Elbow, forearm injuries

K. Fekete
Outline:

- Fractures of the elbow
- Dislocation of the elbow
- Fractures of the forearm
- Special injuries
ANATOMY

3. Lennard Funk
Anatomical reminder

Three joints:

- Humero-ulnar j.
- Humero-radial j.
- Prox. radio-ulnar j.
The elbow has a tendency towards contracture!

Contracture:
Temporary or permanent stiffness or narrowing of function of the joint.
BIOMECHANIC I.

Valgus position

Baumann angle
The position of the trochlea:
The trochlea and the pivot point of the elbow is not located in the continuation of the humerus, it is actually placed ventrally to this.

-10° /hyperextension -0-140/150°
Humeral-trochlear angle

25-40°
BIOMECHANIC II.
The role of the humeral-trochlear angle

25-40°
10. In this position that the elbow is in its most stable position as well
BIOMECHANIC III.
The distal end of the humerus similar to the front fork of a bicycle!

basic condition:
restoration of the radial and ulnar columns and the axis
Examination

Signs of fracture:
- swelling
- pain
- deformity
- crepitation
- abnormal mobility

Signs of joint dislocations:
- swelling
- pain
- deformity
- flexible immobilization
Assessment of nerve and vascular damages:

- N.radialis
- N.medianus.
- N.ulnaris
THE WELL-KNOWN DANGERS:

- Vessel injury (Volkmann ischemic contracture)
Volkmann ischemic contracture

Art. brachialis
DIAGNOSTIC bi-directional x-ray CT, 3D-CT
DSA
Fractures of the distal humerus: CLASSIFICATION (AO, ASIF)
EXTRAARTICULAR FRACTURES

• radial epicondyle injury
• ulnar epicondyle injury (A1)
• supracondylar fractures (A2)
Ulnar epicondyle injury

Treatment: open reduction, and fixation with pins or tension band wires.

ORIF:
Open reduction, Internal fixation.
MISTAKE: ABSENCE OF APPROPRIATE DIAGNOSIS
RADIAL EPICONDYLE INJURY
SUPRACONDYLAR FRACTURES
Mainly in children!

13 Y. boy.
THE DIFFERENCES IN THERAPY:

• In children:
  – closed reduction
  – pinning
  – casting

• In adults:
  – stable internal fixation
  – without plaster casting
Supracondylar fractures in adults are usually treated operatively with plate and screws.
Casting should be avoided!
Intra-articular fractures

- FRACTURES OF THE RADIAL AND ULNAR CONDYLE
- FR. OF THE HUMERAL HEAD
- TROCHLEAR FRACTURES
- INTERCONDYLAR FRACTURES
Fractures of the intra-articular surface of the joint are serious injuries

The elbow will certainly be stiff without operative treatment!

30% contracture!
(in certain publications!)
FRACTURES OF THE Ulnar Condyle

Neglected treatment. Pseudoarticulation.
FRACTURES OF THE ULNAR CONDYLE

B2 fracture 37y ♂
Total stiff elbow
3 МО
П.ОП.
TROCHLEAR FRACTURES
TROCHLEAR FRACTURE

Fr. Type B3, 18y

6 MO.

6 MO.

6 MO.

0-0-90
Osteotomy of the articular surface
6 weeks p. op.

4 years later
FRACTURE OF THE CAPITULUM HUMERI
The fracture piece can be removed!
Conservative treatment of a dislocated fracture

Neglected therapy!
4 years later...
14 Y.

FRACTURE (pseudoarticulation) OF THE CAPITULUM HUMERI
The main idea: exact reconstruction of the joint!
POSITION AND APPROACHES

Laying on the sound side

Prone position

The arm propped up
HABITUAL INCISION is on the dorsal side

„ANCONEAL FLAP“
osteotomy of olecranon: better visualise the joint surface
INTERCONDYLAR FRACTURES

1. Anatomical reposition of the articular surface
INTERCONDYLAR FRACTURES

2. stationary immobilization with screws and provisional fixation
INTERCONDYLAR FRACTURES

3. Restoration of the two lateral column
IMPLANTS

Current standard

New standard

SYNTHERES
Distal Humerus Plates (DHP).

Functional therapy may be commenced immediately following surgery!

SYNTHES
Fracture of the proximal ulna:
Distractional fracture of the olecranon

Treatment: Tension-band wiring
26 y.

0.

8. months

54.
Olecranon fracture. Plate and screws
Fr. of the prox. ulna

6 Month after injury
FRACTURE OF THE PROXIMAL RADIUS

conservative and functional therapy: plaster casting 3-4 days, careful exercises

Operative treatment

Fracture classification is associated with Mason
Radial head fr. Mason I.
Functional treatment

6 weeks after injury
Fracture of the proximal radial head (Mason 2.) In cases of large dislocation, operative incision and screwing is performed.
Mason 2.

Mini plate fixation
The removal of the radial head

Result: good mobility, but the joint is unstable!
MASON 3.fr.

Prosthesis of the radial head

Prevention of the joint instability
The head is fractured into several pieces, and is not reconstructable.
• The various stems and heads can be combined in various ways. This is why it is a modular prosthesis! (Designe from Debrecen)
ROM
3 Months after injury
ELBOW DISLOCATION: 2. Place (20%) after dislocation of the shoulder!

- RADIAL
- ULNAR
- DORSAL
- VENTRAL
- DIVERGENS
- COMBINATIONS

Dorso-radial dislocation (luxatio)
Dislocation (luxation): temporary or permanent separation of the joint surfaces from each other
Dislocation of the elbow.

„Isolated dislocation“: a dislocation without fracture
"Fracture dislocation" in addition to the dislocation the bone or bones making up the joint are also broken 25 y. Dislocation (luxation) of the elbow, fr. of the radial neck and head
Examination of the Hüter triangle:

the two epicondyles and the tip of the olecranon form an equilateral triangle.
Elbow dislocation
TREATMENT

Reduction: under local, or general anaesthesia
Examination of stability

The elbow is stable: following reduction
- physical therapy can be begun after 3 days of plaster casting.

Unstable:
- prone to re-dislocation
- the elbow should be put in a right angle plaster cast for 3 weeks.
LARGE INSTABILITY:

• Ulnar collateral ligament must be repaired
Amsterdam. The anatomy lesson of Dr. Nicolaes Tulp
Rembrandt (1632)
The radius and ulna are joined by the interosseous membrane

Assessment of the vascular and nerve function is obligatory!
Diagnosis: x-rays in two views are necessary

On one x-ray the wrist should be visible and on the other the elbow joint!
Forearm fracture: both bones are broken
Stable fracture:
if it is transverse or jagged

Casting for 6-12 weeks
(4-6 weeks)
14 y old boy. Undisplaced fr. of the ulna, dislocation of the radius. Treatment: intramedullary splinting + plaster cast for 4 weeks.
15y. 3 mo. after injury
Poor treatment option!
Unstable fractures (diagonal, long diagonal or spiral): operation is performed
- Intramedullary pinning
- Plate and screws
In open fractures: external fixation
Absolute indications for operation:

- Stage II. and III. open fractures
- Vascular injuries
- Nerve injuries
- Non-reducible fractures
Isolated fracture of the ulna
Parier fr.: the patient wards off a blow to the face
Isolated fracture of the ulna
32 y.

3 Months
Special injuries
Monteggia injury:

- fracture of the ulnar diaphysis
- dislocation of the head of the radius

Classification: BADO
Extension typ. Monteggia inj. 47. Y.
Treatment:
Reduction of the ulna.
The head of the radius is usually spontaneously reduced due to the pull of the interosseous membrane.
Flexion typ. Monteggia inj. 59 y.
Special injuries: Galeazzi injury

- Fracture of the radial diaphysis
- Dislocation of the distal radio-ulnar joint
24 Y. Galeazzi injury

3 months
Galeazzi injury
Treatment: Stabile plate fixation

2 months
Essex-Lopresti injury: dislocation of the radius at both joints, thus at the elbow and wrist joints, with the complete tearing of the interosseous membrane.