

relationships in the medial part with the crescent, and in the lateral part with the scaphoid. (fig 2)

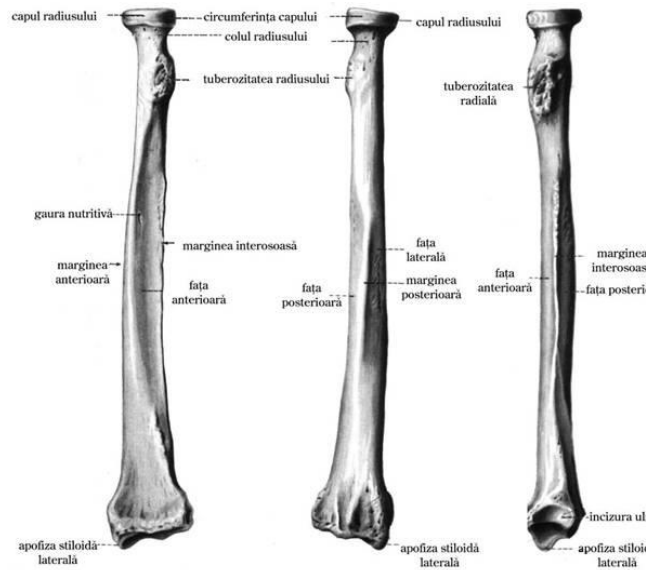


Fig 2 Radius anterior, posterior and side view

2.1.2. Anatomy and biomechanics of elbow joints

The humerus, radius and ulna participate in the formation of this joint. From a structural point of view, they all form a single joint, having a common joint capsule, but from a biomechanical point of view, two different joints must be mentioned:

the humeroantibrachial joint, a trochlear joint
the proximal radioulnar joint, which is a trochoid joint

Humeroantibrachial joint

The articular surfaces of this joint are represented by the humeral condyle (the trochlea corresponds to the articular surface of the ulna, and the head and intermediate groove, the radius), the fossa and the edge of the fossa of the radial head, as well as the trochlear incision of the ulna.

The means of attachment in the elbow joint are the joint capsule and the following ligaments:
ulnar collateral ligament: connects the medial humeral epicondyle to the edge of the trochlear notch of the ulna.

- radial collateral ligament: joins the lateral epicondyle of the humerus to the anterior and posterior parts of the radial notch of the ulna
- annular ligament: is the main means of strengthening the radioulnar ligament and detaches from the posterior end of the radial notch of the ulna
- the quadrate ligament is a four-sided fibrous sheet that runs between the lower edge of the radial notch of the ulna and the medial side of the radial neck.

The possible movements in the humeroantibrachial joint are those of flexion and extension, and in the proximal radioulnar joint are those of pronation and supination.

The distal radioulnar joint is part of the same category of joints as the distal one, that of the trochoids.

Biomechanics of the humero-ulnar (humero-ulnar) joint

It is a joint with a single degree of freedom, compared to an axis that passes transversely through the elbow and allows only flexion-extension movements.

In the sagittal plane and frontal axis - the axis of movement is perfectly transverse but oriented from outside to inside from front to back and from top to bottom passing through the middle of the trochlea of the humerus and through the middle of the humeral head. The movements are flexion-extension.

- Flexion – is the movement by which the anterior face of the forearm approaches the anterior face of the arm. The amplitude of the active movement is 140° - 150° , and the passive one is 160° . The limitation of the flexion movement is determined by the closure of the posterior part of the capsule, the brachial triceps muscle, the soft tissues at the level of the elbow fold as well as by the penetration of the coronoid process into the corresponding fossa. The movements that ensure flexion of the forearm on the arm are: biceps brachii, brachii, brachioradialis, epitrochleins, and the pronator teres muscle.

- Extension – is the movement by which the anterior face of the forearm moves away from the anterior face of the arm, it is practically the movement of returning to zero. From the anatomical position, the elbow has no extension except in cases of hyperlaxity when values of 5° - 10° are obtained, especially in women and children. The extension movement is limited by the tip of the olecranon which is stopped by the olecranon fossa as well as by the anterior ligament of the elbow which is put under tension. At the end of the extension movement, the longitudinal axis of the forearm forms with the longitudinal axis of the arm an obtuse angle of 170° open outward due to the orientation of the humeral trochlea. The muscles that perform the extension are: triceps brachii, anconeus and the extensor muscles of the fingers as a secondary action.

Proximal radioulnar joint

The articular surfaces are represented by the articular face located on the external side of the distal extremity of the ulna and the ulnar notch of the radius, at this level there is also an articular disc that is located between the bony surface of the distal ulnar and pyramidal epiphysis.

Means of attachment are the joint capsule, the joint disc, the interosseous membrane and a fibrous formation called the oblique chord. Physiologically allowed movements in this joint are supination (external rotation) and pronation (internal rotation).

Biomechanics of the proximal radioulnar joint (fig. 3)

In the case of this joint, the movement is made by the radius around the ulna through the proximal and distal radioulnar joints. These are trochoid joints, with a single axis of motion. In supination the two bones are in the same plane, the radius is located lateral to the ulna. In pronation, the radius crosses the ulna anteriorly so that the distal radial epiphysis reaches medial to the ulnar one. Movement is also possible thanks to the interosseous membrane whose cross fibers stretch in supination and relax in pronation.

- pronation - is the movement by which the forearm is pointed inwards, the palmar side of the hand being oriented downwards and the phalanx medially. The amplitude is from 0° - 80° . It is provided by the muscles: pronator teres, pronator quadratus and carpi radialis flexor.

- supination – is the movement by which the forearm rotates outwards, the palmar face of the hand being oriented upwards and the phalanx to the side. The amplitude is 0° - 85° . The movement is produced by the biceps brachii and supinator muscle.



Fig.7 Treatment of scabies

Treatment in adults

In adults, treatment varies from conservative to surgical. In isolated type I fractures, it consists of a short immobilization (3-4 days) followed by re-education, while in those associated with elbow dislocation we will be more cautious extending the immobilization to 7-10 days, if possible with a splint articulating. Immobilization will be followed by careful retraining, avoiding full elbow extension at first. In type II fracture treatment varies depending on the presence or absence of the mechanical block & propulsion, but also on the association with soft tissue injuries:

when both will be absent, the behavior is identical to that of type I fractures

the presence of the mechanical block indicates the reduction and osteosynthesis of the fracture when both will be present. Reconstruction of the anatomy by osteosynthesis is included

if osteosynthesis proves impossible, when the primitive excision of the radial head is performed. How this gesture can be generated by the instability of the elbow or the proximal translation of the radius, we have at hand:

- b1) repair of internal ligaments (in simple dislocation)
- b2) coronoid osteosynthesis
- b3) immobilizing the elbow in flexion

Child treatment

In the case of a child, it starts from the findings that through growth, many imperfections are corrected

surgical treatment has fresh functional results. Grade V and II fractures will be treated by immobilization and re-education. In the case of inclinations of the articular surfaces of more than 15°, a correction will be attempted through external maneuvers. Grade III fractures are reduced and immobilized in children up to eight years old, they are treated as in grade IV. Grade V fractures are operated and after bleeding reduction will be fixed by oblique broaching and a condyloradial broaching. However, the results of the operations are unfavorable in 2/3 cases.

2.2.2. Radial head fracture (fig. 8)

Definition - These are the fractures located between the superior radial tuberosity and the inferior bicipital tuberosity.

Late complications are determined by the non-recognition of a diaphyseal-epiphyseal detachment that evolves towards the formation of a vicious callus with the limitation of movements in the fist joint.

The treatment consists of emergency orthopedic reduction followed by immobilization in a plaster cast for 2 weeks with the hand flexed on the forearm. Old fractures benefit from surgical treatment aimed at callus removal, reduction and fixation with a Kirschner pin for 3-4 weeks.

2.2.7. Distal ulnar epiphysis fractures and detachments - These are rare fractures and can involve the ulnar styloid, the head or the elbow. Clinically, swelling, ecchymosis, pain in a fixed point are observed. The treatment consists of immobilization in a plaster cast for 2 weeks. Surgery is rarely indicated.

2.2.8. Volkmann syndrome

Definition

Described by Volkmann in 1869, this syndrome represents a progressive postischemic retraction of the muscles of the anterior lobe of the forearm. of this syndrome is found much less often nowadays, in the last 7-8 years in the Orthopedic Clinic of the "Grigore Alexandresc" hospital, not a single case has been reported, however, it must be described in order to be easily recognized from the first moments, the of the warning signs, when the therapeutic attitude can completely solve the evolution towards sequelae.

etiopathogeny

Volkmann's syndrome can occur in supracondylar humerus fracture, forearm bone fracture, or traumatic elbow dislocations. Traumatization of the brachial artery at the bifurcation, the radial and ulnar arteries or the venous return system causes ischemic muscle lesions at the level of the anterior compartment of the forearm, as well as ischemic nerve lesions that ultimately lead to irreversible muscle retraction.

The physiopathological mechanism is as follows: bone trauma causes perifocal bleeding and edema, which together with the fractured bone fragments compress the arterial vessels (brachial artery, ulnar artery or radial artery). In addition to this mechanical effect, there is also the arterial spasm caused by nociceptive stimuli from the trauma site. The circle ends by hindering the venous return which accentuates the edema amplifying the "tourniquet" effect. In this way, areas of muscle ischemia appear, initially reversible, then irreversible, which transform the muscle tissue into fibrous, rigid and retracted tissue.

Symptomatology , the premonitory or alarm signs, recognized and well interpreted, have recently made Volkmann's syndrome no longer appear in all its complexity: intense pain, localized or diffuse, in the forearm, cyanosis of the fingers accompanied by the absence of capillary pulse, swelling of the fingers , marked edema of the hand or arm or distal to the cast device, the fingers are cold and have paresthesias.

The careful supervision and the surprise of the moment of the appearance of these clinical signs, can lead to the prevention of the appearance of the syndrome with all its procession of irreversible manifestations. The condition period is characterized by the presence of three syndromes.

b1) the muscle syndrome characterized by: the claw attitude of the hand, the muscles of the anterior lodge of the forearm are atrophied, sclerotic, with retracted tendons.

The claw can be described as follows: the hand is flexed on the forearm, the proximal phalanges are in extension, and the middle and distal phalanges are flexed on the first

- 3 men

● **Distribution of patients according to the type of fracture :**

- elbow fractures: 3 patients:
 - 2 women
 - 1 men
- radius fractures: 3 patients:
 - 2 women
 - 1 men
- ulnar+radius fractures: 6 patients:
 - 1 women
 - 5 men

● **Breakdown of patients by production mechanism:**

- fall trauma: 7 patients:
 - 3 women
 - 4 men
- road accident trauma: 5 patients:
 - 2 women
 - 3 men

Table no. 1 – Presentation of the studied patients

No.	INITIALS	Age	Sex	Occupation	Sport practiced	The type of fracture	Other associated injuries
1	DR	25	F	-	Tennis	- iterative cubitus fracture dr.	-consolidated pelvic fracture
2	HR	49	F	accounting	-	-distal epiphyseal fracture radius+cubitus stg.	-multiple rib fractures C5, C6 right -fracture of the sacral wing dr
3	KE-I	30	F	Manager	Tennis	- bifocal type II open fracture with minimal cubitus displacement dr	-fracture 1/3 middle clavicle dr - right frontal cerebral contusion - chest contusion
4	ZL	43	F	Secretary	Fitness room	-fr. comminutive distal epiphysis radius dr	
5	OE-R	25	F	Trade worker	Football	- articular fracture with distal epiphysis displacement radius stg	
6	SP-V	28	m	-	Tennis	-fracture distal	-transverse

						epiphysis radius dr	apophyseal fracture L2, L3, L4
7	GD-V	35	m	Economist	Fitness room	-fracture 1/3 medial radius diaphysis with distal radio-ulnar dislocation dr	
8	HD	22	m	household	Basket-ball	- fracture 1/3 middle both bones of the left forearm	- contusion wound right leg
9	KI	26	m	Bartender	Basket-ball	- fracture 1/3 proximal both forearm bones dr	- intolerance to MOS basin
10	MC	48	m	Auto mechanic	-	-cominutive fracture 1/3 medial diaphysis radius and cubitus dr	-costal fracture C2 stg axillary arch
11	BN-S	42	m	Call center operator	-	-fracture with epiphyseal metaphyseal displacement proximal cubitus dr	
12	CD	29	m	-	Handball	- type III open fracture of both forearm bones dr	-luxation metacarpophalan geal police stg

● **Distribution of patients according to the sport practiced :**

- tennis practice: 3 patients:

- 2 women

- 1 men

- football practice: 1 patient:

- 1 woman

- 0 men

- basketball practice: 2 patients:

- 0 women

- 2 men

- handball practice: 1 patients:

- 0 women

- 1 men

- non-athletes: 5 patients.

● **Distribution of patients according to the affected forearm :**

- right: 9 patients:

- 3 women

- 6 men

- left: 3 patients.

- 2 women

- 1 men

3.2. Presentation of patients

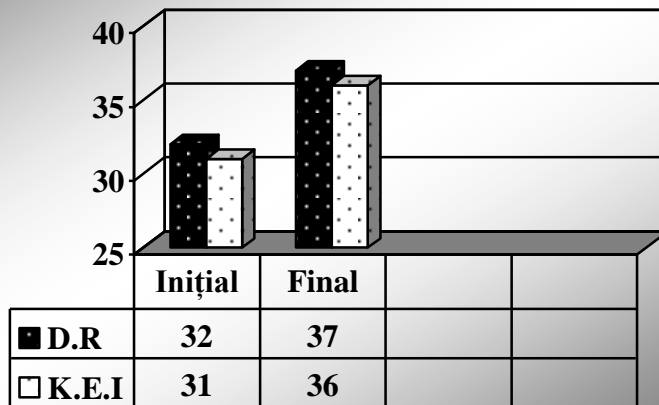
1. Initials : KI

KEI	Impossible	Impossible	Impossible	Difficult	Difficult	Average diff
ZL	Impossible	Impossible	Impossible	Average diff	Average diff	Small diff
OER	Impossible	Impossible	Impossible	Average diff	Average diff	Small diff
SPV	Impossible	Impossible	Impossible	Difficult	Difficult	Average diff
GDV	Impossible	Impossible	Impossible	Difficult	Difficult	Average diff
HD	Impossible	Impossible	Impossible	Average diff	Average diff	Small diff
KI	Impossible	Impossible	Impossible	Average diff	Average diff	Average diff
MC	Impossible	Impossible	Impossible	Difficult	Difficult	Difficult
NBS	Impossible	Impossible	Impossible	Difficult	Difficult	Difficult
CD	Impossible	Impossible	Impossible	Difficult	Difficult	Difficult

Table no. 10 - Evaluation of prehension in patients of the group studied in the stage final

INITIAL	Type I	Type II	Type III	Type IV	Type V	Type VI
DR	Small diff	Small diff	Possible	Small diff	Possible	Possible
HR	Small diff	Small diff	Possible	Small diff	Possible	Possible
KEI	Small diff	Small diff	Possible	Small diff	Possible	Possible
ZL	Small diff	Small diff	Possible	Small diff	Possible	Possible
OER	Small diff	Small diff	Possible	Small diff	Possible	Possible
SPV	Small diff	Small diff	Possible	Small diff	Possible	Possible
GDV	Average diff	Small diff	Possible	Small diff	Possible	Possible
HD	Average diff	Small diff	Possible	Small diff	Possible	Possible
KI	Average diff	Small diff	Possible	Small diff	Possible	Possible
MC	Average diff	Small diff	Possible	Small diff	Possible	Possible
NBS	Average diff	Small diff	Possible	Small diff	Possible	Possible
CD	Average diff	Small diff	Possible	Small diff	Possible	Possible

grafic.8 Valorile bilanțului articular pentru mișcarea de pronatie la la pacienții cu fractură de cubitus



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grafic.9 Valorile bilanțului articular pentru mișcarea de pronasie la pacienții cu fractură de radius+cubitus

