Kenézy Gyula Hospital
Debrecen
Trauma and Hand Department

Department

Turchányi Béla
Head of Department of Traumatology and Hand Surgery

No one student came on 11. september
• Welcome

• Book:

www.traumatologia.deoec.hu

ID: traumatology KW lectures
lectures & practices
The place of traumatology in medicine.

Epidemiology of injuries, significance to the national economy.

Classification of injuries.

Closed and open mechanical injuries.

Progression of wound healing.

Classification of wounds.

Methods of wound care.
Historia est magistra vitae
Until the middle of XIXth century injured patients were treated mainly by magicians, bone seters & barbers !!!
- Hippocrates (cca 440 BC): fixation of injured extremities (splinting, traction)
- Documentation - oath
- Celsus (1st century A.D.) – Rubor, tumor, calor, dolor
- Dark Middle Ages
- Cosmas & Damian XIIIth century
Historia est magistra vitae

- Vesalius (1514-1564)
  » Anatomy
    - Sanatio per primam / secundam
    - pus bonum et laudabile

- Ambroise Paré (1510-1590)
  » Vascular ligation
Main steps to developing Traumatology

- **W. Morton 30th. sept. 1846. Boston USA**
  - First ether narcosis

- **Semmelweis 1847**
  - Hand-disinfection


- **Landtseiner 1901 Blood groups**

- **Kirschner 1909**
  - K wire for osteosynthesis

- **1st world war…**
Main steps to developing Traumatology

- Lorenz Böhler 1925 AUVA Hospital
  » Middle European system of traumatology
- G. Küntscher 1939
  » First intramedullary nailing
- 2nd world war…
- AO 1958
- Malt & McKhann 1962
  » First successful replantation
- 1976 Nebraska - ATLS
”What does it mean to be a trauma surgeon?”

Traumatology is an independent speciality in Hungary, Switzerland, Germany, Austria, Slovakia.
ETHYMOLOGY

trauma, traumatos
logos

traumatology • injury
• science

orthos
pes /pais

orthopaedics • straight
• leg /child

• straight leg(s)/child
Orthopaedics:

Management of injuries and the chronic and hereditary diseases of the musculoskeletal system.
(spine and the extremities)
Traumatology: treatment of all kinds of injuries

mechanical

thermic  (burn - combustion
            freezing - congelation)

chemical
The trauma can be:

unintentional:
industrial accidents
road accidents
household accidents (the most frequent!)
sport & leisure accidents (≈50 %)

disasters
The trauma can be:

intentional:
fights
violence, insults
  wars (inter arma silent musae…)
terrorism
EPIDEMIOLOGY

Trauma is the main cause of death & invalidity
1 to 45 years
12% of hospital beds!

• 10 million disabled / year!

• Daily expenses for injuryes
  » 265 million dollars! (USA)
HUNGARY:

• ~ 300 million Forint/ day

• ~ 100-120 billion Forint / year
HUNGARY

the mortality rate of accidents:

115 /100 000

11 500 deaths / year
MORTALITY STATISTICS:

1. Circulatory
2. Tumorous

3. Trauma /♂:♀=2:1/
Average age of deceased from accidents is ~ 28 years! (Working age group!)

(In cardiovascular diseases ~ 68 years…)

TRAUMA IS THE „EPIDEMIC” OF OUR TIME
Hip fracture is the most frequent type of injury in elderly
data: USA, Sweden, Hungary

1/3 of beds in Trauma & Orthopedic Departments is occupied by patients with hip fractures!

Treatment costs the government more than the health care of all diabetic patients!
Present?
Future?

Salus aegroti
suprema lex esto
Closed injuries

Open injuries
Function of skin

- Mechanic protection
- Antibacterial protection
- Thermoregulation
- Fluid balance
- Sensation
- Esthetics
- Identity
wound = discontinuity of the skin
Types of wounds

- vulnus abrasum excoriatio
- vulnus punctum stab
- vulnus scissum incision
- vulnus contusum contusion
- vulnus lacerum laceration
- vulnus sclopetarium gunshot wound
- vulnus morsum bite
- burn & frostbite, congelation
• vulnus abrasum
• Vulnus punctum
• vulnus scissum
• vulnus contusum
  crush
• vulnus lacerum
tear
• vulnus sclopetarium
Rock&roll of the bullet
high energy gun shot
• vulnus morsum
  bite
• congelation
  chillblain
Phases of wound healing

EXSUDATION

Place of the wound, direction of the wound, diabetes, blood circulation of region, neurological state, infection, drugs, immun-suppression, genetics, age?
Medicus curat...

per secundam

per primam
Sanatio per primam
Sanatio per secundam
• Wound care = restoration of the skin

• Natura sanat…
• 6 hours? (AB?)
• Wash, wash, wash (isotonic saline)
• Escision of wound, radical, but sparesome
• Excision
• Idegentest eltávolítás
• Nerve & vessels, tendons, muscles
• Close or not to close?
Take home massage

- Trauma is the 3. cause of death
- Treatment of hip fracture costs more then DM
- The intact wound can mislead the doctor
- The wound should be explored & cleaned
- The primary wound closure can be dangerous or fatal.
1. ch. AO scheme:

XYZV....
2. ch. AO scheme - localization:

1 prox. Metaph.

2 Diaph.

3 dist. metaph.

11=proximal humeral

33=distal femoral
3-4. ch. AO scheme - morphology: diaphysis

A
- simple A
  - spiral 1
  - oblique 2
  - transverse 3

B
- wedge B
  - spiral 1
  - fragmented 2
  - bending 3

C
- complex C
  - spiral 1
  - irregular 2
  - segmental 3
3-4. ch. AO scheme - morphology: metaphysis

Extra artic.

1. simple
2. metaph. wedge
3. metaph. complex.

Simple intraarticular

1. sagittal
2. palmar
3. dorsal

Complex intraarticular

1. s. artic. s. metaph.
2. c. metaph. s. artic
3. c. metaph. c. artic.

23A2 = radius dist. „typical”

43C3 = tibia dist. unstable „Pilon“
Basic principles of the fracture treatment

Original anatomical conditions

Good functional state
Basic principles of fracture treatment /considering the bone/

epositio (reduction)
Closed, invasive, open

Retentio (fixation)
Extension, splinting, plaster, operative fixation

Rehabilitatio(n)
gymnastics,
physiotherapy,
balneotherapy …

Good functional result
Results of fr. treatments:

- **Excellent** - operative
- **Good** - conservative
- **Fair** - conservative
- **Poor** - operative
OSTEOSYNTHESIS (OS)

stable OS

motion stable
weight bearing stable

adaptation OS
Indication

Prox. humerus plate, T plate

L, T mini plate

Scaphoid plate

Mini Hes condylus plate

Clavicula plate

Intramedullary nail
Reconstruction plate-curved

Cobra head plate

Lateral tibial head plate

DHS

IM nail

Tibia condylus supporting plate

Gripper plate

Calcaneus plate

Spoon plate, cloverleaf plate, T plate

L, T supporting plate

Distal tibial plate
END / Good functional result depends on…
Good functional result depends on…
Good functional result depends on…

END /
Why should we make OS?

• provide
  • original
    – length of the bone
    – axis of the bone
  • anatomical restoration of articular surfaces
  • early free motion of joints
  • early –partial- bodyweight bearing

• to speed up bone healing ???
• to short time of rehabilitation
• to avoid (reduce) invalidity
How should we operate?

- Safe the blood-supply of bone
- Provide biologically sufficient stability
- Protect or restore soft tissue coverage

»Avoid infection!!!
Skin – common integument

• mechanic protector
• antibacterial protector
• thermo regulator
• fluid equilibrium
• tactile sense
• esthetic - identification
Types of wounds

- vulnus abrasum  abrasion
- vulnus punctum  stitch, stab
- vulnus scissum  incision
- vulnus contusum  contusion
- vulnus lacerum  laceration
- vulnus sclopetarium  /gun/ shot
- vulnus morsum  bite
- thermic & xray wounds  burn frostbite
Phases of wound healing

Direction/position of the wound, diabetes, blood supply, neuropathy, infection, drugs/immunosuppression, disposition/heredity/, age?
Sanatio per primam- healing by primary intention

Difference is only in the amount of scar tissue between the edges of the wound

Sanatio per secundam- healing by secondary intention
Sanatio per secundam-secondary intention
Lines of force in the skin
Lines of force in the skin
Lines of force in the skin
Lines of force in the skin
Diaphyseal displacement types

- rotation (dislocatio ad peripheriam)

+ angulation,
+ shortening, and
+ dislocation ad periferiam
AO scheme:

- transverse
- short oblique
- long oblique (the fracture surface is twice as much as the diameter of the bone)
- spiral
- comminuted fractures
- segment or etage fracture.
Classification like M. Müller: AO (ASIF)

2.1 The plan of the classification

The fractures of each bone segment are then divided into three types and with further subdivision into three groups and their subgroups (Fig. 1.4-2) generating a hierarchical organization in detail.

The definitive subdivision of each group into subgroups may often be possible only after surgery, when the finer fracture details have been established.

These groups and subgroups are then arranged in an ascending order of severity according to the morphological complexities of the fractures, the difficulties inherent in their treatment, and their prognosis.

Fig. 1.4-1: Numbering according to the Crib system for the anatomic location of a fracture in three bone segments (proximal, distal, and axial).

Fig. 1.4-2: To express the morphological characteristics of the fractures, these types are labeled A, B, and C. Each type is then divided into three groups A1, A2, A3; B1, B2, B3; C1, C2, C3.

Fig. 1.4-3: A simple fracture, B wedge fracture, C complex fracture.

Fig. 1.4-4: Type A: Simple fractures.

Morphological classification of regions
Is the fracture really a serious injury?

- What’s the better: sprain or fracture?

- Result of bone healing is: BONE
- Damages to skin, muscles, tendons, vessels, nerves lead to aspecific SCAR formation
- In contrast to soft tissues compression of the injured bone during healing process is favourable
OSTEOSYNTHESIS

stable OS

motion stable
weight bearing stable

relatively stable OS
adaptation OS
Clinical and physical signs of

• Fractures
  – Pain
  – Deformity (swelling)
  – loss of function
  – abnormal movement
  – crepitation (bone crackling)

• Dislocations
  – Pain
  – deformity
  – loss of function
  – „empty joint”
  – elastic immobility
• Biomechanical design
  – early mobilization,
    – short stay in bed
    – short hospitalization
  – full function restoration
    – rapid return to work
• Applied materials: strong and non toxic
  – Payable

Minimize complication rate
lectures & practices