

An example of a case: subcapital fracture in humerus

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CLINICAL DIAGNOSIS:

Medical Diagnosis:

Subcapital fracture with tearing out of non-displacement trochiter of left humerus. There is no nervous injury. There was no surgical intervention, because a conservative treatment with immobilization during 3 weeks was chosen.

To understand these type of fractures and its medical treatment, you should know beforehand the anatomical bases of the injured zone. Therefore, I will briefly state the anatomy and physiology concepts of the humerus proximal ending.

- Anatomical aspects :

The humerus represents the third part of a sphere which borders on its outside with the anatomic head. It has two tuberosities.



The trochiter, the largest, which is found outside the head and presents three muscle insertion facets: supraspinous, infraspinous and teres minor. In our case, this tuberosity is pulled out and, consequently, this feature will affect muscle functionality. We must bare this in mind by the time we establish our treatment protocols.

The troquin, the smallest, is located beneath and in front of the head and the subscapularis muscle inserts there. The trochiter and troquin borders the bicipital groove, whose lips give insertion to the pectoralis major, latissimus dorsi and teres major. Through the middle, descends the large portion of biceps.

The superior extreme of humerus is separated from the diaphysis by the surgical neck, narrow portion of the bone, underlying outwards the troquin and underlying inwards on the lower border of the anatomical neck.

The shoulder blade collects the humerus head in its glenoid cavity. On top of this cavity, there is the supraglenoid tubercle where it inserts the tendon of the long portion of biceps and beneath in the subglenoid tubercle where it inserts the tendon of the long portion of triceps.

From a functional point of view, the shoulder is made up of five joints: 1) scapulohumeral. 2) sternoclavicular. 3) acromioclavicular. 4) scapulothoracic. 5) subdeltoid. The two last articulations are considered fake joints, from an anatomical point of view.

- Physiology Movement:

The shoulder is the joint with the most mobility of all in the human body. The movements are done in three directions:

- Flexion 180°/ extension 45-60°
- Abduction 180°/ adduction 65°
- External Rotation 80-90°/ internal rotation 80-90°

- Physiopathology :

There are two mechanisms to produce a fracture.

1. Direct: This is the mechanism through which our patient was injured.
2. Indirect: Bones are weakened because of osteoporosis.

Factors which influence the type of injury:

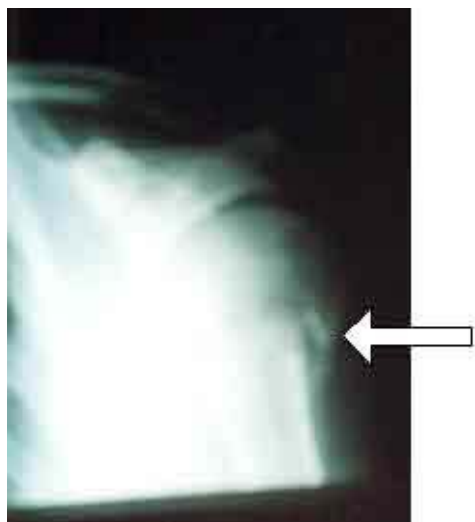
- Strength intensity
- Weight of the body and speed during the fall-over
- Direction that takes the arm at the time it hits the floor, before the impact strength spreads.

The injury mechanism determines the swift. In our case, it was a direct impact and there were no fragment displacement.

In the trochlear fractures, the supra and infraspinous and teres minor tend to swift the fragments upwards, backwards and outwards. You must bare this fact in mind in order to inform the patient not to do any abrupt contracture which could aggravate the fracture.

- Radiographic study :

The joint glenohumeral and the fact that it is located between the sagittal and coronal planes of the body makes that 2 or 3 projections are needed. These incidences allow to locate the different fragments and the humeral head in order to do a correct treatment planning.



In the radiography, we observe the fracture line where the arrow points. We can see how the subacromial space is conserved. This element will not difficult mobility.

This image is not very clear, because the scanning has lost definition.

- Medical treatment of the humerus proximal third :

The objectives of the treatment is the restitution of all the tissues involved in their anatomical normal state and the recovery of the limb with complete functionality in the less possible time.

The principal aim is to achieve the total recovery of the fractured limb through the early restoration of the injured shoulder function, which avoids the fracture illness. This depends totally in the mechanical stability which we provide to the fracture focus and which is done by the reduction and conservation of the fragment vascularization.

The reduced fracture stability is the principal reason for the pain disappearance and the lack of pain allows the immediate rehabilitation.

Stability is the factor that conditionates the traumatic injury healing and the quick tissue scarring.

In our case, the treatment done has been the conservative one since it is a non-shifted fracture. She was placed a Sling-model sling during 3 weeks, which was the necessary time to close the fracture focus (see joint photocopy).

PHYSIOTHERAPY HEALTH HISTORY:

1. Anamnesis:

- Personal patient data:

Name and surname: Anonymous

Address: Unknown

Phone: Unknown.

Age: 72

Profession: Retired

- Current problem-illness:

Medical diagnosis: Left subcapital humerus fracture with trochiter pulling out. Immobilisation with pre-manufactured bandage (Sling model) during 3 weeks (see photocopy).

Date of accident: 16/12/02 (dd/mm/yy)

Cause of accident: The patient wore plastic sole shoes which made her destabilize and loose balance while she walked on the street. She did not stumble or slip, but lost balance control.

- Pathological records:

She doesn't present known allergies, but she occasionally has pruritus in the forearm ventral zone with unknown cause.

She has previously presented tachycardia episodes, which are today normalized.

- Pain valuation:

We follow the Kipling rule:

Where: At the arm and elbow level. She doesn't show pain in the shoulder.

When: During active movement, in short, during the contraction.

How: Diffuse pain in the forearm at a moderate intensity.

2. Inspection:



Picture taken at 20/01/03



Picture taken at 20/01/03

The general attitude of the patient indicates the left (injured) superior limb in light internal rotation and adduction, specially at walk, due to pain and to possible retractions.

At the cutaneous level, she presents dehydration and skin desquamation.

At the muscle tissue level, a general atrophy is observed in the left arm and forearm.

As it can be seen from the pictures, there is an improvement in the hematoma in the arm area.

3. Palpation:

Generalized hypotony is palpated in the left superior limb due to immobilization.

The other limb has been examined, but there is no alteration whatsoever in the different tissues.

There are neither contractures, nor bilateral cervicodorsal overload.

4. Joint Balance:

The accident was on December, 16th. She had immobilization during 3 weeks and she arrived in the Rehabilitation Department on January, 17th.

Date: 17/01/03	Sane Extremity	Affected Extremity
		Activo/Pasivo
Flexion	170°	140° 145°
Extension	70°	60° 60°
Abd	170°	90° 95°
Add	80°	30° 30°
Internal Rot.	60°	45° 50°
External Rot.	70°	40° 40°

Conclusions: She was formerly done the joint balance of the sane limb in order to compare. We could affirm that the patient has a limitation of all the movements in the injured arm, specially in abduction. This limitation could be explained by a soft tissue retraction like the pectoralis major, latissimus dorsi, scapulohumeral ligaments, etc. and to the troquiter injury due to the fracture.

She was also measured the movements of the "fake" scapulothoracic joint, but there is no alteration.

5. Muscle Balance:

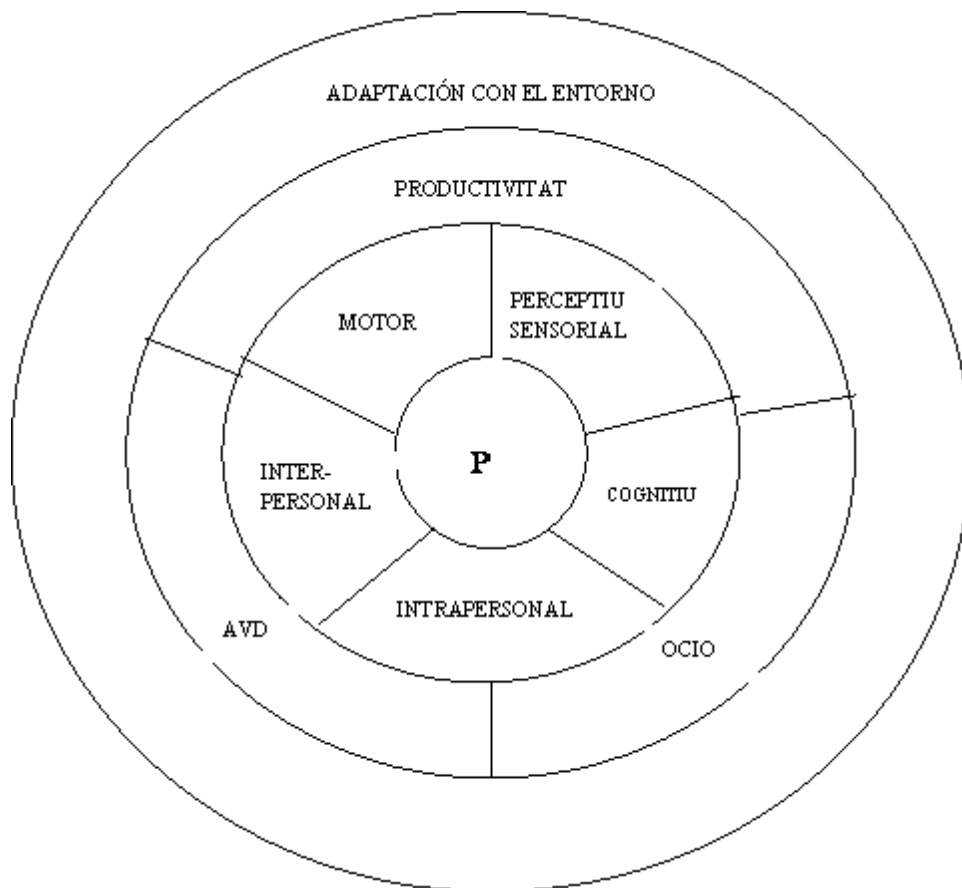
	Muscle Balance
17/01/03	
Biceps	3 -
Triceps	3 -
Deltoids	3 -

Conclusions: The patient can do the movements she is asked, but she experiences tremor because to muscle weakness. She is incapable of doing the movement with a resistance, eventhough it may be minimum.

6. Ordinary Life Activities (O.L.A.):

In order to value this parameter, she was done the Barthel and Katz index (see photocopy). She obtained a 100%, showing a total independence and autonomy. Nevertheless, she affirmed that she wasn't able to dress herself or to take a shower when she was taken the immobilization.

7. Reed Anderson :



- In the **first level** or central department, we find the patient as the representative of the problem to analyze.
- In the **second level** we find:
 - The neuromuscular or motor system: It expresses everything related to the musculoskeletal system and movement. The patient we are about to study has this department affected, since she has a movement restriction and muscle weakness in the superior left limb.
 - Sensitiv-perceptive system: Here there are the sensitivity concept (superficial or deep) and all types of pain. In our case, this area is affected since she suffers from diffuse pain in the arm and elbow area.
 - Cognitive: Means the comprehension ability. In this case, the patient has no problem in this area.
 - Interpersonal: It is the way the patient accepts the problem. In this case, the fracture. The patient is encouraged to fight and to recover to improve her life quality.
 - Intrapersonal: It is the relationship with family relatives, etc. According to what has been seen and heard from comments, there is no problem in this aspect. She speaks with other patients to amuse herself and there is a good relationship with family.
- Since there is a problem in the second level, the patient suffers from a **deficiency**.
- **In the third level**, we find:
 - O.L.A.: There is no alteration, since she has obtained the maximum punctuation in the Barthel and Katz index.
 - Entertainment: It doesn't affect neither her free time nor her recreational activities.
 - Productivity: There isn't any problem in this aspect.
- Since there is no alteration in this level, the patient does **not have disability**.
- In the **fourth level**, we deal with the environment adaptation. In this case, there aren't problems, since she can go to public or private places without any difficulty. Therefore, there is **no handicap**.

FUNCTIONAL DIAGNOSIS :

According to the world's International Physiotherapy Community, the functional diagnosis or physiotherapy diagnosis is:

" Diagnosis is the term that describes the essential disfunctions, objectives of the physiotherapy treatment. The physiotherapist identifies the disfunctions through the informations obtained from the history illness, signs, symptoms, exams and tests that the physiotherapist himself exerts or asks for".

If we analyze and summary the former definition, the physiotherapy history will help us to find the patient's deficiencies, disabilities or handicaps in order to establish the treatment aim.

In the history of our patient, we have valued the symptoms (subjective), signs (objective) and different tests have been made (Barthel, Katz, Reed Anderson) to know the adaptation to the O.L.A. and to other aspects. From these elements, we can deduce:

- The patient had an immobilization during three weeks in the left higher limb. Therefore, all the tissues were affected by generalized atrophy, a small edema at the elbow level (specially in epitrochlea) and ligament and joint capsule retraction.
- She has pain during active movement in the arm and elbow area (not in the shoulder).
- She suffers from generalized limitation of all the movements of the glenohumeral joint without alteration in the "fake" scapulothoracic joint, with a joint balance where it is shown that the most important restriction is abduction.
- In the muscle balance, a muscle weakness is observed, where biceps, triceps and deltoids have an Oxford scale degree of 3, but with high difficulty. Therefore, she can do active movement without tolerance to resistance.
- She presents a light edema at the epitrochlea level.
- She presents an hematome in the arm region.
- She has the maximum punctuation in the Barthel and Katz index. This indicates the perfect ability to do O.L.A.
- According to Reed-Anderson, the patient suffers from a deficiency, since she has the motor or neuromuscular system and the sensitive-perceptive system affected.

OBJECTIVES OF THE TREATMENT:

- In short term:
 - Pain reduction.
 - Edema reduction.
 - To prevent cervico-dorsal overload.
 - To gain joint mobility.
 - To start muscle potentiation workout.
- In medium term:
 - To achieve all the joint arche.
 - To potentiate muscles in an analytical way.
 - To potentiate muscles generally.
- In long term:
 - Make to person join in labour world, in OLA, in sports, in leasure, etc.
 - Maximum functional reeducation.

TREATMENT:

- In short term:
 - We will use cryotherapy to reduce pain. Thermotherapy is contraindicated due to the presence of edema in the superior affected limb. You can use cold-packs, surrounded by a thin towel for skin protection. Place 10 minutes in order to obtain the effect on the elbow.
 - We will apply lymphatic drainage in all the left superior limb in order to reduce edema at the epitrochlea level.
 - We will use massotherapy techniques. Maneuvers must be slow, relaxing, and discontracting at the cervico-dorsal level to prevent pain appearance in this area.
 - We will start gaining mobility by the Codman exercises: patient must be in bipedestation in front of the wall bars. He will do a slight flexion of the trunk, and from then on he will do soft and slow movements towards flexion and extension, then towards abduction and adduction and, finally, external and internal rotating movements. The aim of these exercises is to gain in flexibility and to increase joint movement.
 - Passive mobilisations in flexion-extension, abd-add and inernal-external rotation.
 - Active-attended exercises will be done to start muscle potentiation, e.g. use of pulleys. The patient is sedestation, one hand holds one side of the rope and the other hand holds the other ending. The sane hand will impulse the movement directing the affected limb while it collaborates. They must be mild exercises respecting pain tolerance.
- Also, the Neer guidelines can be done: the patient in dorsal decubitus position must take the affected extremity with the sane one with the hands and do flexion and adduction.
- Active exercises with the finger steps: the patient follows the steps of the ladder with the fingers and counts

how many she rises. In this way, you can quantify the patient's evolution. The exercise may be done with the patient in front of the ladder (in a frontal plane) to gain flexion and after with the ladder placed on the left-hand side (sagittal plane) to gain abduction.

- In medium term:

- We will continue with passive mobilisations to gain all the joint range in flexoextension, adduction and rotations.
- To potentiate muscles in an analytical way, resisting exercises must be done: for flexion, we will potentiate brachial biceps and coracobrachialis, for extension we will gain strength in the triceps, for the add, the deltoid, in the add we gain in the pectoralis major and latissimus dorsi (majorly), in the major internal rotation, subscapularis, latissimus dorsi and teres major and, finally, in the external rotation we potentiate infraspinous and teres minor.
- We will also use the contraction-relaxation technique, elastic bands like Thera-band, weights...
- To potentiate muscles as a whole, it is advised to do Kabat diagonals together with bendings. In this way, we will adapt the person to OLA, sports, etc.

- In long term:

- To achieve the maximum functional reeducation and the OLA adaptation, the Kabat exercises must be continued, since they have been created on this purpose.

We can also practise some type of sport, either individual or in group, etc.

In case there are any sequelae, difficulties can be overcome with technical helps.

DATA RETRIEVAL :

During the practical stage period I did in the Medical Center of Collblanc, I could do a new data retrieval of the affected shoulder joint balance, and a muscle balance.

- **Joint balance:**

	Sane limb	Affected limb
Date: 31/01/03		Active/Passive
Flexion	170°	160° 160°
Extension	70°	60° 60°
Abd	170°	90° 95°
Add	80°	50° 50°
Internal Rot.	60°	45° 50°
External Rot.	70°	40° 40°

- **Muscle balance:**

	Muscle balance
31/01/03	
Biceps	3 +
Triceps	3
Deltoid	3

As we can see, the patient has had a positive evolution, specially in joint balance. Our main objective in a short term of mobility gaining has been achieved. The new data retrieval shows an important difference in flexion and in adduction with an approximate 20° improvement.

In muscle balance, there has been no great difference, but in any case there has been a positive evolution.

PREVENTION RULES:

As we stated in its health history, the accident reason was to wear plastic sole shoes which made her lose stability. Consequently, the first prevention rule would be give her advise about shoes manufactured with rigid materials, preferably with noble materials which could help with transpiration and good stability. It is not advisable the use of high heels due to the fact that they reduce the sustentation base and, consequently, increase the unbalance.

The toe area, where the fingers are located, must be wide to avoid both horizontal and side compressions and therefore prevent hallux valgus and ulcers.

The backside of the shoe, must be rigid and reinforced to prevent heels movements and to avoid possible falls.

Considering the affected area in our patient, we believe that the sequelae that may persist are minimum

because the abilities of the affected arm are similar to the sane arm, and therefore they do not limitate ordinary life activities.

Nevertheless, in case any sequela may exist because of the fracture it would be a deficit in the joint balance and there are technical supports. In the market, there are many types of tools like knives with rocking chair shape, spoons of different shapes, wrist addaptors to take the fork, spoon, knives, etc.

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