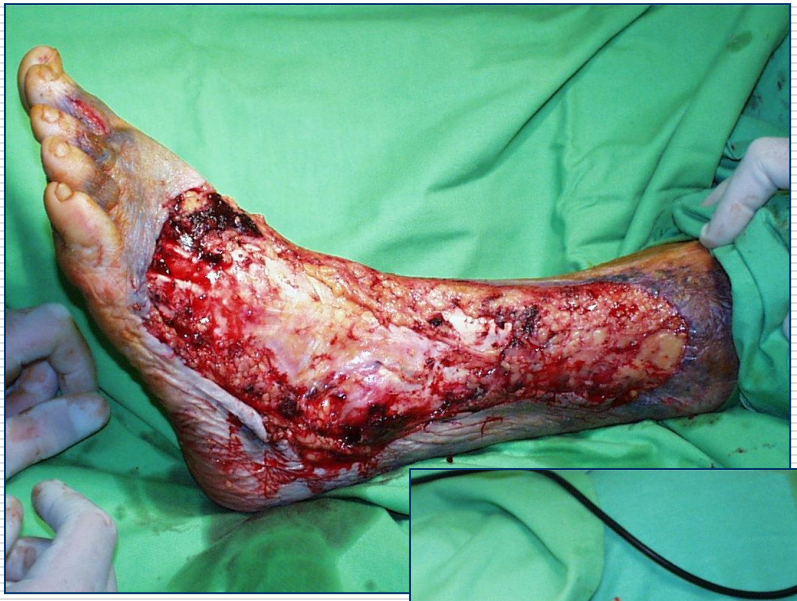
- Skin grafts
  - Split thickness skin graft
    - Epidermis + part of dermis
  - Full-thickness skin graft
    - Epidermis + dermis
- Flaps

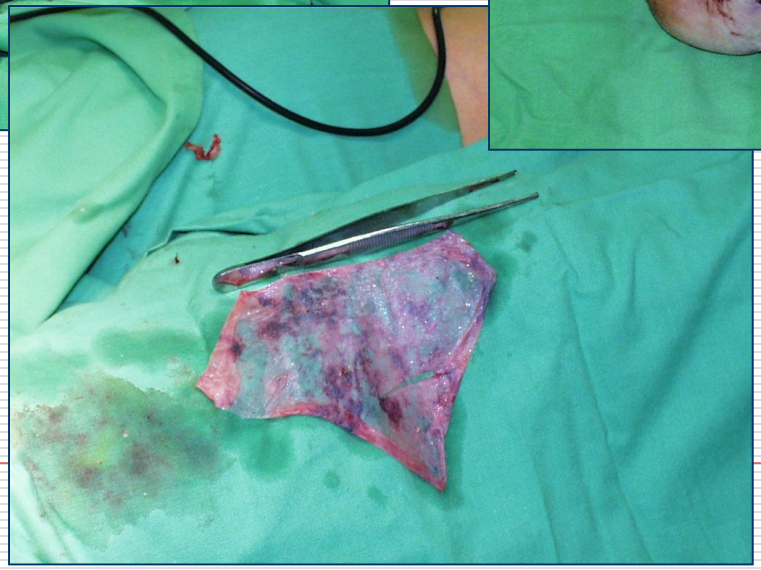


# Skin defect of the hand: split thickness skin graft

# Hematoma: bullectomy, split thickness skin graft





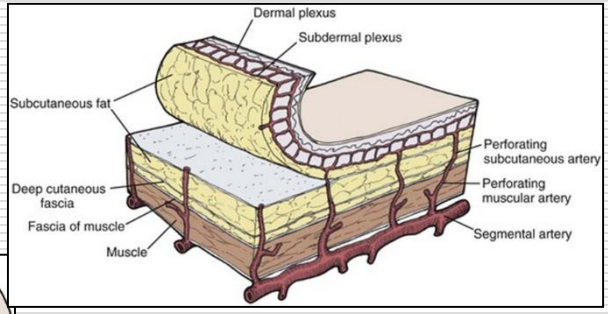
# Complex soft tissue injury without fracture: split thickness skin graft

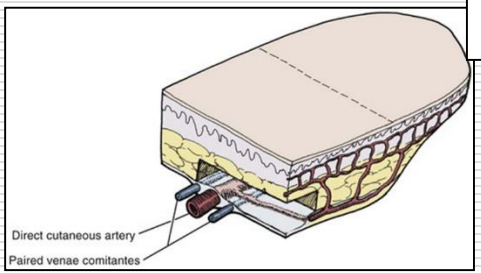
# Indication of flap coverage

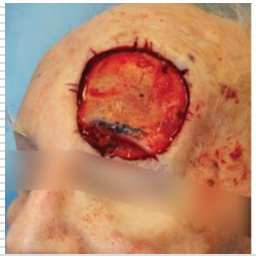
- Cover:
  - Avascular recipient site
  - Poor perfusion of wound
  - Wound at pressure site
  - Infection
  - Require a plenty of layer
  - Cosmetic

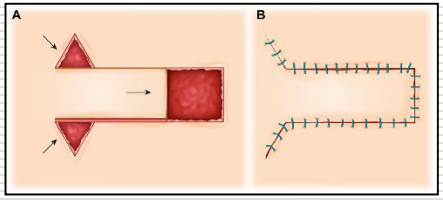
# Types of flaps

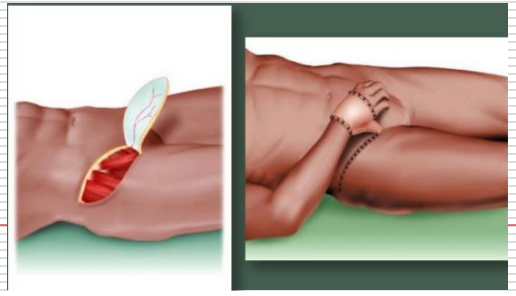
- Due to blood supply
  - Random pattern flap
  - Axial pattern flap (arterial)
    - Peninsular
    - Island
    - Free
- Due to site of flap
  - Local flap
    - Rotation
    - Advancemet
  - Distant flap
    - Direct
    - Tube



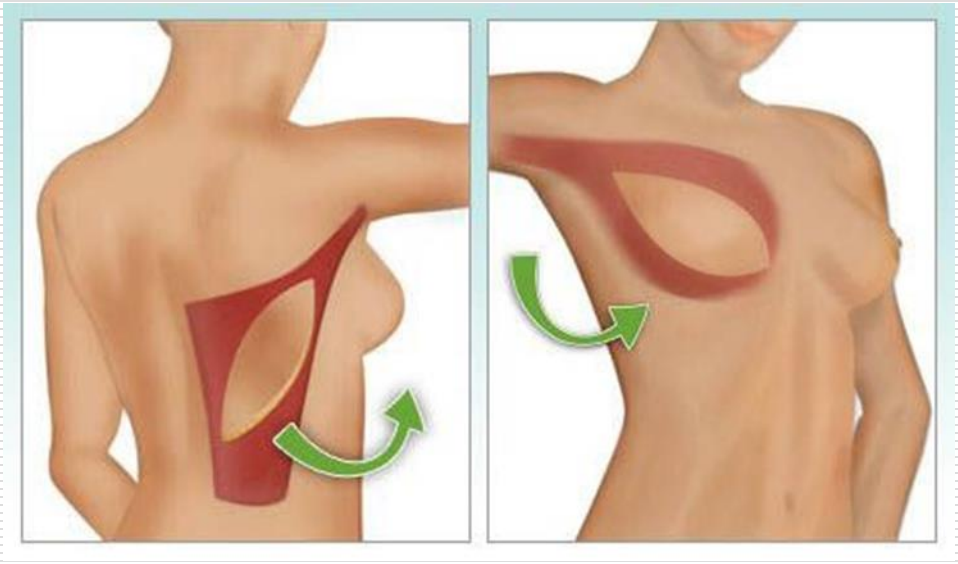



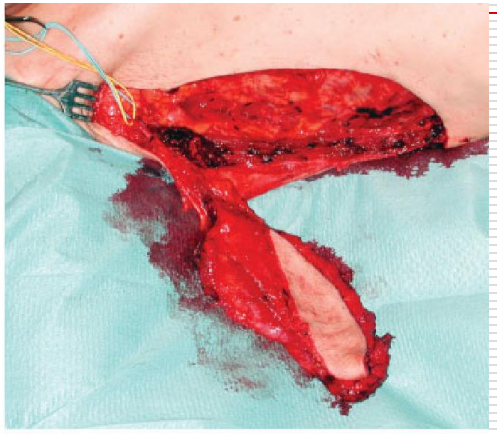





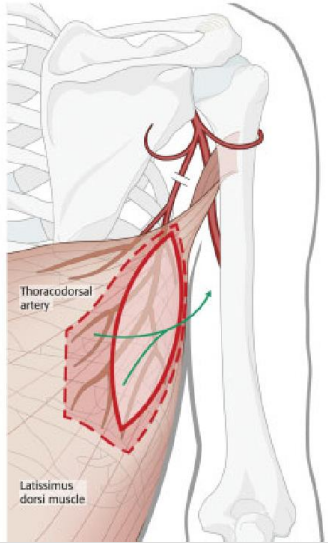



# Latissimus dorsi flap





A

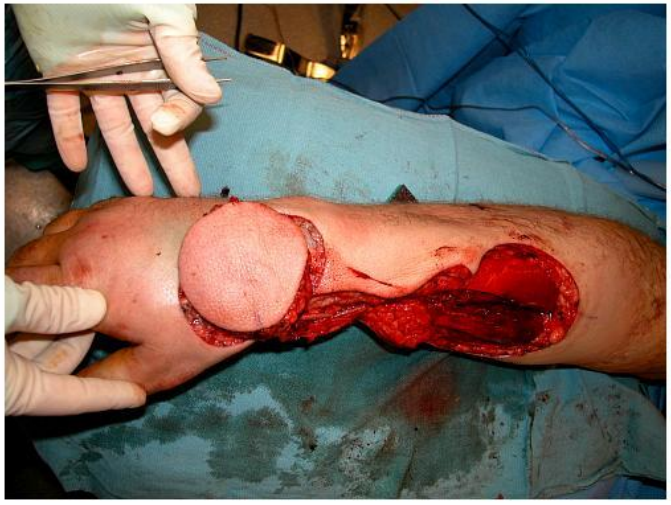



B

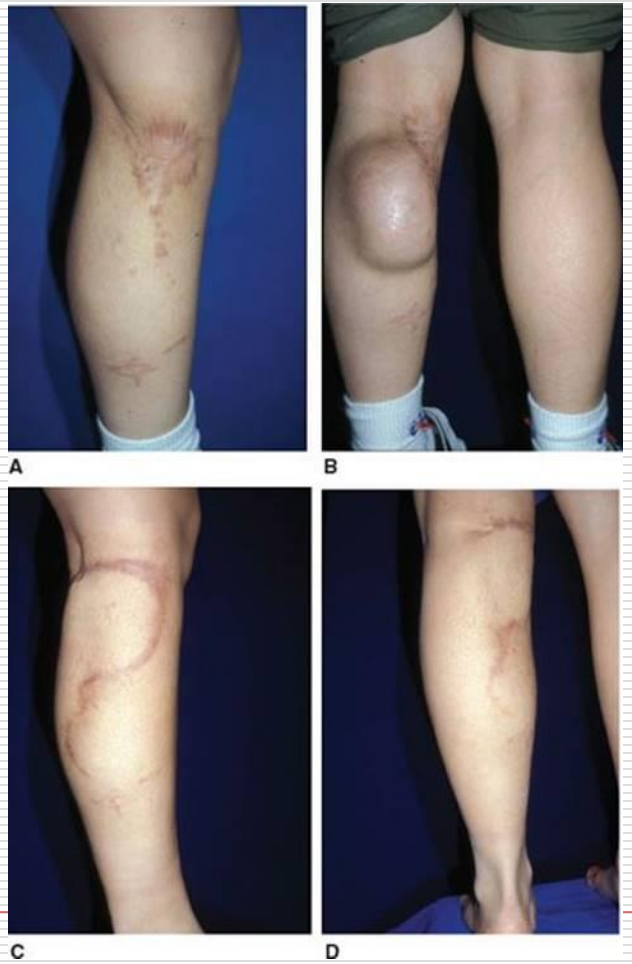
# Crush injury of the foot, latissimus dorsi free flap,  and skin graft

# Gastrocnemius muscle flap (axial pattern, rotation flap)

# Forearm radial flap procedure (axial pattern island flap)



# Tissue expander



# Thank you for your attention