CHARLES UNIVERSITY IN PRAGUE
FACULTY OF PHYSICAL EDUCATION AND SPORT
DEPARTMENT OF PHYSIOTHERAPY

CASE STUDY OF PHYSIOTHERAPY TREATMENT OF A PATIENT WITH THE DIAGNOSIS SHOULDER LUXATION

BACHELOR THESIS

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April 2014, Prague

ABSTRACT

Title: Case Study of Physiotherapy Treatment of a Patient with the Diagnosis Shoulder Luxation

Název: Kazuistika fyzioterapeutické péče o pacienta s diagnózou luxace ramenního kloubu

Author: Emmanouil Kassakis

This bachelor thesis is divided into two parts, the general part and the special part. In the general part, it is included all the theoretical information about my patient's diagnosis. Specifically, the theoretical part is composed by the basic anatomy of the shoulder joint including muscles, joint, ligaments and bones. Then the biomechanical and kinesiological field. Furthermore, it is explained in details how the shoulder luxation injury is it possible to happen.

Secondly, the special part which is the most important part of the bachelor thesis, it is composed by the whole information, examinations, therapy sessions and results of my patient. It is explained in details and in pictures of the patient during her therapy sessions as well.

There were performed to the patient about 7 therapies sessions. Starting from Wednesday 5 February 2014 and ending on Friday 14 February 2014. Each therapy session is explained in details including the procedure and the results as well.

Key words: shoulder, shoulder luxation, conservative treatment, shoulder girdle, range of motion, exercise.

DECLARATION

In this bachelor thesis, I declare that it was managed and organized by myself. I was guided by the instructions of Doc., PaedDr. Dagmar Pavlů, CSc. I was supervised by PhDr. Edwin Mahr, Ph.D and I had a patient at the C.L.P.A. (Centrum léčby pohybového aparátu), who had seven (7) therapy sessions by myself.

In the bachelor thesis I also declare that all the personal information, examinations and therapeutic procedures were applied on my own knowledge which I learned in these years of my studies at Charles University of Prague at the department of physiotherapy.

Emmanouil Kassakis
April 2014, Prague

ACKNOWLEDGES

I would like to thank all my professors for the good knowledge that I gained from them during my studies.

Basically, I would like to give special thanks to my supervisor Doc., PaedDr. Dagmar Pavlů, CSc with whom we had a very good cooperation together, for her guidelines on helping to build this bachelor thesis.

DEDICATION

During my studies at Charles University in Prague I experiences a lot of good and bad moments but I know that from these moments and from the big support of my family, I learned a lot of things because they make me stronger and never to stop what I’ve begun.

Finally, the most special thanks I would like to give to my parents to whom I know that always supported and will keep supporting me in any difficulty that I experience in my life.

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1. INTRODUCTION

During the following pages we will examine one of the most common conditions affecting the shoulder joint, the dislocation of shoulder joint. Firstly is presented the theoretical general part and secondly the special part of a case of a patient suffering from shoulder dislocation.

In the general part the anatomy of the shoulder joint is presented. Specifically all the muscles, bones and ligaments consisting and supporting not only the glenohumeral but also and the other joints contributing to a normal shoulder motion are analyzed. Some informations about the sensory and motor innervation are also given. A normal scapulohumeral rhythm and the contribution of each joint at the shoulder area is explained since it is one of the most important aspects of the functionality of the upper limb. Finally the pathology of the dislocation is explained including the types of shoulder dislocation, mechanism of injury and reduction techniques. Some therapeutic options about conservative and surgical approach are mentioned.

In the second and most important part a case of shoulder dislocation is presented. Firstly a history, mechanism of injury shall give us information about the physical status of the patient and the extension of injury. Then a physical examination will reveal any abnormality or pain affecting kinesiology and functionality of the shoulder. Finally a full therapeutic program is analyzed followed by a final kinesiology examination assessing the results of our program.

2. GENERAL PART

The human shoulder is the most mobile joint in the body. This mobility provides the upper extremity with tremendous range of motion such as adduction, abduction, flexion, extension, internal rotation, external rotation, and 360° circumduction in the sagittal plane. Furthermore, the shoulder allows for scapular protraction, retraction, elevation, and depression. This wide range of motion also makes the shoulder joint unstable. This instability is compensated for by rotator cuff muscles, tendons, ligaments, and the glenoid labrum. (35)

A complex network of anatomic structures endows the human shoulder with tremendous mobility greater than any other joint in the body. The shoulder girdle is composed of three bones (clavicle, scapula and proximal humerus) and four articular surfaces (sternoclavicular, acromioclavicular, glenohumeral and scapulothoracic). The glenohumeral joint, commonly referred to as the shoulder joint, is the principal articulation. (18)

2.1. ANATOMY

2.1.1. Bones

2.1.1.1. Clavicle

The collar bone or clavicle is an s-shaped bone. Toward the sternum is the stout sternal end toward the scapula the flat acromial end. When positioned in the skeleton the sternal convexity is oriented ventrally. The inferior side of this bone shows two characteristic apophyses for the attachment of both parts of ligament coracoclaviculare. Medially positioned is the tuberculum conoideum, lateral the linea trapezoidea is located (Figure No 1 plus radiological view) (34).

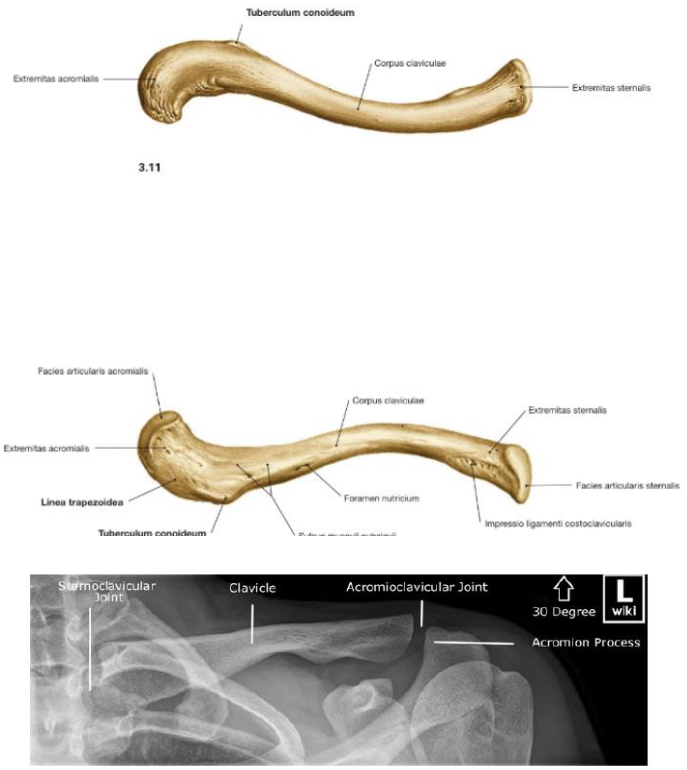

Figure No 1 - The clavicle a. Anterior surface, b. Posterior surface, according Sobotta (34).

Connections with the trunk are made through a continuous fibrous (costoclacicular) ligament and discontinuous synovial joints (sternoclavicular articulation). In the same way the parts of the shoulder girdle are connected to each other by continuous fibrous (coracoclavicular) ligament and discontinuous synovial joints (acromioclavicular articulation).

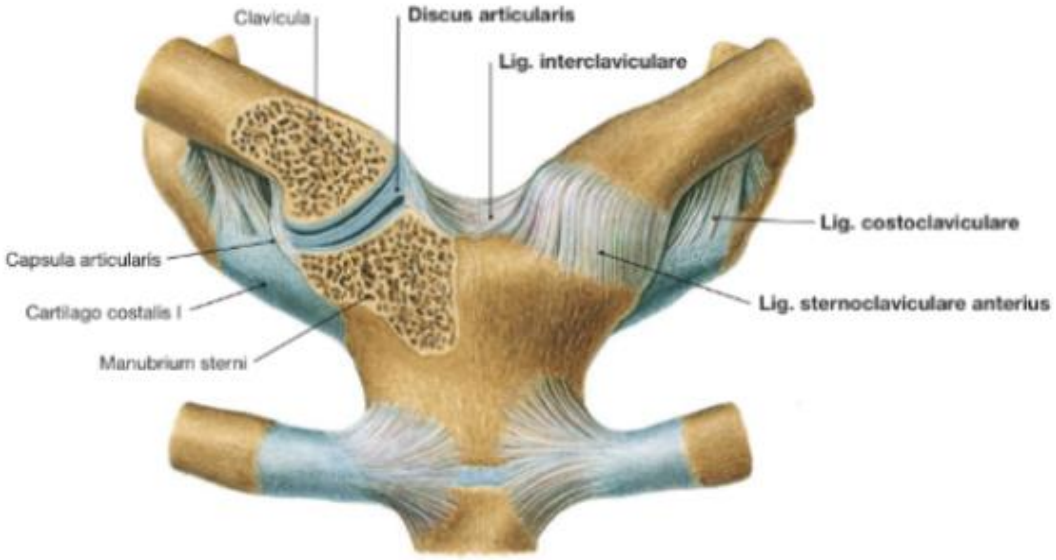

Figure No 2 – The sternoclavicular joint and ligaments according Sobotta (34)

The sternoclavicular joint is divided in two by an articular disk. The capsule is thick and is strengthened by the anterior and posterior sternoclavicular ligament. The joint has three degrees of freedom (Figure No 2). The joint is so well stabilized that fractures of the clavicle are considerably more common than dislocations of the sternoclavicular joint. In fact the clavicle is the bone most commonly fractured in humans. Trauma to the sternoclavicular joint and clavicle most commonly occurs from forces applied to the upper extremity (7). The sternoclavicular joint is the sole connection between the axial skeleton and the upper extremity. The sternoclavicular joint allows 30-35 º of upward elevation, 35 º of antero-posterior movement, and 44-50 º of rotation about the long axis of the clavicle (9).

The acromioclavicular joint is consisted of two opposing almost flat joints. The capsule has a strengthening ligament, the acromioclavicular ligament. Other supportive ligaments are the coracoclavicular ligament which extends between the coracoid process and the clavicle and is divided into trapezoid and conoid ligament (Figure No 3). Due to its position, any subluxation of the clavicle can compress or damage the subclavian artery or the brachial plexus (3, 4). Little motion exists in this joint.

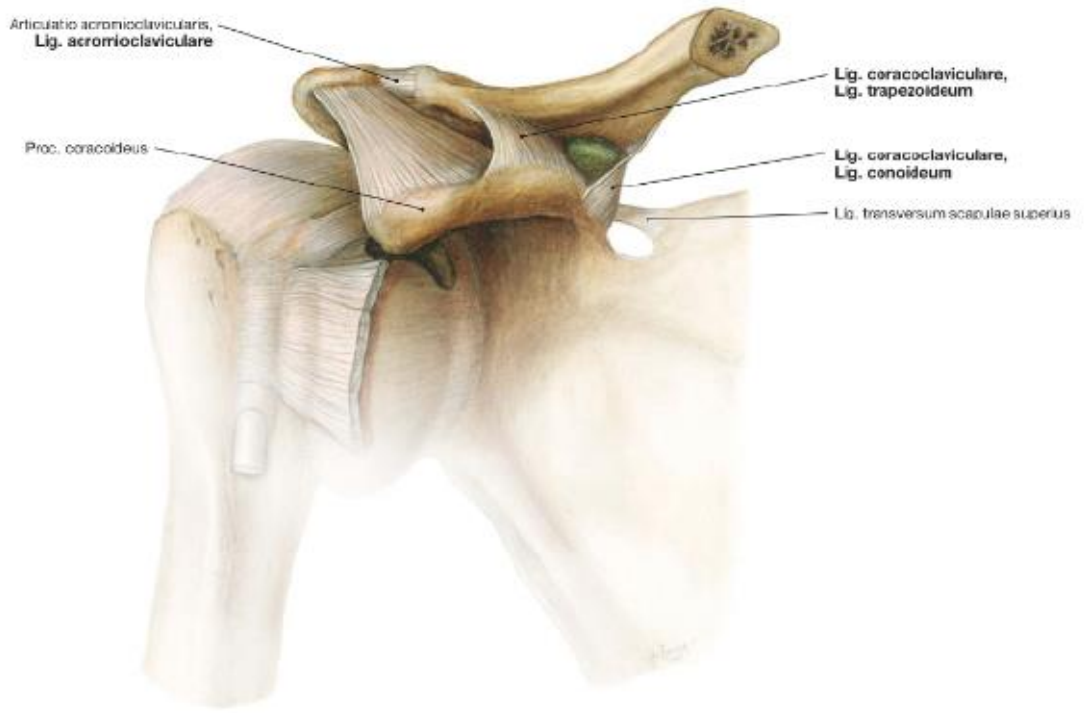

Figure No 3 - The acromioclavicular joint and ligaments according Sobotta (34).

2.1.1.2. The scapula

In anatomy, the scapula (plural scapulae) (Medical Latin; from Greek σκάπτειν (skaptein), meaning "to dig"), or shoulder blade, is the bone that connects the humerus (upper arm bone) with the clavicle (collar bone). Like their connected bones the scapulae are paired, with the scapula on the left side of the body being roughly a mirror image of the right scapula. In early Roman times, people thought the bone resembled a trowel, a small shovel. The shoulder blade is also called omo in Latin medical terminology (9).

The shoulder blade is a flat bone with three margins (medial, lateral, superior) and three angles (superior, inferior, lateral). The anterior or costal surface is flat and slightly concave (subscapular fossa). The posterior surface is divided by the spine of the scapula into a smaller supraspinatus fossa and a larger infraspinatus fossa. The spine of the scapula terminates in a flattened process, the acromion.

The lateral angle bears the glenoid cavity which is non deep in contrast to the lunate surface of acetabulum allowing the shoulder joint to move freely but also predisposing it to "instability". The coracoid process lies above the glenoid cavity and together with the acromion it protects the joint which lies beneath it (Figure No 4).

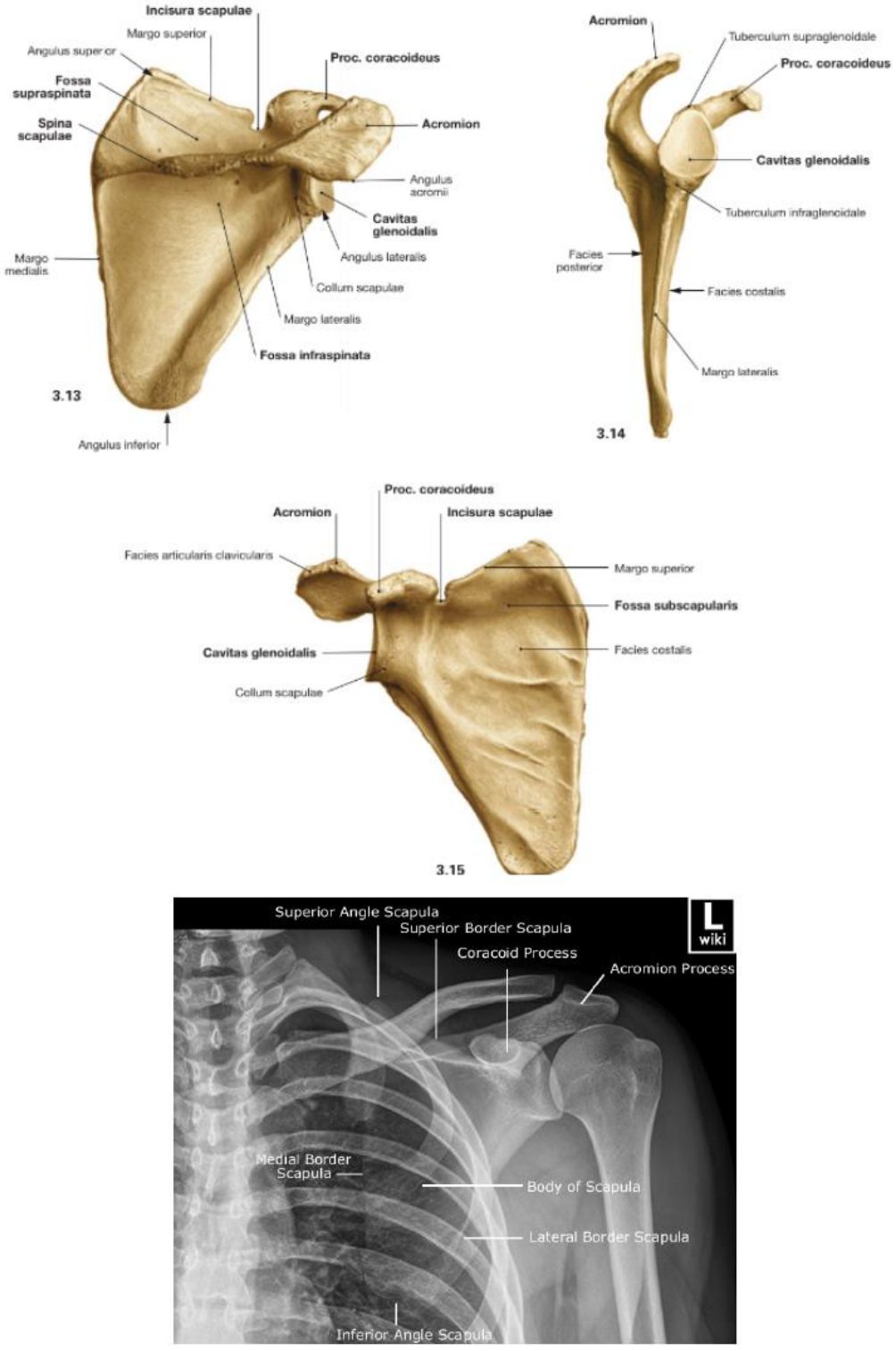

Figure No 4 - The scapula and frontal radiologic view according Sobotta (34).

The scapula lies on the thorax with the base of its spine at the level of the third thoracic vertebra. The inferior angle of the scapula should lie between ribs 7-8 when the arms hang down, its medial margin should be parallel to the row of spinous process. Movements of the scapula are brought about by scapular muscles: elevation, depression, protraction (abduction) retraction (adduction) upward (lateral) rotation, downward (medial) rotation, anterior tipping and posterior tipping.

The scapulothoracic joint is an atypical joint that lacks all of the traditional characteristics of a joint except one, motion. The primary role of this joint is to amplify the motion of the glenohumeral joint, thus increasing the range and diversity of movements between the arm and trunk. In addition with its surrounding musculature is described as an important shock absorber protecting the shoulder, particularly during falls on an outstretched arm (21).

The main ligaments of the scapula is the coracoacromial ligament (between the coracoid process and the acromion) and the superior transverse scapular ligament (31) (Figure No 5).

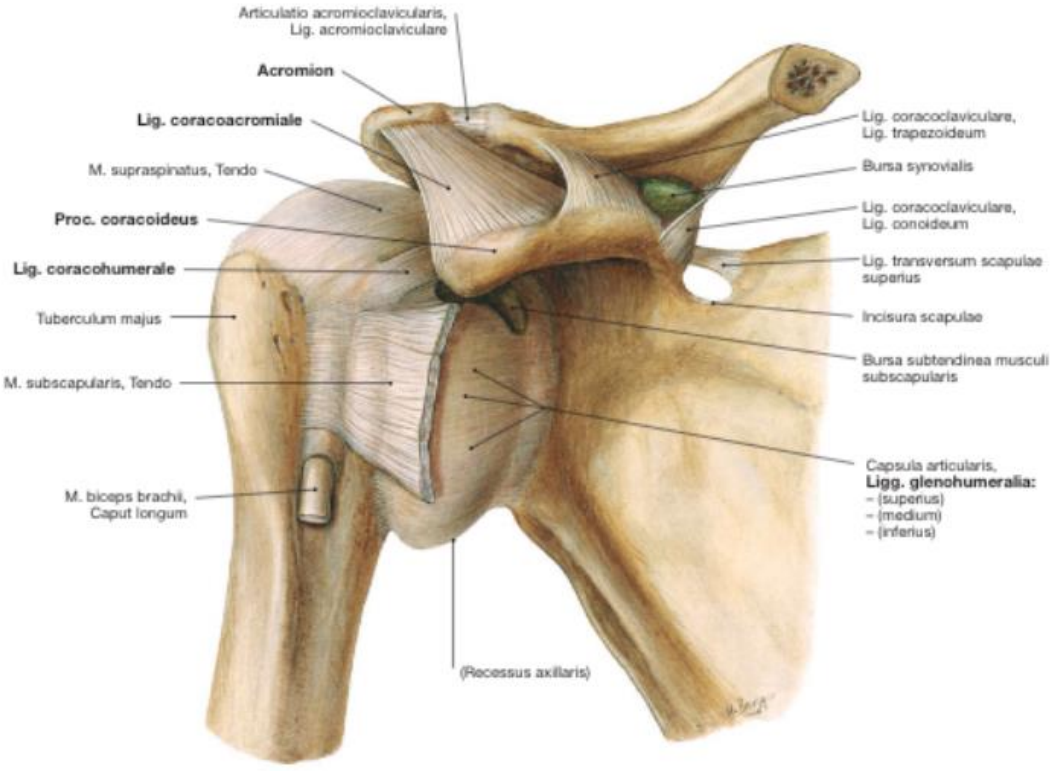

Figure No 5 - The shoulder joint and ligaments according Sobotta (34).

2.1.1.3. The Humerus

Anatomically, it connects the scapula and the lower arm (consisting of the radius and ulna), and consists of three sections. The upper extremity consists of a rounded head, a narrow neck, and two short processes (tubercles, sometimes called greater and lesser tuberosities). Between the tubercles begins the intertubercular sulcus. Its body is cylindrical in its upper portion, and more prismatic below. In the middle of the body lies laterally the deltoid tuberosity. The lower extremity consists of 2 epicondyles, 2 processes (trochlea & capitulum), and 3 fossae (radial fossa, coronoid fossa, and olecranon fossa) (Figure No 6-7-8). As well as its true anatomical neck, the constriction below the greater and lesser tubercles of the humerus is referred to as its surgical neck due to its tendency to commonly get fractured, thus often becoming the focus of surgeons, 50% of the fractures occur in the shaft (sulcus nervi radialis) where there is a risk of damage to the radial nerve. More peripheral fractures (sulcus nervi ulnaris) may damage the ulnar nerve.

The humeral head forms an angle of 150-180 degrees with the axis of the humeral shaft. In addition the head shows a retro-torsion of 15-30 degrees and a posterior rotation relative to its axis (19). Beside the surrounding musculature (that will be discussed later) the humerus is connected and stabilized to the torso with a number of ligaments, with the glenohumeral and coracohumeral being the most important. Three glenohumeral ligaments exist: the superior glenohumeral ligament (SGHL), the middle glenohumeral ligament (MGHL) and the inferior glenohumeral ligament (IGHL) (Figure No 5). The SGHL has a variable origin and inserts on the humerus near the lesser tubercle; this ligament resists inferior translation of the humeral head in the adducted shoulder. The MGHL originates from the labrum and inserts on the humerus medial to the lesser tubercle; this ligament resists inferior translation in the adducted and externally rotated shoulder. The IGHL originates from the labrum and the adjacent glenoid neck, inserts on the anatomic neck of the humerus, and resists humeral head anterior and posterior translation. Furthermore, the IGHL is the primary restraint to inferior dislocation in the abducted shoulder.

The coracohumeral ligament (CHL) originates on the base and lateral border of the coracoid process of the scapula and inserts on the greater tubercle.

The biomechanical function of this ligament is not fully understood, however, it appears to have suspensory function of the humeral head (Figure No 5) (31).

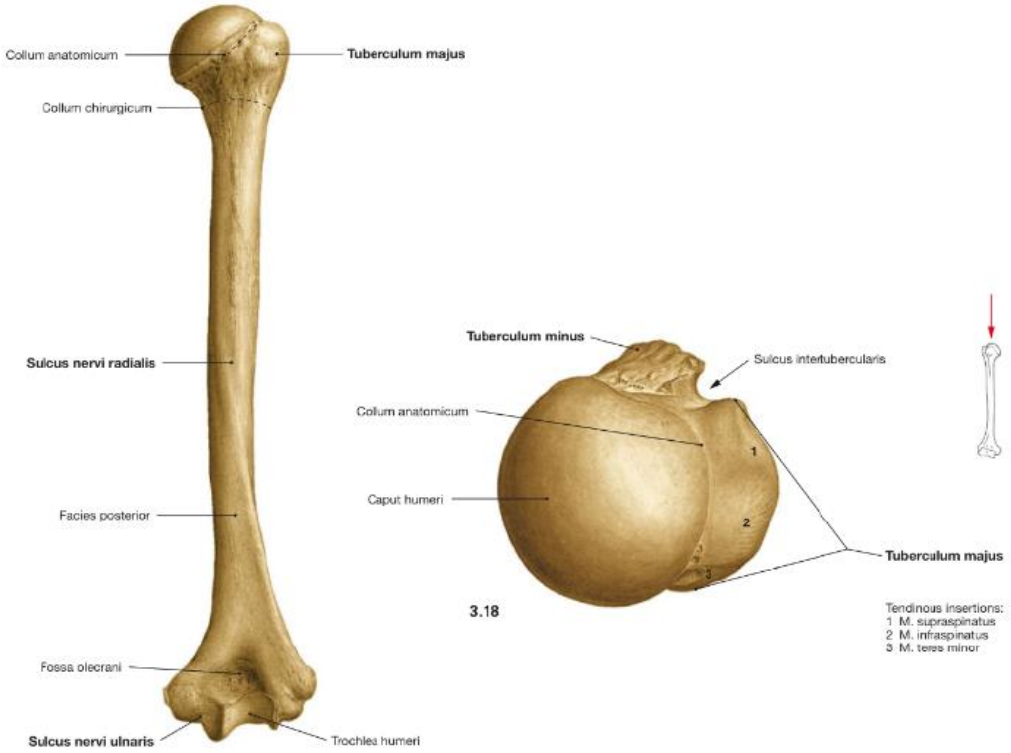

Figure No 6 - The humerus right side dorsal and proximal view according Sobotta

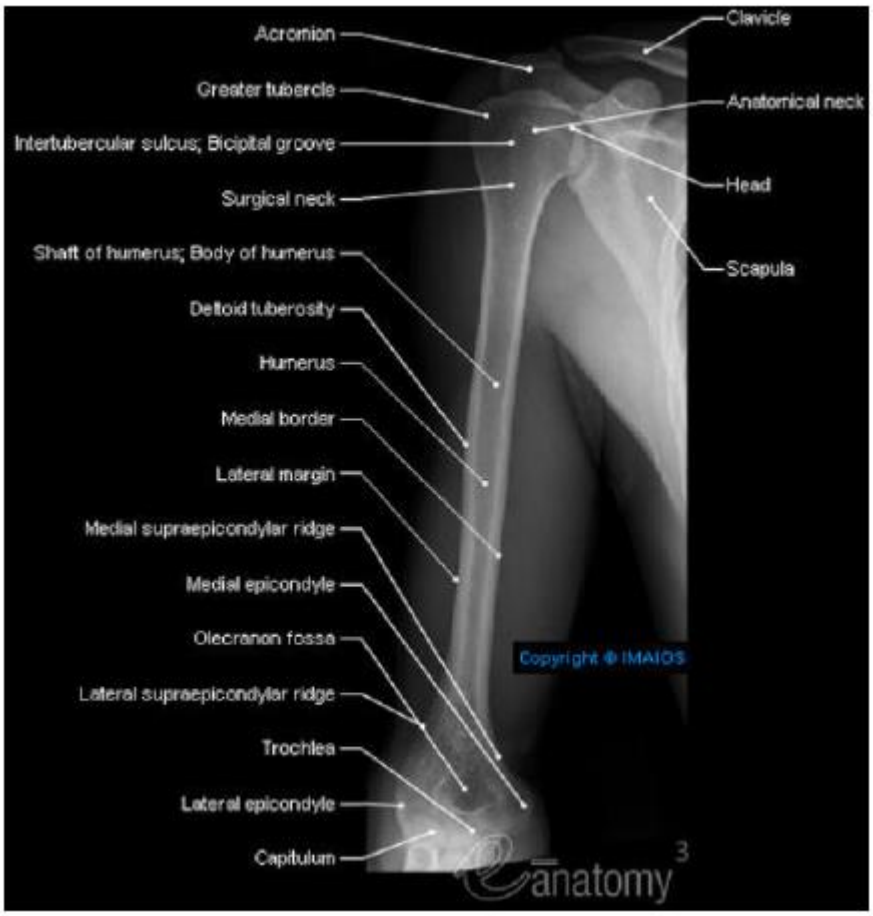

Figure No 7 - Frontal radiologic view of humerus according Sobotta

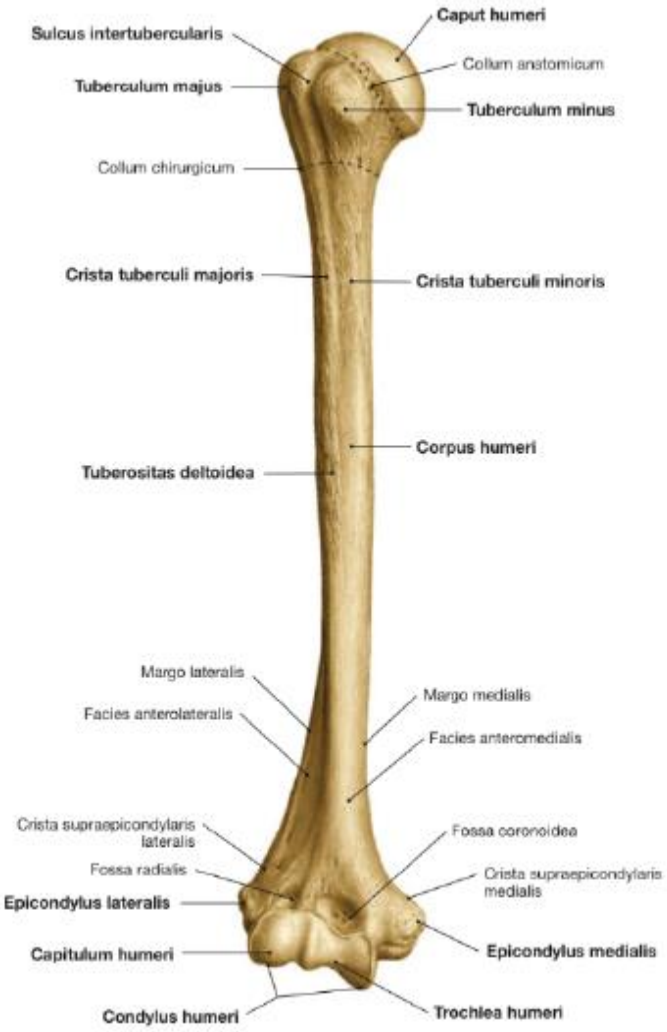

Figure No 8 - The humerus right side, ventral view according Sobotta (34).

2.1.1.4. The Glenohumeral Joint

Although the glenohumeral joint is frequently referred to as the shoulder joint, it must be emphasized that the "shoulder" is a composite of four joints, of which the glenohumeral joint is only a part, albeit a very important part. The glenohumeral joint is a classic ball-and-socket joint that is the most mobile in the human body. Yet its very mobility presents serious challenges to the joint's inherent stability. The interplay between stability and mobility of this joint is a major theme that must be kept in mind to understand the mechanics and pathomechanics of the glenohumeral joint (6). The two articular surfaces, the head of the humerus and the glenoid fossa, are both spherical, yet only 25% of the humeral head surface makes contact with the glenoid cavity.

The glenoid labrum is a ring composed of mostly dense fibrous tissue. The average depth of the glenoid cavity is 2.5 mm, but the labrum serves to increase this depth (34).

Although the labrum increases the depth and volume of the glenoid cavity, it does not seem to increase the stability of the glenohumeral joint (36).

The synovial articular capsule is attached to the glenoid lip. It is evaginated pouch-like along the intercapsularly coursing tendon of the long head of biceps and surrounds it as the synovial sheath of the intertubercular groove. The fibrous portion of the joint capsule in the upper arm forms a connective tissue layer across the intertubercular sulcus and converts it into on osteofibrous canal. The upper portion of the capsule is strengthened partly by the coracohumeral and the three glenohumeral ligaments (Figure No 5-9-10-11) (19).

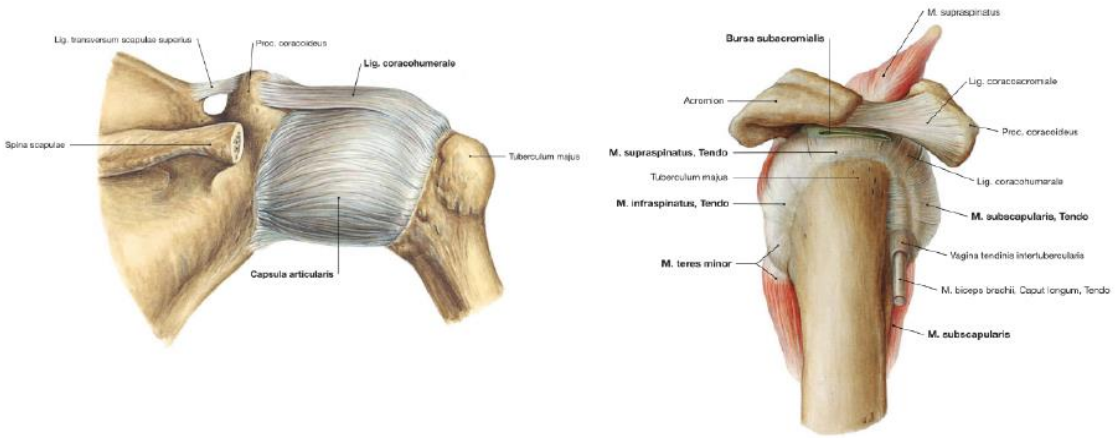

Figure No 9, 10 - The shoulder joint dorsal and lateral view according Sobotta (34).

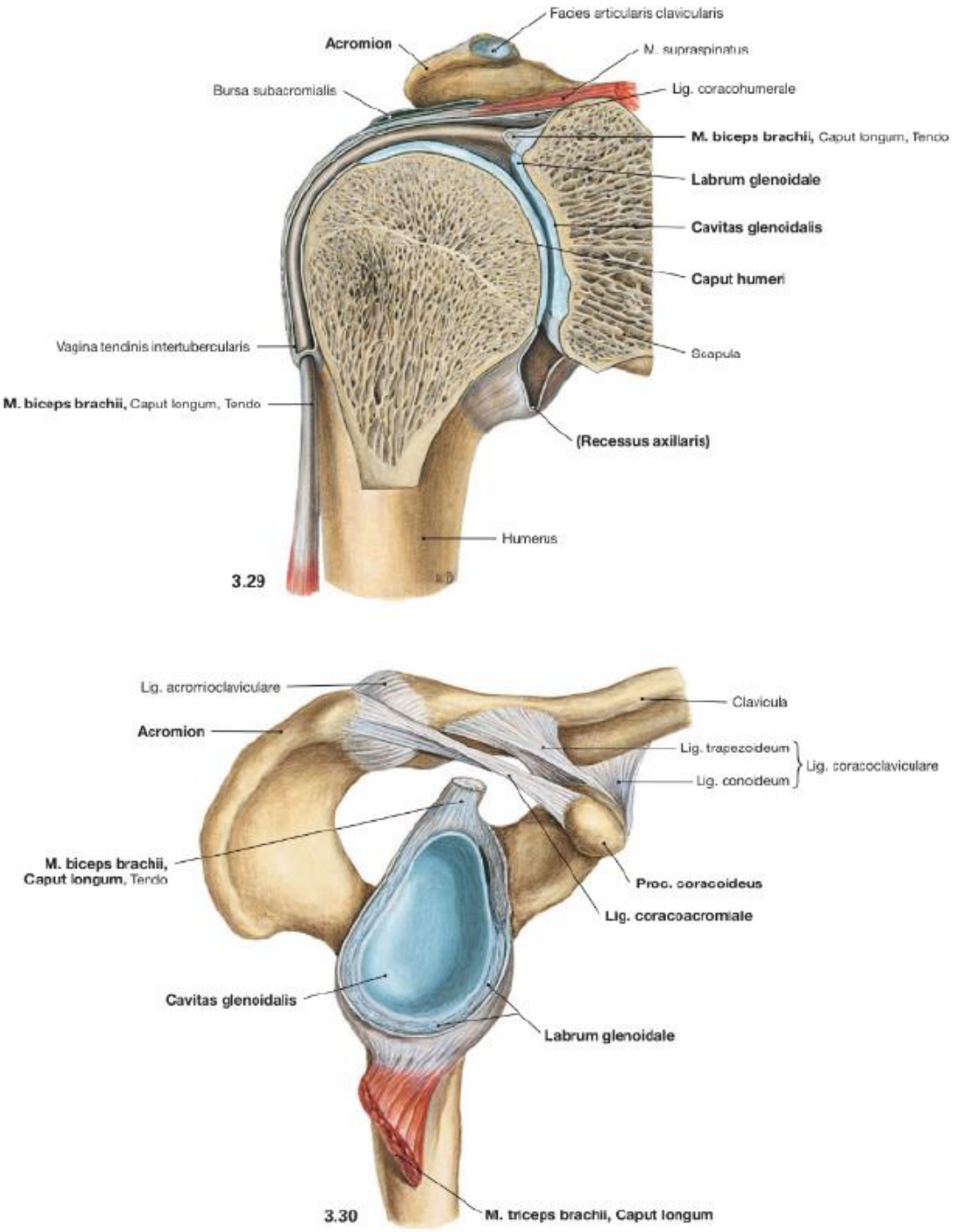

Figure No 11- The shoulder joint right side according Sobotta (34).

The shoulder joint is associated with a number of synovial sacs. Some of them are the subcoracoid bursa the subtendinous bursa of the subscapular muscle, the intertubercular synovial sac and the bursa of the coracobrachial muscle. These sacs enable friction free movement of the head of the humerus and the tendons of the rotator cuff muscles beneath the acromion.

Several muscles contribute to the stability of the shoulder joint through insertion of their tendons in the joint capsule. These muscles are collectively called rotator cuff subscapularis support the joint capsule from the ventral, supraspinatus from the superior, infraspinatus and terres minor from the dorsal aspect. Thus, the inferior aspect is the weakest part of the joint capsule. In addition to stabilization, the rotator cuff provides the shoulder with tremendous mobility. (Figure No 10) (34).

Summarizing the supporting structures of the glenohumeral joint consist of the:

• Labrum
• Capsule
• Three glenohumeral ligaments
• Coracohumeral ligament
• Surrounding musculature

Motions of glenohumeral joint

As a ball-and-socket joint, the glenohumeral joint has three axes of motion that lie in the cardinal planes of the body. Therefore the motions available at the glenohumeral joint are:

• Flexion/extension
• Abduction/adduction
• Medial/lateral rotation

Flexion and abduction in the sagittal and frontal planes of the body, respectively, occur with simultaneous rotation of the glenohumeral joint about its long axis, lateral rotation with abduction, and medial rotation with flexion It has been theorized that this motion helps prevent contact between the greater tubercle and the acromion. Movement of the greater tubercle toward the acromion narrows the sub-acromial space that contains the sub-acromial bursa, the muscle and tendon of the supraspinatus, the superior portion of the glenohumeral joint capsule, and the intraarticular tendon of the long head of the biceps brachii muscle. Thus lateral rotation of the glenohumeral joint during abduction is important in preserving the subacromial space. Lateral rotation of the glenohumeral joint also is required to avoid impingement of the greater tubercle on the superior rim of the glenoid fossa Clearly, lateral rotation of the humerus is essential for full, pain-free abduction of the glenohumeral joint in the frontal plane (Figure No 12) (38).

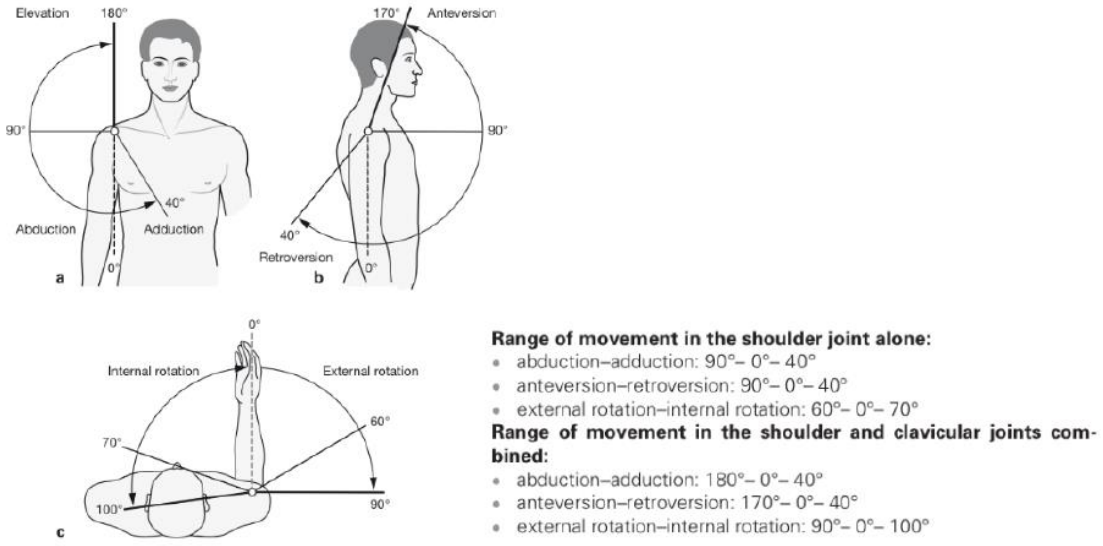

Figure No 12- Range of movement in the shoulder joint according Sobotta (34).

Scapulohumeral rhythm

During arm–trunk elevation the scapula rotates upward as the glenohumeral joint flexes or abducts. In addition, the scapula rotates posteriorly about a medial– lateral axis and laterally about a vertical axis during shoulder elevation. It has long been recognized that the upward rotation of the scapula and the flexion or abduction of the humerus occur synchronously throughout arm–trunk elevation in healthy individuals. In the last 50 years, several systematic studies have been undertaken to quantify this apparent rhythm, known as scapulohumeral rhythm (20) for every 2 degrees of glenohumeral joint abduction or flexion there is 1 degree of upward rotation at the scapulothoracic joint, resulting in a 2:1 ratio of glenohumeral to scapulothoracic joint movement in both flexion and abduction. Thus the glenohumeral joint contributes approximately 120 degrees of flexion or abduction and the scapulothoracic joint contributes approximately 60 degrees of upward rotation of the scapula, yielding a total of about 180 degrees of arm–trunk elevation

(Figure No 13-14) (26, 28).

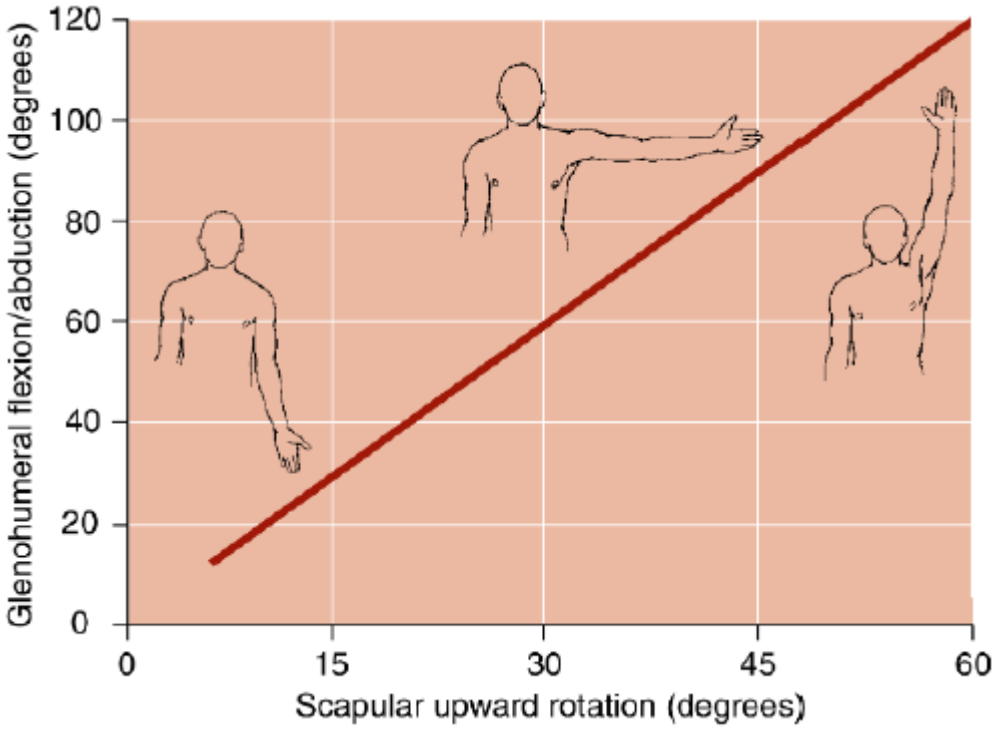

Figure No 13 - Contribution of the glenohumeral and scapulohumeral joints to arm–trunk motion. There is approximately 2 degrees of glenohumeral motion to every 1 degree of scapulothoracic motion during shoulder flexion or abduction according Karduna (20).

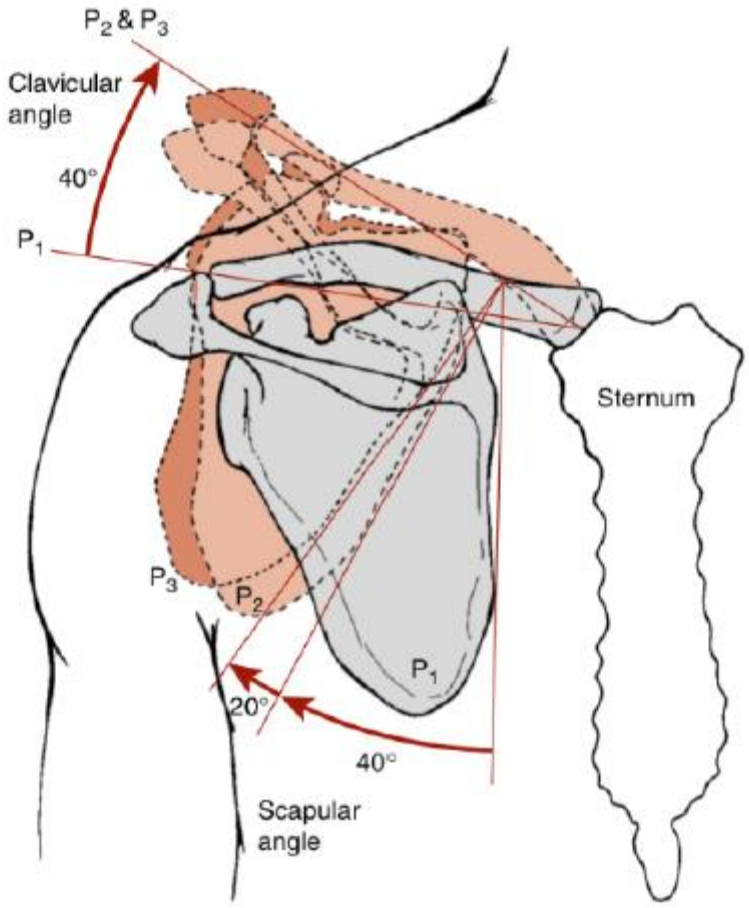

Figure No 14 - Motion of the sternoclavicular and scapulothoracic joints during arm–trunk motion. The scapula and clavicle move together throughout much of shoulder flexion and abduction. During this motion, the scapula rotates upwardly approximately 60 degrees while the clavicle elevates only about 40 degrees. The difference causes the scapula to move away from the clavicle toward the end of the ROM. Initially the clavicle elevates as the scapula rotates upward approximately 40 degrees from position one (P1) to position two (P2). The scapula continues to rotate another 20 degrees from P2 to P3 (position 3), but the clavicle does not elevate any more through this same excursion. Instead, the clavicle undergoes upward rotation about its long axis from P2 to P3 according Mac Quade (28).

2.1.2. Muscles

The shoulder girdle muscle may be grouped ontogenically into those which have migrated from the trunk into the upper limb, those which extend secondarily from the arm into the trunk and those which have immigrated as craniothoracic muscles from the head to the shoulder girdle (19).

Shoulder girdle muscles with insertion on the humerus

Dorsal muscle group:

- Supraspinatus
- Infraspinatus
- Teres minor
- Teres major
- Deltoid
- Subscapularis
- Latissimus dorsi

Ventral muscle group:

- Coracobrachialis
- Pectoralis major
- Pectoralis minor

Migrated trunk muscles which insert on the shoulder girdle

Dorsal muscle group:

- Rhomboideus major
- Rhomboideus minor
- Levator scapulae
- Serratus anterior

Ventral muscle group:

- Subclavious
- Omohyoid

Cranial muscles which insert on the shoulder girdle

• Trapezius

• Sternocleidomastoid

Supraspinatus Muscle	
O	Supraspinous fossa of the scapula
I	Greater tubercle of the humerus
A	Shoulder abduction
N	Suprascapular nerve (C5, C6)

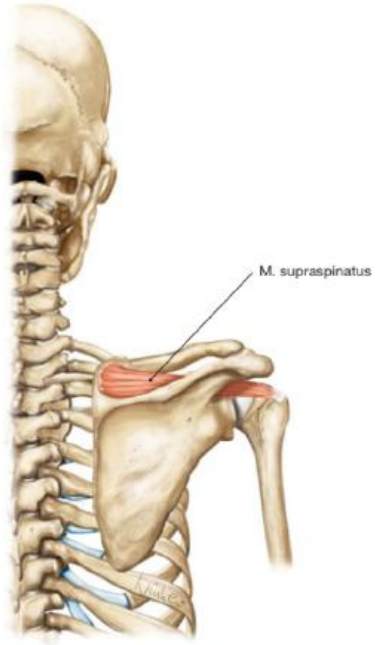

Figure No 15 - Supraspinatus according Sobotta (34).

The supraspinatus muscle holds the humerus in its socket, tenses the capsule and abducts the arm. Tendonopathy of the muscle cause by excessive strain or trauma is common. It is associated with calcification in the tendon near the greater tubercle and causes severe pain on abduction (25).

Infraspinatus Muscle

O	Infraspinous fossa of scapula
I	Greater tubercle of humerus
A	Shoulder lateral rotation, horizontal abduction
N	Suprascapular nerve (C5, C6)

Teres Minor Muscle

O	Axillary border of scapula
I	Greater tubercle of humerus
A	Shoulder lateral rotation, horizontal abduction
N	Axillary nerve (C5, C6)

Teres Major Muscle

O	Axillary border of scapula near the inferior angle
I	Crest below lesser tubercle inferior to the latissimus dorsi muscle attachment
A	Shoulder extension, adduction, and medial rotation
N	Lower subscapular nerve (C5, C6, C7)

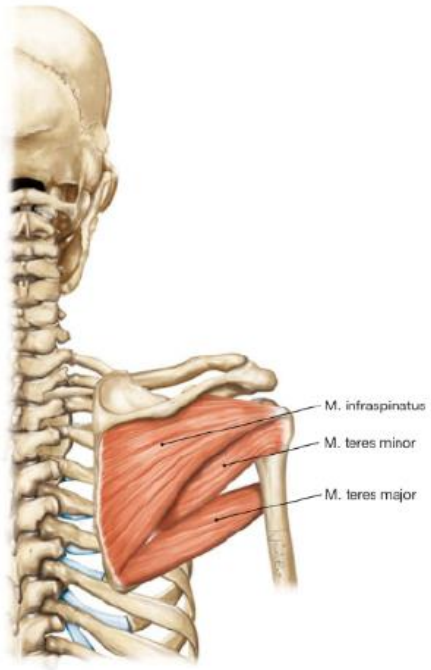

Figure No 16 - Infraspinatus, Teres major and minor according Sobotta (34).

Infraspinatus has a main function, external rotation of the arm. Near the joint socket there is often the subtendinous bursa of the of the infraspinatus muscle. Teres minor is a weak lateral rotator of the arm and sometimes can be fused with the infraspinatus. Teres major can be fused with latissimus dorsi or be completely absent (25).

Anterior Deltoid Muscle

O	Lateral third of the clavicle
I	Deltoid tuberosity
A	Shoulder abduction, flexion, medial rotation, and horizontal adduction
N	Axillary nerve (C5, C6)

Middle Deltoid Muscle

O	Acromion process
I	Deltoid tuberosity (same as anterior deltoid muscle)
A	Shoulder abduction
N	Axillary nerve (C5, C6)

Posterior Deltoid Muscle

O	Spine of scapula
I	Deltoid tuberosity (same as anterior deltoid muscle)
A	Shoulder abduction, extension, hyperextension, lateral rotation, horizontal abduction
N	Axillary nerve (C5, C6)

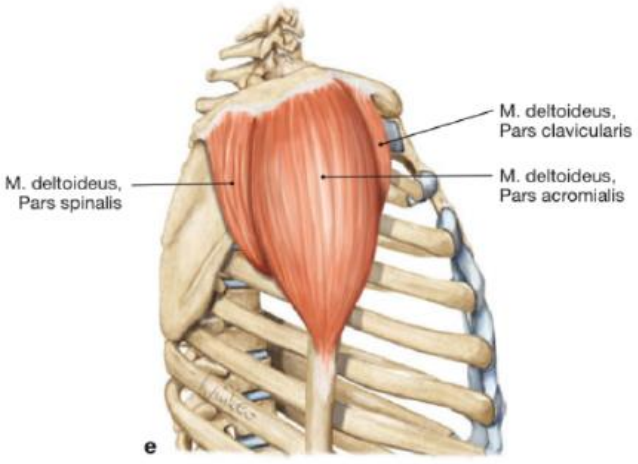

Figure No 17 - Deltoid muscle according Sobotta

The deltoid muscle is divided into three parts, clavicular, acromial and spinal. The three sections act partly as synergists and partly as antagonists. It is the most important abductor of the shoulder joint. Abduction up to 90 degrees is performed by deltoid, for the rest range of motion supraspinatus contributes more.

The first two thirds of abduction is completed mainly by the acromial part and the rest one third by the clavicular and spinal part (19).

Subscapularis Muscle	
O	Subscapular fossa of the scapula
I	Lesser tubercle of the humerus
A	Shoulder medial rotation
N	Upper and lower subscapular nerve (C5, C6)

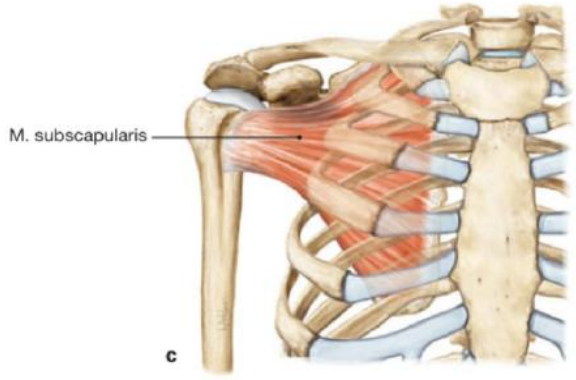

Figure No 18 - Subscapularis muscle according Sobotta (34).

Latissimus Dorsi Muscle	
O	Spinous processes of T7 through L5 (via dorsolumbar fascia), posterior surface of sacrum, iliac crest, and lower three ribs
I	Medial floor of bicipital groove of humerus
A	Shoulder extension, adduction, medial rotation, hyperextension
N	Thoracodorsal nerve (C6, C7, C8)

Figure No 19 - Latissimus dorsi muscle according Sobotta (34)

Between the subscapularis and the joint capsule occurs the subtendinous bursa of the subscapularis muscle and between it and the base of the coracoid process lies the subcoracoid bursa. Both bursae are connected with the joint space.

Latissimus dorsi is broad and flat and is the largest muscle in humans. The muscle enables a strong retroversion movement of the anteverted arm (such as raising the arm to the trunk when climbing). However with the arms fixed its action aids in the compression of the thorax like when coughing, patients with COPD develop a strong latissimus dorsi (34).

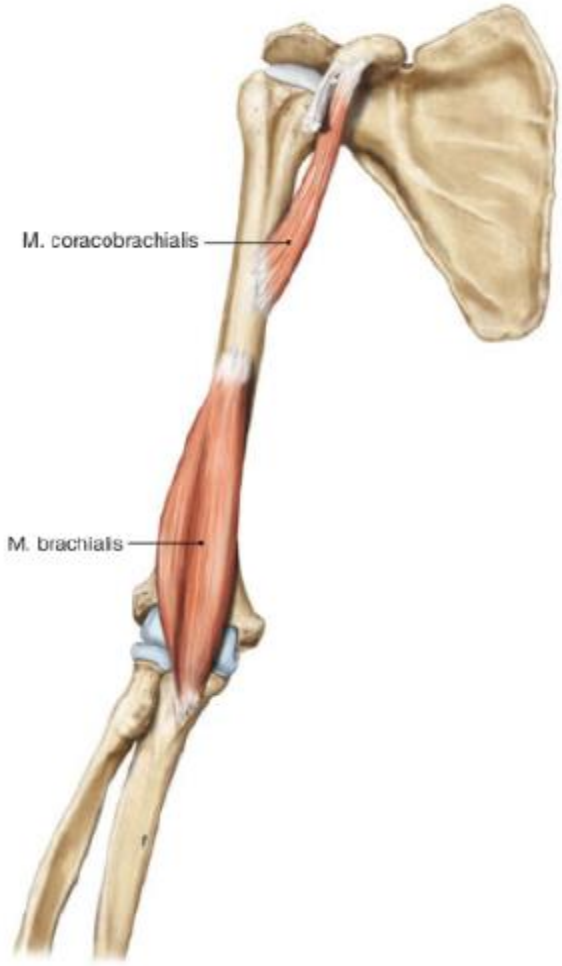

Figure No 20 - Coracobrachialis according Sobotta (34).

Pectoralis Minor Muscle	
O	Anterior surface, third through fifth ribs
I	Coracoid process of the scapula
A	Scapular depression, protraction, downward rotation, and tilt
N	Medial pectoral nerve (C8, T1)

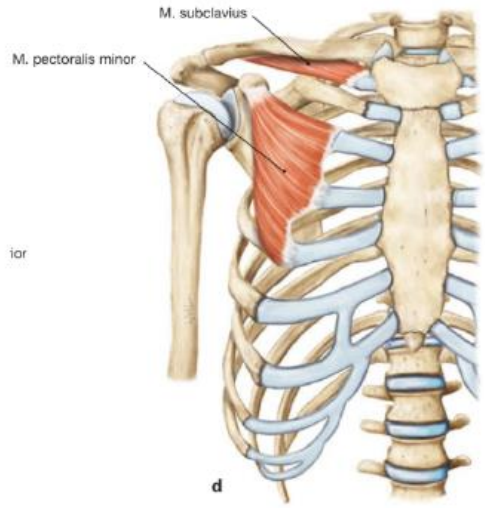

Figure No 21 - Pectoralis minor according Sobotta (34).

Pectoralis Major Muscle, Clavicular Portion	
O	Medial third of clavicle
I	Lateral lip of bicipital groove of humerus
A	Shoulder flexion—first 60 degrees
Pectoralis Major Muscle, Sternal Portion	
O	Sternum, costal cartilage of first six ribs
I	Lateral lip of bicipital groove of humerus (same as clavicular portion)
A	Shoulder extension—first 60 degrees (from 180 degrees to 120 degrees)
Pectoralis Major Muscle, Clavicular and Sternal Portions	
A	Shoulder adduction, medial rotation, and horizontal adduction
N	Lateral and medial pectoral nerve (C5, C6, C7, C8, T1)

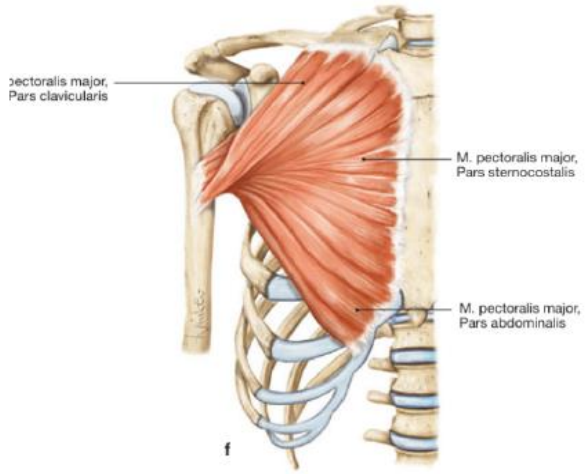

Figure No 22 - Pectoralis major according Sobotta (34).

The pectoralis major is the strongest muscle for anteversion and adduction of the arm. Additionally the muscle can act as an accessory muscle during inspiration if the arms are fixed. Exhausted athletes after a race may be seen to prop up their arms on their trunk so that the muscle can be brought into action to elevate the thorax (34).

Levator Scapula Muscle	
O	Transverse processes of first four cervical vertebrae
I	Vertebral border of scapula between the superior angle and spine
A	Scapular elevation and downward rotation
N	Third and fourth cervical nerves and dorsal scapular nerve (C5)

Rhomboid Muscles	
O	Spinous processes of C7 through T5
I	Vertebral border of scapula between the spine and inferior angle
A	Scapular retraction, elevation, and downward rotation
N	Dorsal scapular nerve (C5)

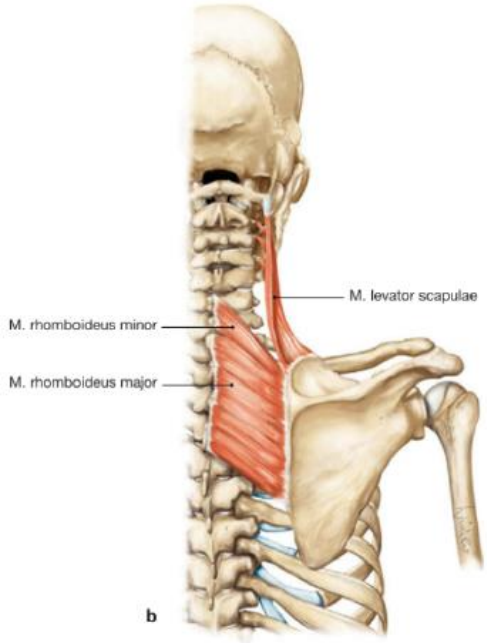

Figure No 23 - Rhomboid muscles and levator scapula according Sobotta (34).

Serratus Anterior Muscle	
O	Lateral surface of the upper eight ribs
I	Vertebral border of the scapula, anterior surface
A	Scapular protraction and upward rotation
N	Long thoracic nerve (C5, C6, C7)

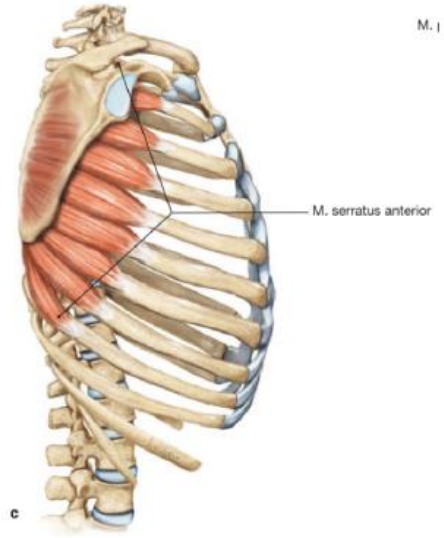

Figure No 24 - Serratus anterior according Sobotta (34).

Paralysis of the serratus anterior produces the condition of "winged scapula" on the affected side and makes lifting of the arm laterally beyond 90 degrees impossible. The possibility of damage to the rhomboid muscles must be considered in the differential diagnosis as this may also produce a winged scapula, although without interfering with elevation of the arm (31).

Sternocleidomastoid Muscle

O	Sternum and clavicle
I	Mastoid process
A	Bilaterally: flexes neck, hyperextends head Unilaterally: laterally bends the neck; rotates face to the opposite side
N	Accessory nerve (cranial nerve XI); second and third cervical nerves

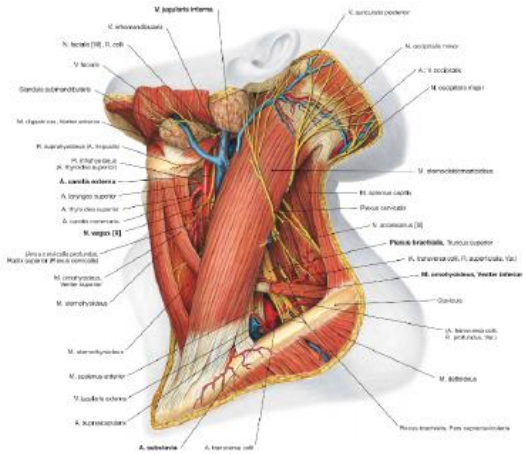

Figure No 25 - Sternocleidomastoid according Sobotta (34).

Upper Trapezius Muscle

O	Occipital bone, nuchal ligament on upper cervical spinous processes
I	Outer third of clavicle, acromion process
A	Scapular elevation and upward rotation
N	Spinal accessory (cranial nerve XI), C3 and C4 sensory component

Middle Trapezius Muscle

O	Spinous processes of C7 through T3
I	Scapular spine
A	Scapular retraction
N	Spinal accessory (cranial nerve XI), C3 and C4 sensory component

Lower Trapezius Muscle

O	Spinous processes of middle and lower thoracic vertebrae
I	Base of the scapular spine
A	Scapular depression and upward rotation
N	Spinal accessory (cranial nerve XI), C3 and C4 sensory component

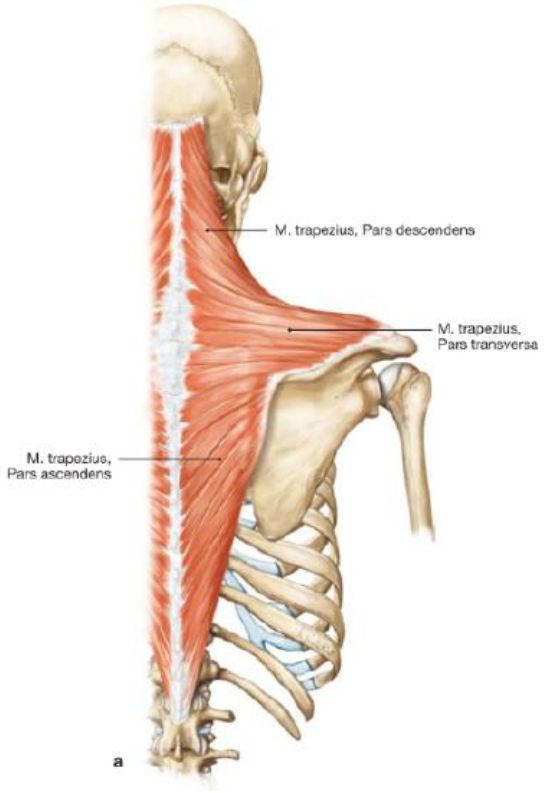

Figure No 26 - Trapezius according Sobotta (34).

Table 10-1 Prime Mover Muscles of the Shoulder Joint

Action	Muscles
Flexion	Anterior deltoid, pectoralis major (clavicular)*
Extension	Posterior deltoid, latissimus dorsi, teres major, pectoralis major (sternal)†
Hyperextension	Latissimus dorsi, posterior deltoid
Abduction	Deltoid, supraspinatus
Adduction	Pectoralis major, teres major, latissimus dorsi
Horizontal abduction	Posterior deltoid, infraspinatus, teres minor
Horizontal adduction	Pectoralis major, anterior deltoid
Lateral rotation	Infraspinatus, teres minor, posterior deltoid
Medial rotation	Latissimus dorsi, teres major, subscapularis, pectoralis major, anterior deltoid

Table 9-1 Prime Movers of the Shoulder Girdle

Action	Muscles
Retraction	Middle trapezius, rhomboids
Protraction	Serratus anterior, pectoralis minor
Elevation	Upper trapezius, levator scapula, rhomboids
Depression	Lower trapezius, pectoralis minor
Upward rotation	Upper and lower trapezius Serratus anterior (lower fibers)
Downward rotation	Rhomboids, levator scapulae, pectoralis minor
Scapular tilt	Pectoralis minor

Tables 1 and 2 - Prime mover muscles of shoulder joint and shoulder girdle according Lynn (25).

2.1.3. The brachial plexus

The brachial plexus is of great practical importance to the physiotherapist. It may be damaged in open, closed or obstetrical injuries, during shoulder dislocation, be pressed upon by a cervical rib or be involved in tumor. It is encountered, and hence put in danger, in operations upon the root of the neck.

The plexus is formed as follows (Figure No 27):

1. Five roots derived from the anterior primary rami of C5, 6, 7, 8 and T1, link up into:

2. Three trunks formed by the union of • C5 and 6 (upper)

• C7 alone (middle)

• C8 and T1 (lower)

Which split into:

3. Six divisions formed by each trunk dividing into an anterior and posterior division, which link up again into:

4. Three cords

• A lateral, from the fused anterior divisions of the upper and middle trunks

• A medial, from the anterior division of the lower trunk

• A posterior, from the union of all three posterior divisions

The roots lie between the anterior and middle scalene muscles. The trunks traverse the posterior triangle of the neck. The divisions lie behind the clavicle. The cords lie in the axilla.

• The cords continue distally to form the main nerve trunks of the upper limb thus:

1. The lateral cord continues as the musculocutaneous nerve
2. The medial cord, as the ulnar nerve;
3. The posterior cord, as the radial nerve and the axillary nerve;
4. A cross-communication between the lateral and medial cords forms the median nerve.

For reference purposes, the derivatives of the various components of the brachial plexus are given below

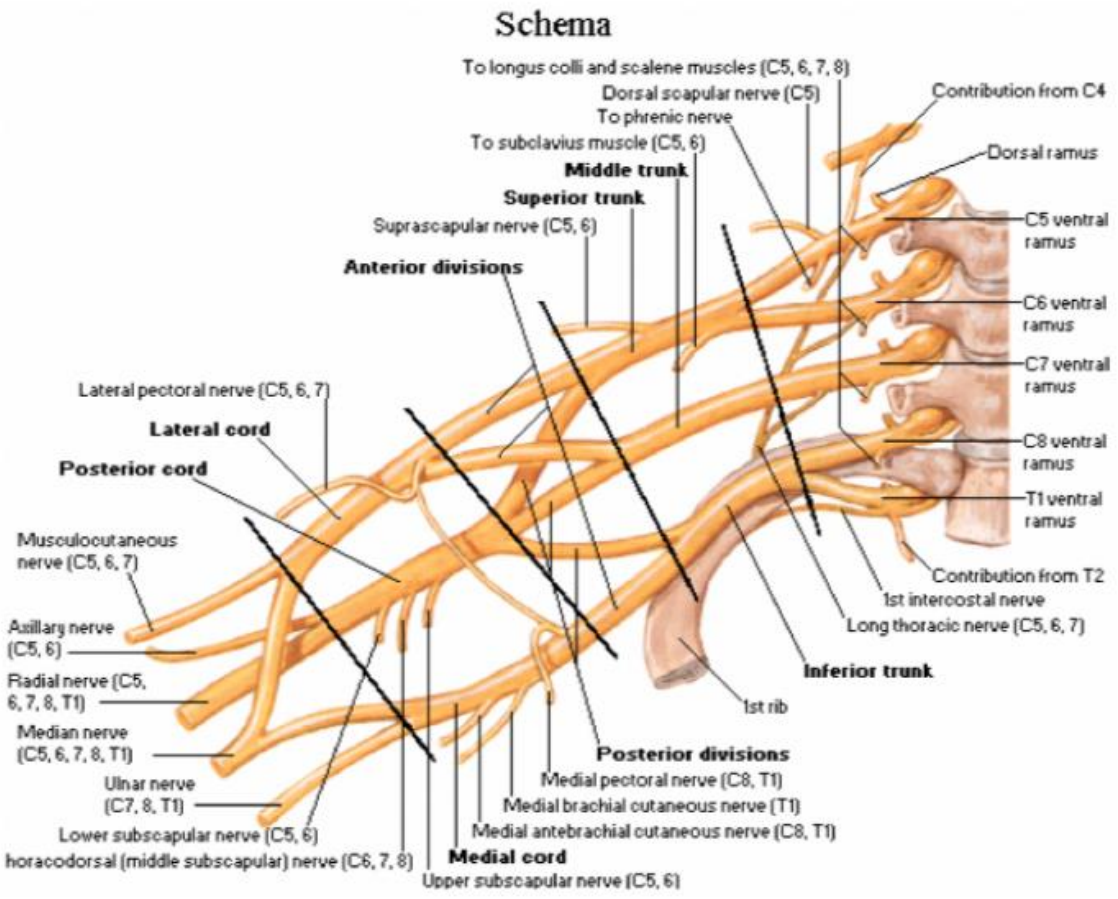

Figure No 27 - Brachial plexus according Moore (31).

From the roots

• Nerve to rhomboids

• Nerve to subclavius

• Nerve to serratus anterior (C5, 6, 7)

From the trunk

• Suprascapular nerve — from the upper trunk (supplies supraspinatus and infraspinatus).

From the lateral cord

• Musculocutaneous nerve

• Lateral pectoral nerve

• Lateral root of median nerve

From the medial cord

• Medial pectoral nerve

• Medial cutaneous nerves of arm and forearm

• Ulnar nerve

• Medial root of median nerve

From the posterior cord

• Subscapular nerves

• Nerve to latissimus dorsi (thoracodorsal nerve)

• Axillary nerve

• Radial nerve

Note that the posterior cord supplies the skin and muscles of the posterior aspect of the limb whereas the anteriorly placed lateral and medial cords supply the anterior compartment structures. Also the brachial plexus can be topographically divided into supra- and infraclavicular part (11).

In spite of this complex interlacing of the nerve roots in the brachial plexus, the skin of the upper limb, as with the skin of the rest of the body, has a perfectly regular segmental nerve supply (dermatomes). This is derived from C4 to T2 which is arranged approximately as follows (31) (Figure No 28):

- C4—supplies skin over the shoulder tip
- C5—radial side of upper arm
- C6—radial side of forearm
- C7—the skin of the hand
- C8—ulnar side of forearm
- T1—ulnar side of upper arm
- T2—skin of the axilla (via its intercostobrachial branch)

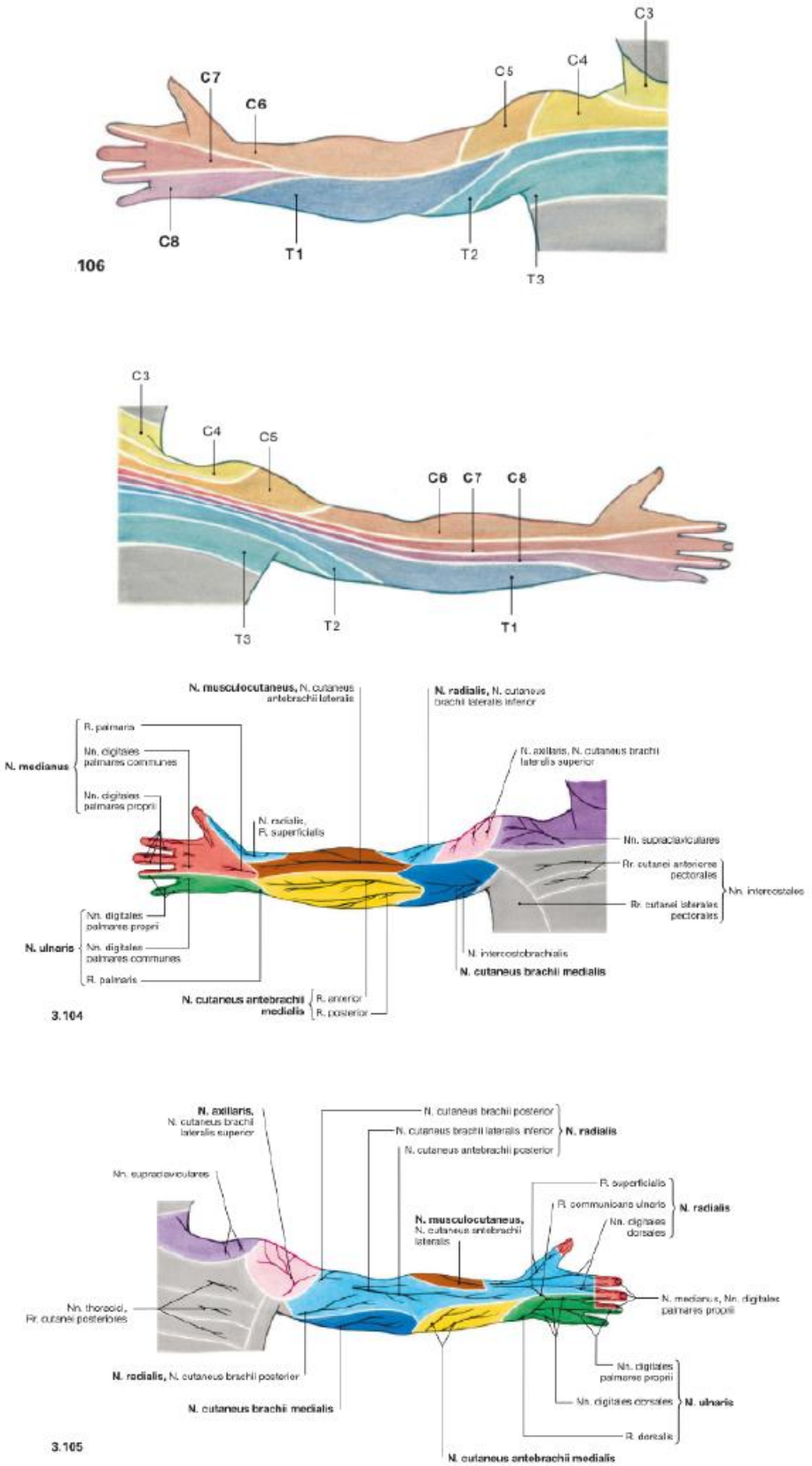

Figure No 28 - Dermatomes and nerve supply of the upper limb according Sobotta (34)

2.2. SHOULDER DISLOCATION

2.2.1. Introduction

Shoulder dislocations account for 50 percent of all major joint dislocations. Anterior dislocation is most common, accounting for 95 to 97 percent of cases. Posterior dislocation accounts for 2 to 4 percent and inferior dislocation (i.e. luxation erecta, which means "to place upward") 0.5 percent (18-19).

As mentioned before the shoulder is an inherently unstable joint. The glenoid is shallow, allowing for a wide range of motion, with only a small portion of the humeral head articulating with the glenoid in any position. The glenoid labrum is a fibrocartilaginous structure that surrounds the glenoid and inserts into the edge of the joint capsule. The distal portion of the joint capsule attaches to the humeral neck. The inferior glenohumeral ligament represents the anterior-inferior portion of the capsule. This ligament is thicker than the rest of the joint capsule and provides the strongest impediment to anterior dislocation.

The rotator cuff muscles provide additional support of the glenohumeral joint. The subscapularis muscle lies anterior to the joint capsule and acts as a secondary support resisting dislocation. Posteriorly the supraspinatus, infraspinatus, and teres minor pull the humeral head into the glenoid and help to prevent it from anterior subluxation (40).

The axillary nerve, the nerve most often injured with shoulder dislocations, runs inferiorly to the humeral head and wraps around the surgical neck of the humerus. It innervates the deltoid and teres minor muscles and the skin overlying the lateral shoulder.

2.2.2. Epidemiology

The shoulder is the most commonly dislocated joint in the body. Although most shoulder dislocations occur anteriorly, they may also occur posteriorly, inferiorly, or anterior-superiorly. Patients with a previous shoulder dislocation are more prone to re-dislocation. Other factors that show a clear correlation to re-dislocation are the age of the patient and concomitant rotator cuff tears and fractures of the glenoid. Younger patients (teenagers and those aged 20 years) have a much higher frequency of re-dislocation than patients in their 50s and 60s. Many physicians believe that age is less of a predisposing risk factor for re-dislocation than activity level.

Patients who tear their rotator cuffs or fracture the glenoid during their shoulder dislocation have a higher incidence of re-dislocation than patients without these problems (7).

2.2.3. Evaluation

Patients suspected of a shoulder dislocation need a thorough examination and frequently radiographic imaging to diagnose dislocation and associated injuries.

2.2.3.1. Anterior shoulder dislocation

2.2.3.1.1. Mechanism of injury

An anterior shoulder dislocation is usually caused by a blow to the abducted, externally rotated, and extended arm (e.g., blocking a basketball shot). Less commonly, a blow to the posterior humerus or a fall on an outstretched arm may cause an anterior dislocation.

2.2.3.1.2. Examination

An anteriorly dislocated shoulder causes the arm to be slightly abducted and externally rotated. The patient resists all movement. The acromion appears prominent in thin individuals and there is loss of the normal rounded appearance of the shoulder (Figure No 29). Clinicians perform a neurovascular examination paying particular attention to distal pulses and the function of the axillary nerve, which is most commonly injured in anterior shoulder dislocations. Axillary nerve dysfunction manifests as loss of sensation in a "shoulder badge" distribution, although this finding is not reliably present. Some degree of axillary nerve dysfunction is present in 42 percent of patients with an anterior dislocation, but most patients recover completely without intervention (43-47).

Figure No 29 - Right shoulder dislocation in a young man, Note the prominent acromion, the rounded appearance of the shoulder, and the slightly abducted and externally rotated position of the right arm (personal file).

2.2.3.1.3. Radiographic evaluation

Many clinicians obtain radiographs before and after reduction of an anterior shoulder dislocation. Initial x-rays confirm the diagnosis and exclude fractures, post reduction x-rays confirm successful reduction and exclude any fracture caused by the procedure. Clinically important fractures occur with approximately 25 percent of shoulder dislocations. According to a retrospective case-control study, factors associated with fracture include age over 40, first-time dislocation, and traumatic mechanism (e.g., fight or fall) (12).

Routine films include an antero posterior (AP), a scapular "Y" view, and an axillary view. The diagnosis of an anterior shoulder dislocation may be straightforward and is often easily visualized on the AP view. The dislocated humeral head usually lies in a subcoracoid position. If the humeral head is subclavicular or subglenoid, there has been a greater degree of displacement and a concomitant greater tuberosity fracture or rotator cuff tear is usually present (Figure No 30).

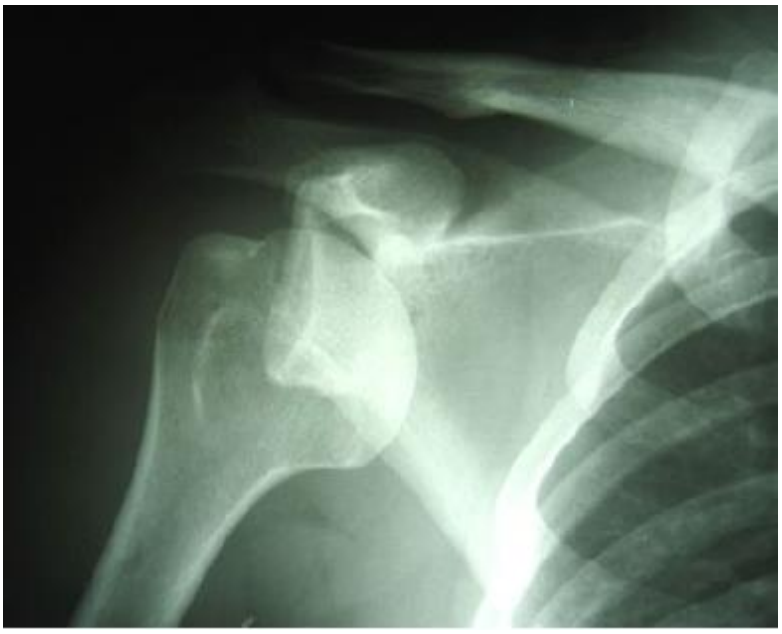

Figure No 30 - Anterior shoulder dislocation on the AP radiograph according Shuster (41).

2.2.3.1.4. Associated injuries (Hill-Sachs and Bankart)

Associated fractures identified on plain radiographs include Hill-Sachs deformities, Bankart lesions, and greater tuberosity fractures. A Hill-Sachs deformity is a cortical depression in the humeral head created by the glenoid rim during dislocation (Figure No 31). They occur in 35 to 40 percent of anterior dislocations and are seen on the AP radiograph with the arm in internal rotation. Bankart lesions occur when the glenoid labrum is disrupted during dislocation and a bone fragment is avulsed (Figure No 32). Bony Bankart lesions are present in 5 percent of patients, while soft tissue Bankart lesions (no bone is avulsed) occur in approximately 90 percent of patients less than 30 years old with an anterior shoulder dislocation. Greater tuberosity fractures are present in 10 percent of patients (41).

Figure No 31-32 Hill-Sachs (left) and Bankart (right) injuries according Shuster (41).

2.2.3.2. Posterior shoulder dislocation

2.2.3.2.1. Mechanism of injury

A blow to the anterior portion of the shoulder, axial loading of an adducted and internally rotated arm, or violent muscle contractions following a seizure or electrocution represent the most common causes of posterior shoulder dislocation (33).

2.2.3.2.2. Examination

Examination reveals prominence of the posterior shoulder with flattening anteriorly. The coracoid process appears prominent. The patient holds the arm in adduction and internal rotation and is unable to externally rotate (Figure No 33).

Figure No 33 – Posterior shoulder dislocation. Prominence of the coracoid is noted anteriorly (Personal file).

2.2.3.2.3. Radiographic evaluation

Radiographic evidence of a posterior shoulder dislocation on a standard anteroposterior (AP) view is subtle and may go undetected in up to 50 percent of cases. Clues to the diagnosis include the "light bulb" sign (Figure No 34), rim sign, and trough line sign. The light bulb sign manifests because the humeral head is internally rotated and the tuberosities no longer project laterally, resulting in a circular appearance of the humeral head.

Posterior shoulder dislocations are commonly associated with tuberosity and surgical neck fractures of the humerus, reverse Hill-Sachs lesions, and injuries to the labrum and rotator cuff. In cases where plain radiographs are indeterminate for dislocation, computed tomography is diagnostic and reveals the size of the articular surface impaction fracture, enabling the orthopedic surgeon to determine the most appropriate treatment (49).

Figure No 34 – Posterior shoulder dislocation. Note the "light bulb" appearance of the humeral head on the AP view and the greater than normal overlap between the anterior glenoid rim and medial aspect of the humeral head according Cicak (4).

2.2.3.3. Inferior shoulder dislocation (luxatio erecta)

2.2.3.3.1. Mechanism of injury

Inferior dislocations are most commonly caused by axial loading with the arm fully abducted or forceful hyper-abduction of the arm [30]. This dislocation frequently occurs when patients fall and suddenly grasp on to an object above their head resulting in hyper- abduction (49).

2.2.3.3.2. Examination

Patients with this injury hold the involved arm above their head and are unable to adduct the arm. The forearm is pronated and in most cases rests on the top of the head. Approximately 60 percent of patients will have some degree of neurologic dysfunction, with the axillary nerve most commonly involved. In most cases, neurologic dysfunction resolves spontaneously following reduction.

Rotator cuff tears or greater tuberosity fractures are present in 80 percent of cases. Arterial injury occurs in approximately 3 percent of patients, and can manifest as an absent or discrepant pulse (48).

2.2.3.3.3. Radiographic evaluation

Radiographs reveal the humeral head beneath the coracoid or the glenoid (Figure No 35). Associated fractures include the greater tuberosity (most common), acromion, scapula, humeral head, coracoid, and glenoid.

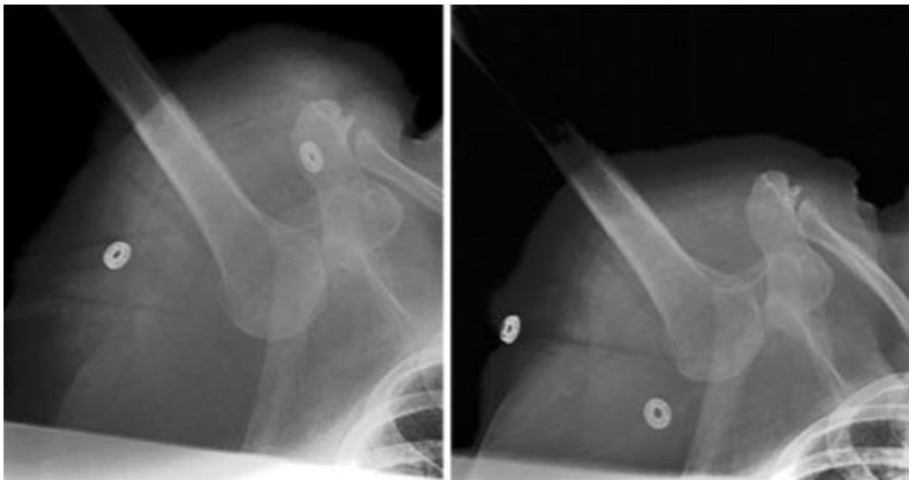

Figure No 35 – Inferior shoulder dislocation. This anterior-posterior (AP) x-ray shows the humoral head lying inferior to the glenoid. Note that the arm is fully abducted according Mallon (48).

2.2.4. Reduction procedure

Inform the patient of the risks specific to the agents to be used, if procedural sedation is planned. The risks of the procedure itself are minimal and include the rare incidence of fractures of the humerus, glenoid, or coracoid process. Rotator cuff injuries may also occur, but are usually present prior to reduction. Axillary artery or nerve injury may occur during reduction, especially with techniques that require a significant amount of traction, but such complications are rare.

Depending on the reduction technique, no materials may be required. Approximately 10 to 15 pounds of weights are needed for the Stimson technique, bed sheets are used with the traction-countertraction technique. An assistant is required for many of the reduction techniques.

If procedural sedation is deemed necessary, a nurse is required to prepare medications, administer oxygen, place the patient on appropriate monitors, and place an IV. Airway management equipment is moved to the bedside if procedural sedation is to be provided. One percent lidocaine, a 20 mL syringe, and a 20 gauge needle are needed when intra-articular lidocaine injection is given for analgesia (30).

2.2.4.1. Anterior shoulder dislocation reduction

No clear evidence exists supporting the superiority of any one of the many methods used to reduce anterior shoulder dislocations (14). The method employed depends on clinician preference and the patient's condition. Generally, a technique that is quick, simple, and requires neither significant force nor intravenous medication is ideal. We suggest starting with scapular manipulation, and if unsuccessful, next attempting the external rotation technique (with or without the Milch technique). If reduction is not accomplished using these approaches, then traction-countertraction or the Stimson technique can be used. Some of the techniques are described below.

Successful reduction is heralded by a "clunk" as the humeral head relocates and the return of the normal contour of the shoulder. With more gradual techniques (e.g., external rotation), reduction may be more subtle with no appreciable "clunk". The ability of the patient to place the hand of the affected extremity on the opposite shoulder further confirms reduction.

Pediatric considerations — Traumatic glenohumeral dislocation in children less than 10 years is rare, accounting for less than two percent of all cases. Closed reduction is usually possible using the same techniques as adults.

Nevertheless, because of the possibility of concomitant physeal (i.e., growth plate) fractures it is recommended orthopedic consultation prior to any attempt at reduction, unless vascular compromise necessitates immediate treatment (1).

2.2.4.2. Reduction techniques

2.2.4.2.1. Scapular manipulation

Scapular manipulation is quick, easy, and well tolerated by the patient and therefore is a good first maneuver. The method employs rotation of the scapula to disengage the humeral head from the glenoid and allow it to reduce into the glenoid.

Success rates range from 80 to 100 percent (27, 23). The procedure takes one to five minutes and premedication is generally unnecessary. It is easiest to perform with the patient upright, but can also be performed with the patient prone if necessary.

Place the head of the bed at 90 degrees. Have the patient dangle their legs over the side of the gurney and rest their unaffected shoulder against the upright portion of the bed. Encourage the patient to relax their shoulder muscles. Stand behind the patient and locate the scapula. Then simultaneously push the tip medially and the acromion inferiorly using the thumbs, thereby rotating the scapula. At the same time, an assistant provides gentle forward or downward traction on the arm (23, 39). Downward traction avoids movement of the patient's arm and may be advantageous. To exert downward traction, the assistant grabs the patient's wrist with one hand and the already flexed elbow with the other hand and pushes down on the elbow while holding the wrist in place (Figure No 36).

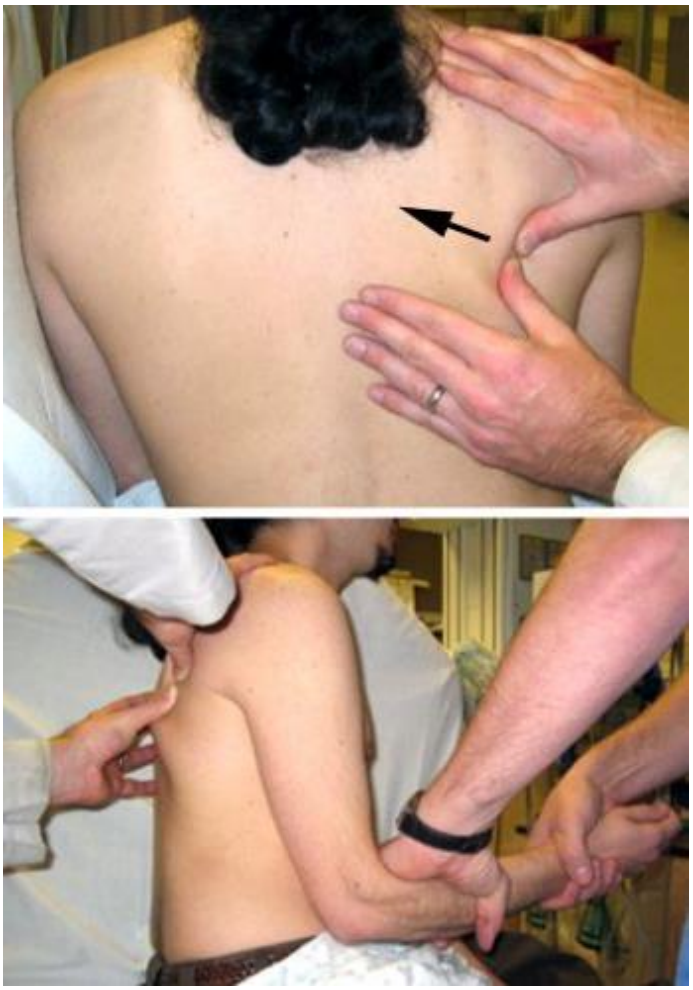

Figure No 36 - Scapular manipulation, reduction technique (personal file).

2.2.4.2.2. External rotation technique

The external rotation technique reduces anterior glenohumeral dislocation by overcoming spasm of the internal rotators of the humerus, unwinding the joint capsule, and enabling the external rotators of the rotator cuff to pull the humerus posteriorly. This method is safe, easy to understand and teach, has no reported complications, and requires only one clinician. It is successful in 80 to 90 percent of cases. In one small case series, 81 percent of patients who were successfully treated required no sedation (10, 46).

To perform the technique, the patient lies supine and the elbow is flexed to 90 degrees to relax the long head of the biceps and allow movement of the humeral head.

Grasp the elbow with one hand to maintain the adducted position of the arm and with the other hand hold the patient's wrist. SLOWLY, the patient is asked to let their arm fall to the side (externally rotate) as the clinician guides the hand (Figure No 37).

Whenever pain or spasm is felt, the movement is stopped and the muscles are allowed to relax. Gradually, over the course of 5 to 10 minutes, the arm externally rotates sufficiently that reduction can occur. Reduction generally happens with the arm externally rotated between 70 to 110 degrees (46). Often the reduction is subtle and the "clunk" of the humerus rearticulating with the glenoid, typical of more forceful reduction techniques, is not appreciable.

Figure No 37- External rotation, reduction technique (personal file).

2.2.4.3. Posterior shoulder dislocation reduction

It is suggested obtaining consultation with an orthopedic surgeon for all cases of posterior shoulder dislocation. Closed reduction is frequently performed in the operating room under general anesthesia, but may be accomplished in the emergency department with procedural sedation.

Reduction involves axial traction on the adducted arm with the elbow flexed. Sheets are used in a similar manner to the traction-countertraction method to reduce an anterior dislocation (Figure No 38). While traction is applied, the arm is externally rotated.

Direct pressure directed anteriorly on the displaced humeral head or gentle lateral traction using a sheet looped under the axilla to unlock the glenoid rim may assist reduction. If successful, the arm is immobilized in a neutral position (4).

Figure No 38- Posterior dislocation, reduction technique (personal file).

2.2.4.4. Inferior shoulder dislocation reduction

Reduction of luxatio erecta (inferior shoulder dislocation) is achieved by traction-countertraction in line with the abducted humerus (Figure No 39). Gentle, gradual adduction of the arm reduces the dislocation closed reduction is successful in most cases, unless a "buttonhole" deformity (humeral head is trapped in a tear of the inferior capsule) exists, in which case open surgical reduction is required (50).

Figure No 39- Inferior dislocation, reduction technique (personal file).

2.2.5. Complications

Reduction of an anterior shoulder dislocation in the emergency department is unsuccessful in 5 to 10 percent of cases. Interposition of the biceps tendon, joint capsule, or fracture fragments within the joint is the most common cause. Postreduction radiographs are necessary only if the clinician is uncertain whether the reduction has been successful (15).

Nerve and vascular injuries are rare complications of shoulder dislocation reduction. Nerve injury, most often of the axillary nerve, occurs more often in the elderly and possibly when methods that employ traction on the abducted arm are used. Axillary nerve injury is managed conservatively. Other less common nerve injuries include damage to the brachial plexus, radial, ulnar, and musculocutaneous nerves. Shoulder dislocation accounts for 7 percent of brachial plexus injuries. Treatment is conservative (i.e., physical therapy) and recovery generally occurs within three to four months (44, 37).

Rotator cuff tears after anterior shoulder dislocations are uncommon in younger patients, but occur in over half of patients over the age of 40.

A complete rotator cuff tendon tear exists in 14 percent of patients with shoulder dislocation. Diagnosing a rotator cuff tear is difficult immediately after an injury, but is often noted during follow-up by difficulty or pain when the patient abducts the arm. Such tears may be difficult to distinguish from axillary nerve injuries, which also present with abduction difficulty (3).

2.2.6. Follow up care

After successful reduction of an anterior shoulder dislocation, the shoulder is immobilized and the patient is referred to an orthopedic surgeon within one week. The most common complication of shoulder dislocation is recurrent dislocation, which occurs in 50 to 90 percent of patients under the age of 20 and in approximately 5 to 10 percent of patients over age 40. Efforts to prevent re-dislocation include altering the position of immobilization, increasing the duration of immobilization, physical therapy, and operative repair (45).

2.2.6.1. Immobilization

The traditional position of immobilization is adduction and internal rotation with a collar and cuff or sling and swathe or commercially available shoulder immobilizer. A cadaveric study, small observational trials, and several systematic reviews suggest recurrent dislocation may be less likely if the shoulder is immobilized in 10 degrees of external rotation (13).

The theory of immobilizing in external rotation is based on the commonly held belief that detachment of the glenoid labrum (i.e., Bankart lesion) is the most common reason for high re-dislocation rates among younger patients. If the shoulder is immobilized in -external rotation, the Bankart lesion lies closer to the glenoid labrum and may be more likely to heal (29, 32, 17) (Figure No 40).

Figure No 40 - Immobilization in external rotation (personal file).

2.2.6.2. Operative treatment

Early indications for surgery include irreducible dislocations, displaced greater tuberosity fractures, and Bankart fractures that create glenohumeral instability. (30). Arthroscopic repair of a soft tissue Bankart lesion is sometimes recommended in young (less than 30), first time dislocators that engage in highly demanding physical activities because surgery reduces the high rate of subsequent re-dislocation in this group. Generally, repair is performed within 10 days. Late surgical indications include recurrent instability or activity limitations (22, 8).

2.2.6.3. Rehabilitation

During the initial period of immobilization (usually three weeks), the patient wears the immobilizer at all times unless bathing, mobilizing the elbow and wrist, or performing Codman's exercises (gentle shoulder range of motion exercises with the arm suspended). Abduction and external rotation must be avoided because these motions stress the anterior capsule (30).

In subsequent weeks, active-assisted range of motion exercises and then isometric strengthening exercises for the muscles of internal rotation and adduction are added to the program. Generally by week 12, limited return to sporting activities is permitted, followed by full return to sporting activities as tolerated by week 16 (8).

Also it’s included the social, occupational and physical therapy. In the main rehabilitation of the shoulder luxation, there are some examinations which are useful to determine how serious this situation of the patient with this diagnosis is. The most precise of all the examinations is the examination by Cyriax.

Examination by Cyriax for the shoulder luxation

Examination of the shoulder with active movement

This examination is mainly categorized with the active movements of ABD, ADD, IR, ER, F and E of the shoulder joint. The patient usually feels pain during the ABD of the shoulder joint covering an angle of less than 90 degrees. This pain is caused mainly by the humeral head and rotator cuff slip under the acromioclavicular ligament during the movement of ABD. If there is a disturbance of the sub-deltoid bursa or in the rotator cuff, this initially results in a transitory constraint. However, if the change is more advanced it leads to a painful, absolute, isolated barrier to abduction. (24).

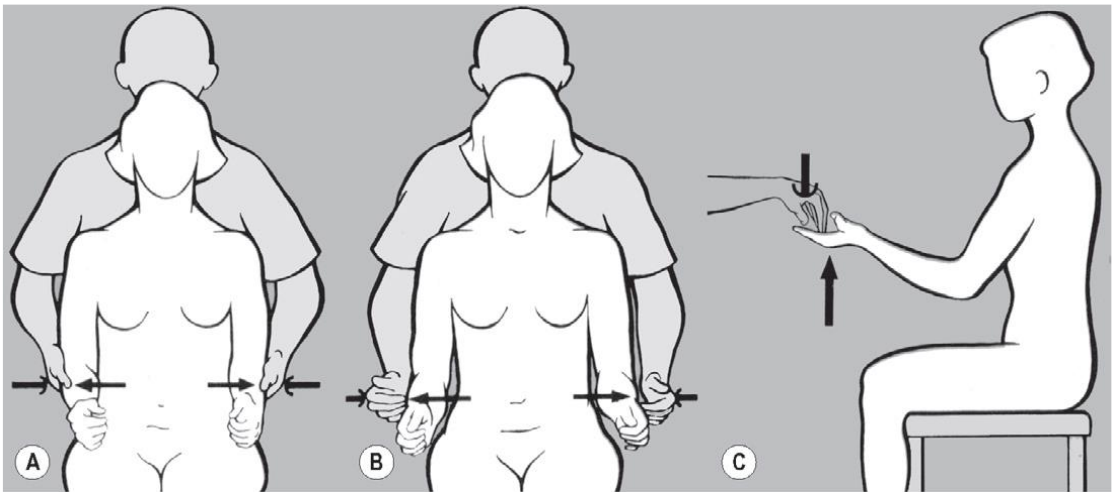

Figure No 41 - Examination of the shoulder with active movement. It is tested by isometric tension, of the muscle attachments, in the (A) field, it's against isometric abduction of the supraspinatus. In the (B) field, it's against isometric external rotation of the infraspinatus and in the (C) field it's against isometric anteversion of the long head of biceps brachii (24).

Examination of the shoulder with passive movement: (24)

If passive mobility is impaired at the shoulder joint itself the characteristic capsular pattern observed is according to Sachse. Furthermore, the most common impairment at the shoulder joint is the restriction in the direction of abduction simultaneously combined with external rotation and then with internal rotation.

To provide this examination it is necessary for the shoulder blade to be fixed, either from above or from the side at the inferior angle of the scapula.

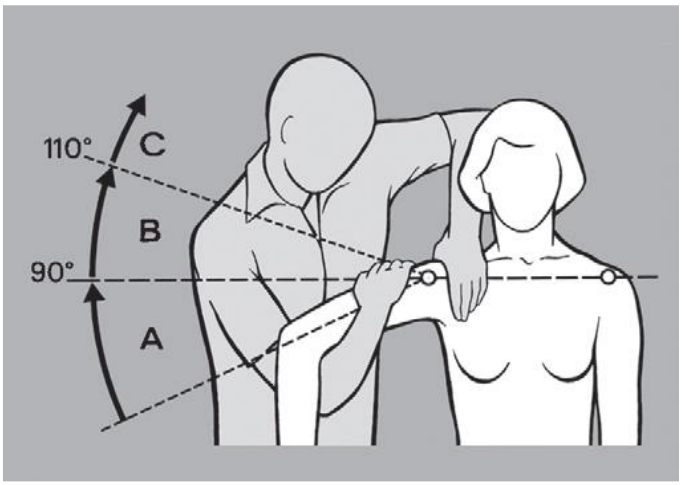

Figure No 42 - Testing the abduction of the glenohumeral joint, with shoulder blade fixed (24)

Passive external rotation movement

It is important when examining external rotation to ensure that the patient's upper arm remains adducted and the elbow flexed at 90 degrees. External rotation is usually examined on both sides at once (See Figure No 43) (24)

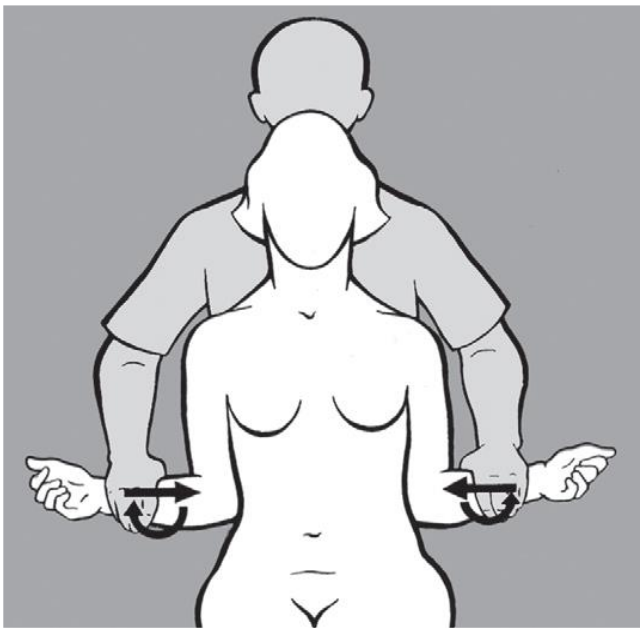

Figure No 43 - Examination of external rotation with the arms in adduction and elbows flexed at right angles (24)

Passive internal rotation movement

Usually during the internal rotation also it's examined on both sides at once by drawing the patient's thumbs upward behind his back and comparing the two sides. When this examination is performed, adduction produces a degree of retroflexion. (24).

Passive abduction movement

With the upper arm abducted at a right angle, the examiner applies slight pressure to the head of the humerus from above to engage the barrier, followed by springing pressure. If abduction alone is restricted, there is generally also a disturbance of joint play. In this case the head of the humerus cannot glide down from the narrow, upper part of the glenoid cavity as it needs to in abduction. When performing this test, it is important, to be aware that the pressure is applied at the correct point on the head of the humerus which is lateral to the apex of the deltoid. (24)

Treatment of the shoulder luxation

Goal of the therapy

- Reduce pain
- Increase ROM.
- Improve mobility of the restricted joints.
- Reinforce the muscle strength.
- Restore the mobility of the soft-tissues.
- Relaxation of the hypertone muscles
- Restore the original state of the ADL of the patient.
- Reduce any sensory deficits.

2.2.6.4. Patient education

Patients can be taught to reduce their own shoulder dislocation by clasping their hands together around the flexed ipsilateral knee from a seated position. The patient then leans back slowly and extends the hip, pausing whenever the pain is too much, until reduction occurs (30).

3. SPECIAL PART (CASE STUDY)

3.1. METHODOLOGY

The clinical work practice was done in C.L.P.A. (Centrum léčby pohybového aparátu). It started on Monday 3th of February 2014 and finished on Friday 14th of February 2014. Each day had the duration of eight hours. The total amount of the hours of my practice was eighty.

My clinical practice was supervised by PhDr. Edwin Mahr, Ph.D. My patient had shoulder luxation and I was able to have seven sessions with her during the outpatient hours. Tuesday 4th of February 2014 was the first therapeutic session combined with the initial kinesiology examinations. Our last therapeutic session was on Friday 14th of February 2014. The final kinesiology examinations took place on the same day as well. All sessions managed to be done at the same time of the day.

Finally a consent form was signed by the patient and me. My clinical practice was approved by the Ethics Committee of the Faculty of Physical Education and Sport at Charles University, under the approval number **088/2014.**

3.2.ANAMNESIS

Examined person: K.M. (female)

Date of birth: 1945

Diagnosis: Shoulder luxation Right.

3.2.1. Present state

Patient's information	Result
Weight:	67kg
Height:	1, 64
BMI:	24, 9
HR	85 beats per min

Table No3: Anamnesis – Patient's personal information

- The patient was in good mood.
- My first examination with Mrs. K.M was 4th of February 2014.
- The patient seems that she was cooperated with me.
- On 29th of December 2014, the patient was running on the road, she felt down because of slippery surface, and to protect herself, she put her hand down.
- Her husband took her and brought her to the hospital immediately.
- The patient doesn't have any swelling.
- Her pain level during the day was 5/10 and at night it was 6/10.

3.2.2. Personal anamnesis

- The patient did not have any other injuries.
- She had all the common childhood diseases (chickenpox).

3.2.3. Previous rehabilitation

- She didn't have any previous rehabilitation.

3.2.4. Operation anamnesis

- The patient didn't have any previous operation.

3.2.5. Gynecological

- Her menstrual circle stopped at her 45 years.

3.2.6. Family anamnesis

- The patient does not have any brothers or sisters.
- She is married.
- She has 2 daughters.
- The rest of her family is completely healthy.

3.2.7. Social anamnesis

- The patient is living on the 2nd floor and she is using the elevator.
- She has some difficulties with her ADL (cleaning her house, take glass on a higher place on her kitchen).

3.2.8. Occupational anamnesis

- She used to be a banker.

3.2.9. Hobbies anamnesis

- Hiking (walking) 10 – 15 km 3 times a week.
- She likes visiting during her holidays other countries.

3.2.10. Allergies

- Flowers.
- Dust.
- Apple.

3.2.11. Pharmacological anamnesis

- Zyrtec one pill at night.
- Seretide discus, one at morning and one at night.

3.2.12. Statement from the patient's medical documentation

- None.

3.2.13. Indication of rehabilitation

- Improve flexion, extension, abduction, and horizontal adduction.
- Strengthening and sensomotoric training for shoulder.
- Manual therapy.

3.2.14. Differential balance

The patient is feeling a pain in her shoulder during flexion, extension, abduction and horizontal adduction. This is caused maybe from an injury from the day of the accident and immobilization of her limb for quite long time. Also I expect that there will be muscle weakness around the area of right shoulder joint and probably will be shortness of muscles, (deltoid, anterior, posterior, middle), biceps brachii, triceps brachii, medial rotators (infraspinatus, terres major), lateral rotators (subscapularis, terres minor), supraspinatus, rhomboids, trapezius and mostly upper trapezius. Logically I expect that there will be limitation ROM (range of motion) in the movements of flexion, extension, and abduction, and horizontal adduction, internal and external rotation. However probably there will be restriction in shoulder joint, acromioclavicular, sternoclavicular, cervicothoracic joint (AO, C1-C8, and TH1) and probably in elbow joint. I expect that the patient will not be able to provide the ADL activities with her right shoulder correctly. Because of the age of the patient there will be hypotonicity in the area of shoulder.

3.3.INITIAL KINESIOLOGY EXAMINATIONS

3.3.1. Observation

- The colour of the skin around the right shoulder it looks normal without any changes.
- There is no oedema in the area of right shoulder.
- The muscles of the right shoulder are hypotrophic.
- Her physiological status is very good.
- The patient seems that she was cooperated with me and she follows my instructions.

Table No4: Initial Kinesiology Examinations - Observation

3.3.2. Postural examination (observation - palpation)

3.3.2.1. *Posterior view*

- Normal space between feet.
- External rotation of right foot.
- Physiological arches of both feet.
- Fossa popliteal on the right knee joint is lower than on the left one.
- Valgosity of right knee joint.
- Small thoraco-humeral triangles on right side bigger.
- Left scapula is elevated more than the right.
- The left shoulder is higher than the right shoulder.
- No tilt of the head to the sides.
- Whole body bent slightly to the right.

Table No5: Initial Kinesiology Examinations - Postural examination

Posterior view

3.3.2.2. *Lateral view*

• More weight bearing on the lateral side, right foot.
• Hyperextension of both knees.
• Right knee joint is in a neutral position.
• Lordosis of lumbar spine.
• Slightly kyphosis of thoracic region.
• Physiological lordosis of cervical spine.
• Slightly protraction of right shoulder.
• Head protracted forward.

Table No6: Initial Kinesiology Examinations - Postural examination

Lateral view

3.3.2.3. *Anterior view*

• Normal space between feet.
• External rotation of right foot.
• Physiological arches of both feet.
• Internal rotation of both knee joints.
• Hips are in neutral position.
• Small thoraco-humeral triangles, on right side is bigger.
• Left clavicle is slightly higher than the right.
• Left shoulder joint is slightly higher than the right.
• No tilt of the head to the sides.

Table No7: Initial Kinesiology Examinations - Postural examination

Anterior view

3.3.3. Special Tests

3.3.3.1. *Two scales test*

Right side	**Left side**
35kg	32kg

Table No8: Initial Kinesiology Examinations - Special tests

Two scales test

Results: The physiological ratio is till 10% -15% of the total body weight. The patient putting more weight on the right side.

3.3.3.2. Trendelenburg test

Right side	**Left side**
The patient was able to keep the stability and stay on the right leg. The test was negative.	The patient was able to keep the stability and stay on the left side. The test was negative.

Table No9: Initial Kinesiology Examinations - Special tests

Trendelenburg test

3.3.4. Gait examination

3.3.4.1. Posterior view

- First touch was with heel and then the whole foot with the lateral side.
- The steps was symmetrical.
- Slightly extension of left knee.
- Slightly rotation of the trunk.
- Head protracted.

Table No10: Gait examination – Posterior - Anterior view

3.3.4.2. Lateral view

- First touch was with heel and then the whole foot.
- The steps was symmetrical.
- There was external rotation at the right foot.
- Asymmetry of the hands during walking.

Table No11: Gait examination - Lateral view

3.3.5. Evaluation of basic movement patterns (by Janda)

Examined pattern	**Right side**	**Left side**
Shoulder abduction	Altered movement pattern, the patient activate first the upper trapezius then deltoid and then supraspinatus. Also during the movement the patient bent to the side.	Altered movement pattern, the patient activate first the upper trapezius then deltoid and then supraspinatus. Also during the movement the patient bent to the side.

Neck flexion	Deep neck flexors are inhibited, so the sternocleidomastoid was overactive.	Deep neck flexors are inhibited, so the sternocleidomastoid was overactive.

Table No12: Initial Kinesiology Examinations

Evaluation of basic movement patterns by Janda

3.3.6. Anthropometric measurements examination

Upper extremities length	**Right Side**	**Left Side**
Whole arm:	72cm	72cm
Humerus:	29,5cm	29,5cm
Forearm:	25cm	25cm
Hand:	17cm	17cm

Table No13: Initial Kinesiology Examinations - Anthropometric measurements

Length of UE

Upper extremities circumferences	**Right Side**	**Left Side**
Humerus:	30cm	30cm
Forearm:	23cm	24cm
Hand:	17cm	17cm

Table No14: Initial Kinesiology Examinations - Anthropometric measurements

Circumferences of UE

3.3.7. Soft tissue examination by Lewit

Examined part	Direction	Location	Results
Skin	Caudal	Shoulder:	No restriction and are elastic.
Subcutaneous	Cranial	Forearm:	No restriction and are elastic.
Fascia	Medial Lateral	Whole back:	No restriction and are elastic.

Table No15: Initial Kinesiology Examinations - Soft tissue examination by Lewit

*The soft tissue examination for the fascia of the whole back was applied in the direction of craniocaudal and caudocranial direction.

3.3.8. Range of motion examination, by Kendall

Evaluation by SFTR method

SHOULDER JOINT				
Plane	**Left**		**Right**	
	Active	**Passive**	**Active**	**Passive**
R_f 90	80 -0- 60	85 -0- 65	70 -0- 50	75 -0- 55
F	170 -0- 0	180 -0- 0	90 -0- 0	95 -0- 0
S	35 -0- 170	40 -0- 180	20 -0-90	25 -0- 95
T	80 -0- 30	90 -0- 40	70 -0- 30	75 -0-35

Table No16: Initial Kinesiology Examinations - ROM examination by Kendall Shoulder joint

3.3.9. Muscle tone (palpation) by Lewit

Examined muscles	Right side	Left side
Upper trapezius	Hypertone	Hypertone
Lower trapezius	Normal	Normal
Middle trapezius	Normal	Normal
Rhomboids	Normal	Normal
Sternocleidomastoid	Hypertone	Hypertone
Levator scapulae	Hypertone	Hypertone
Latissimus dorsi	Normal	Normal
Supraspinatus	Normal	Normal
Pectoralis major	Hypotone	Hypotone
Pectoralis minor	Hypotone	Hypotone
Deltoid anterior	Hypertone	Normal
Deltoid posterior	Hypertone	Normal
Deltoid middle	Hypertone	Normal
Brachioradialis	Normal	Normal
Triceps brachii	Hypotone	Hypotone
Biceps brachii	Hypotone	Hypotone

Table No17: Initial Kinesiology Examinations - Muscle tone examination by Lewit

3.3.10. Muscle length test by Janda

Examined muscles	Right side	Left side
Scalenes	0	0
Sternocleidomastoid	0	0
Upper trapezius	1	1
Levator scapulea	1	1
Pectoralis major upper	1	1
Pectoralis major lower	1	1
Pectoralis major middle	1	1
Pectoralis minor	The patien feel pain during the examinatio and wasnt able to provide on the rght side.	0

Table No18: Initial Kinesiology Examinations - Muscle length test by Janda

3.3.11. Muscle strength test, by Kendall

Examined muscles	Right side	Left side
Serratus anterior	4	5
Upper trapezius	4	4
Lower trapezius	3	4
Middle trapezius	4	4
Rhomboids	4	4
Levator scapulea	4	4
Latissimus dorsi	4	4
Teres major	4	4
Teres minor	4	4
Infraspinatus	4	4
Supraspinatus	4	4
Pectoralis major upper	4	4
Pectoralis major lower	3	4
Pectoralis major middle	3	4
Deltoid anterior	3 little pain	3little pain
Deltoid middle	3little pain	3little pain
Deltoid posterior	3little pain	3little pain
Brachioradialis	4	4
Triceps brachii	4	4
Biceps brachii	4	4

Table No19: Initial Kinesiology Examinations - Muscle strength test by Kendall

3.3.12. Examination of joint play, by Lewit

Examined part	Direction	Result
Metatacarpophalangeal $1^{st} – 5^{th}$ fingers	Dorsal	Not restricted both sides
	Plantar	Not restricted both sides
	Lateral	Not restricted both sides
Interphalangeal $1^{st} – 5^{th}$ fingers	Dorsal	Not restricted both sides
	Plantar	Not restricted both sides
	Lateral	Not restricted both sides
Elbow joint	Lateral and medial direction	Not restricted both sides
Acromioclavicular	Craniocaudal and ventrodorsal direction	Restricted and the patient feels pain during the examination, both sides
Sternoclavicular	Ventrodorsal and craniocaudal direction	Restricted, on the right side only
Shoulder joint	Ventrodorsal and caudal direction	Restricted and the patient feels pain during examination on the right side
Antlantooccipital joint	Anteflexion, retroflexion, lateroflexion, rotation	Restricted
Cervical spine	Flexion, extension, lateroflexion, rotation	Not restricted

Table No20: Initial Kinesiology Examinations - Examination of joint play by Lewit

3.3.13. Neurological examination

Deep tendon reflexes		
Examined part	**Right side**	**Left side**
Biceps brachii reflex (C5,C6)	Normal	Normal
Triceps brachii (C7)	Nromal	Normal
Brachioradialis (TH1,C8)	Normal	Normal

Table No21: Initial Kinesiology Examinations

Neurological examination - Deep tendon reflexes

Superficial sensation		
Dermatome	**Right side**	**Left side**
C4	Normal	Normal
C5	Nromal	Normal
C6	Normal	Normal
C7	Normal	Normal
C8	Normla	Normal
TH1	Normal	Normal

Table No221: Initial Kinesiology Examinations

Neurological examination – Superficial sensation

3.3.14. Conclusion of all examinations

Concerning the movement pattern examination we found that the patient is not activate deltoid and supraspinatus as primary muscles because of weakness of the muscles. Also the neck flexion was inactivation of deep neck flexors and over activity of sternocleidomastoid muscle. The results of two scales test and posture examination showed us that the patient is putting more weight on the right side. The soft tissue examination skin, subcutaneous and fascia were not restricted and elastic (also because of the age of the patient). According to ROM examination there is restriction in the movement of Flexion, abduction, horizontal abduction and extension were restricted in right shoulder joint.

As far as the examination of strength test and length test is concerned, the patient has weakness in internal (subscapularis, terres major) and external (infraspinatus, terres minor) rotators of shoulder joint, trapezius, deltoid and pectoralis muscles.

The short muscles were trapezius, levator scapulae, and pectoralis major. Furthermore, the joint play examination showed that the patient has restriction in acromioclavicular joint, (both sides all directions), sternoclavicular (right side only, all directions) shoulder joint (right side only, all directions) and AO (all directions). Also the muscle tone examination by the means of palpation showed that there was hypertonicity in upper trapezius, sternocleidomastoid, levator scapulae, deltoid (anterior, middle, posterior). The hypotone muscles are biceps brachii, triceps brachii, and pectoralis major and minor. The results of the neurological examination showed that the patient problem has not affected the function of nerves in the upper extremities neither the sensation.

3.4. SHORT PHYSIOTHERAPY PLAN

- Decrease pain in the area of right shoulder joint.
- Increase ROM (range of motion) in the right shoulder joint.
- Strength the weak muscles (subscapularis, terres major, infraspinatus, terres minor, trapezius, deltoid and pectoralis muscles).
- Elongate the short muscles (trapezius, levator scapulae, and pectoralis major).
- Decrease hypertonicity, by post isometric relaxation (by Lewit) (upper trapezius, sternocleidomastoid, levator scapulae, deltoid anterior, middle, posterior).
- Correction of the posture because the patient bent to the right side.
- Mobilization of restricted joints (acromioclavicular, sternoclavicular, shoulder joint and AO joint).
- Instruct the patient how to provide properly the ADL activities.

3.5.LONG PHYSIOTHERAPY PLAN

- Maintain the goals of short physiotherapy plan.
- Continue strengthening and stretching the muscles of the right shoulder joint (according muscle strength test by Kendall and muscle length test by Janda).
- Coordination and functional exercises.
- Reeducation of altered movement pattern (shoulder ABD).

3.6.DAY TO DAY THERAPY

1st Therapy, Wednesday 5 February 2014

Goal of today's therapy unit

Main goal for today therapy, decrease pain, increase ROM, relax the hypertone muscles, strengthening the weak muscles mobilization of restricted joints and sensomotoric stimulation and exercises and stabilization to improve the condition of the shoulder.

Procedure

Increase ROM

The patient was in sitting position, I instructed the patient to provide the movement of flexion, extension, abduction and horizontal adduction actively until the point that she was able to achieve. Then I applied the same movements passively and the ROM was increased. The patient during the therapy was feeling pain (5/10)

Relaxation of hypertone muscles (PIR)

I did Post Isometric Relaxation by Lewit, (upper trapezius, levator scapulae and sternocleidomastoid). The patient during the therapy didn't feel pain.

Strengthening the weak muscles

I did strengthening exercises with the theraband (yellow) and softball flexion, extension abduction, horizontal adduction, internal and external rotation to increase the strength of the muscles, (infraspinatus, terres minor, subscapularis, terres major, trapezius, deltoid anterior, posterior, middle and pectoral muscles). The patient during the therapy was feeling pain (5/10), also she couldn't provide the exercises for a long time because she get tired.

Figure No 44 – Strengthening exercise with ER of the shoulder

Figure No 45 - Strengthening exercise with F of the shoulder

Figure No 46 – Strengthening exercise with ADD of the shoulder

Sensomotoric stimulation exercises

I did sensomotoric exercises with posturomed machine to improve the stability of shoulder joint. The patient was in kneeling position with both palms attached to the machine and I instructed her to apply the movements to craniocaudal direction and laterolateral direction but her both hand should be stable. The patient during the therapy was feeling pain (5/10), also she couldn't provide the exercises for a long time because she get tired.

Figure No 47 - Sensomotoric stimulation exercise

Mobilization of the restricted joints by Lewit

I did mobilization of acromioclavicular, sternoclavicular, shoulder joint in all directions by Lewit. The patient felt little pain during the therapy, pain level (3/10).

End of therapy No1

2nd Therapy, Thursday 6 February 2014

Goal of today's therapy unit

Main goal for today therapy, decrease pain, increase ROM, relax the hypertone muscles, strengthening the weak muscles mobilization of restricted joints and sensomotoric stimulation and exercises and stabilization to improve the condition of the shoulder.

Procedure

Increase ROM

The patient was in sitting position, i instructed the patient to provide the movement of flexion, extension, abduction and horizontal adduction actively until the point that she was able to achieve. Then I applied the same movements passively and the ROM was increased. The patient during the therapy was feeling pain (5/10)

Relaxation of hypertone muscles (PIR)

I did Post Isometric Relaxation by Lewit, (upper trapezius, levator scapulae and sternocleidomastoid). The patient during the therapy didn't feel pain.

Strengthening the weak muscles

I did strengthening exercises with the theraband (yellow) and softball flexion, extension abduction, horizontal adduction, internal and external rotation to increase the strength of the muscles, (infraspinatus, terres minor, subscapularis, terres major, trapezius, deltoid anterior, posterior, middle and pectoral muscles). The patient during the therapy was feeling pain (5/10), also she couldn't provide the exercises for a long time because she get tired.

Sensomotoric stimulation exercises

I did sensomotoric exercises with posturomed machine to improve the stability of shoulder joint. The patient was in kneeling position with both palms attached to the machine and I instructed her to apply the movements to craniocaudal direction and laterolateral direction but her both hand should be stable. The patient during the therapy was feeling pain (5/10), also she couldn't provide the exercises for a long time because she get tired.

Mobilization of the restricted joints by Lewit

I did mobilization of acromioclavicular, sternoclavicular, shoulder joint in all directions by Lewit. The patient felt little pain during the therapy, pain level (2/10).

End of therapy No2

3rd Therapy, Friday 7 February 2014

Goal of today's therapy unit

Main goal for today therapy, decrease pain, increase ROM, relax the hypertone muscles, strengthening the weak muscles mobilization of restricted joints and sensomotoric stimulation and exercises and stabilization to improve the condition of the shoulder.

Procedure

Increase ROM

The patient was in sitting position, I instructed the patient to provide the movement of flexion, extension, abduction and horizontal adduction actively until the point that she was able to achieve. Then I applied the same movements passively and the ROM was increased. The patient during the therapy was feeling pain (5/10)

Relaxation of hypertone muscles (PIR)

I did Post Isometric Relaxation by Lewit, (upper trapezius, levator scapulae and sternocleidomastoid). The patient during the therapy didn't feel pain.

Strengthening the weak muscles

I did strengthening exercises with the theraband (yellow) and softball flexion, extension, abduction, horizontal adduction, internal and external rotation to increase the strength of the muscles, (infraspinatus, terres minor, subscapularis, terres major, trapezius, deltoid anterior, posterior, middle and pectoral muscles). The patient during the therapy was feeling pain (5/10), also she couldn't provide the exercises for a long time because she get tired.

Sensomotoric stimulation exercises

I did sensomotoric exercises with posturomed machine to improve the stability of shoulder joint. The patient was in kneeling position with both palms attached to the machine and I instructed her to apply the movements to craniocaudal direction and laterolateral direction but her both hand should be stable.

The patient during the therapy was feeling pain (5/10), also she couldn't provide the exercises for a long time because she get tired.

Mobilization of the restricted joints by Lewit

I did mobilization of acromioclavicular, sternoclavicular, shoulder joint in all directions by Lewit. The patient felt little pain during the therapy, pain level (2/10).

End of therapy No3

4th Therapy, Monday 10 February 2014

Goal of today's therapy unit

Main goal for today therapy, decrease pain, increase ROM, relax the hypertone muscles, strengthening the weak muscles mobilization of restricted joints and sensomotoric stimulation and exercises and stabilization to improve the condition of the shoulder.

Procedure

Increase ROM

The patient was in sitting position, I instructed the patient to provide the movement of flexion, extension, abduction and horizontal adduction actively until the point that she was able to achieve. Then I applied the same movements passively and the ROM was increased. The patient during the therapy was feeling pain (5/10)

Relaxation of hypertone muscles (PIR)

I did Post Isometric Relaxation by Lewit, (upper trapezius, levator scapulae and sternocleidomastoid). The patient during the therapy didn't feel pain.

Strengthening the weak muscles

I did strengthening exercises with the theraband (yellow) and softball flexion, extension, abduction, horizontal adduction, internal and external rotation to increase the strength of the muscles, (infraspinatus, terres minor, subscapularis, terres major, trapezius, deltoid anterior, posterior, middle and pectoral muscles).

The patient during the therapy was feeling pain (5/10), also she couldn't provide the exercises for a long time because she get tired.

Sensomotoric stimulation exercises

I did sensomotoric exercises with posturomed machine to improve the stability of shoulder joint. The patient was in kneeling position with both palms attached to the machine and I instructed her to apply the movements to craniocaudal direction and laterolateral direction but her both hand should be stable.

The patient during the therapy was feeling pain (5/10), also she couldn't provide the exercises for a long time because she get tired.

Mobilization of the restricted joints by Lewit

I did mobilization of acromioclavicular, sternoclavicular, shoulder joint in all directions by Lewit. The patient felt little pain during the therapy, pain level (2/10).

End of therapy No4

5th Therapy, Tuesday 11th February 2014

Goal of today's therapy unit

Main goal for today therapy, decrease pain, increase ROM, relax the hypertone muscles, strengthening the weak muscles mobilization of restricted joints and sensomotoric stimulation and exercises and stabilization to improve the condition of the shoulder, PNF 1 and 2 diagonal flexion upper extremity.

Procedure

Increase ROM

The patient was in sitting position, i instructed the patient to provide the movement of flexion, extension, abduction and horizontal adduction actively until the point that she was able to achieve. Then I applied the same movements passively and the ROM was increased. The patient during the therapy was feeling pain (5/10)

Relaxation of hypertone muscles (PIR)

I did Post Isometric Relaxation by Lewit, (upper trapezius, levator scapulae and sternocleidomastoid). The patient during the therapy didn't feel pain.

Strengthening the weak muscles

I did strengthening exercises with the theraband (yellow) and softball flexion, extension, abduction, horizontal adduction, internal and external rotation to increase the strength of the muscles, (infraspinatus, terres minor, subscapularis, terres major, trapezius, deltoid anterior, posterior, middle and pectoral muscles).

The patient during the therapy was feeling pain (5/10), also she couldn't provide the exercises for a long time because she get tired.

Sensomotoric stimulation exercises

I did sensomotoric exercises with posturomed machine to improve the stability of shoulder joint. The patient was in kneeling position with both palms attached to the machine and I instructed her to apply the movements to craniocaudal direction and laterolateral direction but her both hand should be stable. The patient during the therapy was feeling pain (5/10), also she couldn't provide the exercises for a long time because she get tired.

Mobilization of the restricted joints by Lewit

I did mobilization of acromioclavicular, sternoclavicular, shoulder joint in all directions by Lewit. The patient felt little pain during the therapy, pain level (2/10).

PNF technique, by Kabat strengthening exercises, diagonal 1 and 2

I did PNF for facilitation and strengthening of the muscles of the upper extremity, firstly I instructed and learn the patient how to provide the movement as more correctly as she could and then I did the diagonals in supine lying position and then I instructed the patient to apply the same movements (1and 2 diagonal) with using of theraband in standing position the patient wasn't able to provide whole movement because of pain. The patient during the exercises felt little pain, pain level (4/10).

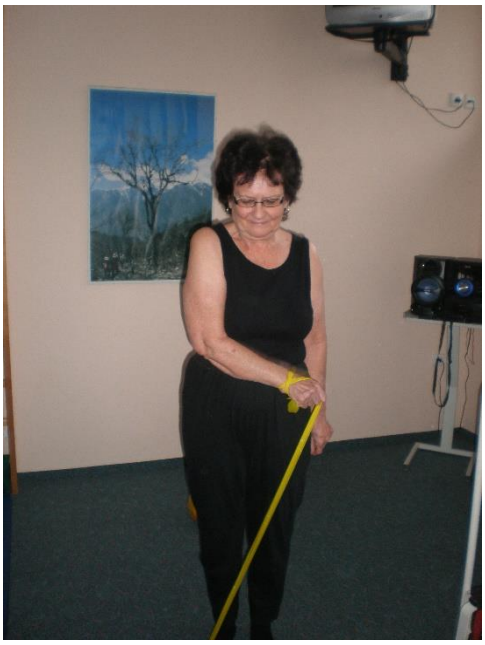

Figure No 48 – PNF technique: 1 diagonal flexion of the UE in standing position

Stabilization of whole body

The patient was in sitting position correctly on the gymnastic ball and she was holding a stick with both hands at the edges of the stick, I instructed the patient to try to contract her abdominal area and to stay stable with correct posture, then I asked her to rotate her trunk to both sides. The patient during the exercise didn't feel any pain.

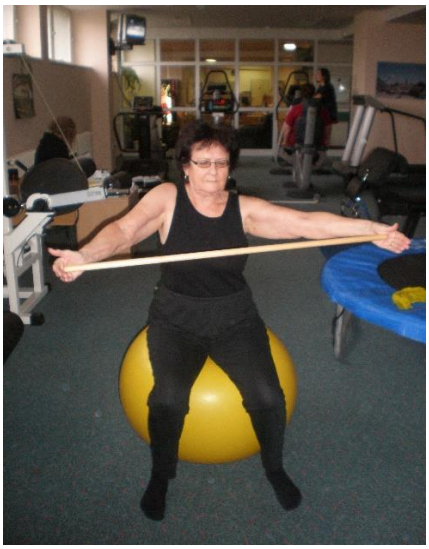

Figure No 49 – Stabilization exercise for the whole body

End of therapy No5

6th Therapy, Wednesday 12 February 2014

Goal of today's therapy unit

Main goal for today therapy, decrease pain, increase ROM, relax the hypertone muscles, strengthening the weak muscles mobilization of restricted joints and sensomotoric stimulation and exercises and stabilization to improve the condition of the shoulder, PNF 1 and 2 diagonal flexion upper extremity.

Procedure

Increase ROM

The patient was in sitting position, i instructed the patient to provide the movement of flexion, extension, abduction and horizontal adduction actively until the point that she was able to achieve. Then I applied the same movements passively and the ROM was increased. The patient during the therapy was feeling pain (4/10)

Relaxation of hypertone muscles (PIR)

I did Post Isometric Relaxation by Lewit, (upper trapezius, levator scapulae and sternocleidomastoid). The patient during the therapy didn't feel pain.

Strengthening the weak muscles

I did strengthening exercises with the theraband (yellow) and softball flexion, extension, abduction, horizontal adduction, internal and external rotation to increase the strength of the muscles, (infraspinatus, terres minor, subscapularis, terres major, trapezius, deltoid anterior, posterior, middle and pectoral muscles). The patient during the therapy was feeling pain (4/10), also she couldn't provide the exercises for a long time because she get tired.

Sensomotoric stimulation exercises

I did sensomotoric exercises with posturomed machine to improve the stability of shoulder joint. The patient was in kneeling position with both palms attached to the machine and I instructed her to apply the movements to craniocaudal direction and laterolateral direction but her both hand should be stable. The patient during the therapy was feeling pain (4/10), also she couldn't provide the exercises for a long time because she get tired.

Mobilization of the restricted joints by Lewit

I did mobilization of acromioclavicular, sternoclavicular, shoulder joint in all directions by Lewit. The patient felt little pain during the therapy, pain level (2/10).

PNF technique, by Kabat, strengthening exercises, diagonal 1 and 2

I did PNF for facilitation and strengthening of the muscles of the upper extremity, firstly I instructed and learn the patient how to provide the movement as more correctly as she could and then I did the diagonals in supine lying position and then I instructed the patient to apply the same movements (1and 2 diagonal) with using of theraband in standing position, the patient wasn't able to provide whole movement because of pain. The patient during the exercises felt little pain, pain level (5/10).

Stabilization of whole body

The patient was in sitting position correctly on the gymnastic ball and she was holding a stick with both hands at the edges of the stick, I instructed the patient to try to contract her abdominal area and to stay stable with correct posture, then I asked her to rotate her trunk to both sides. The patient during the exercise didn't feel any pain.

End of therapy No6

7th Therapy, Friday 14 February 2014

Goal of today's therapy unit

Main goal for today therapy, decrease pain, increase ROM, relax the hypertone muscles, strengthening the weak muscles mobilization of restricted joints and sensomotoric stimulation and exercises and stabilization to improve the condition of the shoulder, PNF 1 and 2 diagonal flexion upper extremity.

Procedure

Increase ROM

The patient was in sitting position, i instructed the patient to provide the movement of flexion, extension, abduction and horizontal adduction actively until the point that she was able to achieve. Then I applied the same movements passively and the ROM was increased. The patient during the therapy was feeling pain (4/10)

Relaxation of hypertone muscles (PIR)

I did Post Isometric Relaxation by Lewit, (upper trapezius, levator scapulae and sternocleidomastoid). The patient during the therapy didn't feel pain.

Strengthening the weak muscles

I did strengthening exercises with the theraband (yellow) and softball flexion, extension, abduction, horizontal adduction, internal and external rotation to increase the strength of the muscles, (infraspinatus, terres minor, subscapularis, terres major, trapezius, deltoid anterior, posterior, middle and pectoral muscles). The patient during the therapy was feeling pain (4/10), also she couldn't provide the exercises for a long time because she get tired.

Sensomotoric stimulation exercises

I did sensomotoric exercises with posturomed machine to improve the stability of shoulder joint. The patient was in kneeling position with both palms attached to the machine and I instructed her to apply the movements to craniocaudal direction and laterolateral direction but her both hand should be stable.

The patient during the therapy was feeling pain (4/10), also she couldn't provide the exercises for a long time because she get tired.

Mobilization of the restricted joints by Lewit

I did mobilization of acromioclavicular, sternoclavicular, shoulder joint in all directions by Lewit. The patient felt little pain during the therapy, pain level (2/10).

PNF technique, by Kabat, strengthening exercises, diagonal 1 and 2

I did PNF for facilitation and strengthening of the muscles of the upper extremity, firstly I instructed and learn the patient how to provide the movement as more correctly as she could and then I did the diagonals in supine lying position and then I instructed the patient to apply the same movements (1and 2 diagonal) with using of theraband in standing position, the patient wasn't able to provide whole movement because of pain. The patient during the exercises felt little pain, pain level (5/10).

Stabilization of whole body

The patient was in sitting position correctly on the gymnastic ball and she was holding a stick with both hands at the edges of the stick, I instructed the patient to try to contract her abdominal area and to stay stable with correct posture, then I asked her to rotate her trunk to both sides. The patient during the exercise didn't feel any pain.

3.7. FINAL KINESIOLOGY EXAMINATIONS

3.7.1. Observation

• The colour of the skin around the right shoulder it looks normal without any changes.
• There is no oedema in the area of right shoulder.
• The muscles of the right shoulder are hypotrophic.
• Her physiological status is very good.
• The patient seems that she was cooperated with me and she follows my instructions.

Table No23: Final Kinesiology Examinations – Observation

3.7.2. Postural examination (observation - palpation)

3.7.2.1. Posterior view

• Normal space between feet.
• External rotation of right foot.
• Physiological arches of both feet.
• Fossa popliteal on the right knee joint is lower than on the left one.
• Valgosity of right knee joint.

- Small thoraco-humeral triangles on right side bigger.
- Left scapula is elevated more than the right.
- The left shoulder is higher than the right shoulder.
- No tilt of the head to the sides.
- Whole body bent slightly to the right.

Table No24: Final Kinesiology Examinations - Postural examination - Posterior view

3.7.2.2. *Lateral view*

- More weight bearing on the lateral side, right foot.
- Hyperextension of both knees.
- Right knee joint is in a neutral position.
- Lordosis of lumbar spine.
- Slightly kyphosis of thoracic region.
- Physiological lordosis of cervical spine.
- Slightly protraction of right shoulder.
- Head protracted forward.

Table No25: Final Kinesiology Examinations - Postural examination – Lateral view

3.7.2.3. *Anterior view*

- Normal space between feet.
- External rotation of right foot.
- Physiological arches of both feet.
- Internal rotation of both knee joints.
- Hips are in neutral position.
- Small thoraco-humeral triangles, on right side is bigger.
- Both clavicles are symmetrical.
- Left shoulder joint is slightly higher than the right.
- No tilt of the head to the sides.

Table No26: Final Kinesiology Examinations - Postural examination – Anterior view

3.7.3. Special Tests

3.7.3.1. Two scales test

Right side	**Left side**
34kg	33kg

Table No27: Final Kinesiology Examinations

Special tests – Two scales test

Results: The physiological ratio is till 10% -15% of the total body weight. The patient has equal weight distribution in the lower extremities

3.7.3.2. Trendelenburg test

Right side	**Left side**
The patient was able to keep the stability and stay on the right leg. The test was negative.	The patient was able to keep the stability and stay on the left side. The test was negative.

Table No28: Final Kinesiology Examinations

Special tests - Trendelenburg test

3.7.4. Gait examination

3.7.4.1. Posterior- anterior view

- First touch was with heel and then the whole foot.
- The steps was symmetrical.
- There was external rotation at the right foot.
- Symmetry of the hands during walking.

Table No29: Final Kinesiology Examinations - Gait examination

Posterior- anterior view

3.7.4.2. *Lateral view*

• First touch was with heel and then the whole foot with the lateral side. • The steps was symmetrical. • Slightly extension of left knee. • Slightly rotation of the trunk. • Head protracted.

Table No30: Final Kinesiology Examinations - Gait examination

Lateral view

3.7.5. Evaluation of basic movement patterns (by Janda)

	Right side	**Left side**
Shoulder abduction	Altered movement pattern, the patient activate first the upper trapezius then deltoid and then supraspinatus. Also during the movement the patient bent to the side. (There was slightly improvement).	Altered movement pattern, the patient activate first the upper trapezius then deltoid and then supraspinatus. Also during the movement the patient bent to the side. (There was slightly improvement).
Neck flexion	Deep neck flexors are inhibited, so the sternocleidomastoid was overactive. (There was slightly improvement).	Deep neck flexors are inhibited, so the sternocleidomastoid was overactive. (There was slightly improvement).

Table No31: Final Kinesiology Examinations

Evaluation of basic movement patterns by Janda

3.7.6. Anthropometric measurements examination

Upper extremities length	Right side	Left side
Whole arm:	72cm	72cm
Humerus:	29,5cm	29,5cm
Forearm:	25cm	25cm
Hand:	17cm	17cm

Table No32 Final Kinesiology Examinations - Anthropometric measurements Length of UE

Upper extremities circumferences	Right side	Left side
Humerus:	30cm	30cm
Forearm:	23cm	24cm
Hand:	17cm	17cm

Table No33: Final Kinesiology Examinations - Anthropometric measurements Circumferences of UE

3.7.7. Soft tissue examination by Lewit

Examined part	Direction	Location	Results
Skin	Caudal Cranial Medial Lateral	Shoulder: Forearm: Whole back:	No restriction and are elastic.
Subcutaneous			No restriction and are elastic.
Fascia			No restriction and are elastic.

Table No34: Final Kinesiology Examinations Soft tissue examination by Lewit

*The soft tissue examination for the fascia of the whole back was applied in the direction of craniocaudal and caudocranial direction.

3.7.8. Range of motion examination, by Kendall

Evaluation by SFTR method

SHOULDER JOINT				
Plane	**Left side**		**Right side**	
	Active	**Passive**	**Active**	**Passive**
R_f 90	80 -0- 60	85 -0- 65	75 -0- 54	80 -0-60
F	170 -0- 0	180 -0- 0	95 -0- 0	95 -0- 0 (The patient after 95 degrees feels pain).
S	35 -0- 170	40 -0- 180	20 -0-90	25 -0- 95
T	80 -0- 30	90 -0- 40	75 -0- 35	80 -0-40

Table No35: Final Kinesiology Examinations

ROM examination by Kendall – Shoulder joint

3.7.9. Muscle tone (palpation) by Lewit

Examined muscles	**Right side**	**Left side**
Upper trapezius	Normal	Normal
Lower trapezius	Normal	Normal
Middle trapezius	Normal	Normal
Rhomboids	Normal	Normal
Sternocleidomastoid	Normal	Normal
Levator scapulae	Normal	Normal
Latissimus dorsi	Normal	Normal
Supraspinatus	Normal	Normal
Pectoralis major	Hypotone	Hypotone
Pectoralis minor	Hypotone	Hypotone
Deltoid anterior	Hypertone	Normal
Deltoid posterior	Hypertone	Normal
Deltoid middle	Hypertone	Normal
Brachioradialis	Normal	Normal
Triceps brachii	Hypotone	Hypotone

Biceps brachii	Hypotone	Hypotone

Table No36: Final Kinesiology Examinations - Muscle tone examination by Lewit

3.7.10. Muscle length test, by Janda

Examined muscles	**Right side**	**Left side**
Scalenes	0	0
Sternocleidomastoid	0	0
Upper trapezius	0	0
Levator scapulea	0	0
Pectoralis major upper	1	1
Pectoralis major lower	1	1
Pectoralis major middle	1	1
Pectoralis minor	The patien feel pain during the examination and wasnt able to provide on the right side.	0

Table No37: Final Kinesiology Examinations

Muscle length test by Janda

3.7.11. Muscle strength test, by Kendall

Examined muscles	**Right side**	**Left side**
Serratus anterior	4	5
Upper trapezius	4+	4
Lower trapezius	3+	4
Middle trapezius	4+	4
Rhomboids	4	4
Levator scapulea	4+	4
Latissimus dorsi	4	4
Teres major	4+	4
Teres minor	4	4
Infraspinatus	4+	4
Supraspinatus	4+	4

Pectoralis major upper	4	4
Pectoralis major lower	3+	4
Pectoralis major middle	3+	4
Deltoid anterior	3 little pain	3little pain
Deltoid middle	3little pain	3little pain
Deltoid posterior	3little pain	3little pain
Brachioradialis	4	4
Triceps brachii	4	4
Biceps brachii	4	4

Table No38: Final Kinesiology Examinations

Muscle strength test by Kendall

3.7.12. Examination of joint play, by Lewit

Examined part	**Direction**	**Result**
Metatacarpophalangeal $1^{st} – 5^{th}$ fingers	Dorsal	Not restricted both sides
	Plantar	Not restricted both sides
	Lateral	Not restricted both sides
Interphalangeal $1^{st} – 5^{th}$ fingers	Dorsal	Not restricted both sides
	Plantar	Not restricted both sides
	Lateral	Not restricted both sides
Elbow joint	Lateral and medial direction	Not restricted both sides
Acromioclavicular	Craniocaudal and ventrodorsal direction	Slightly restricted and the patient feels pain during the examination, both sides
Sternoclavicular	Ventrodorsal and craniocaudal direction	Not restricted
Shoulder joint	Ventrodorsal and caudal direction	Slightly restricted and the patient feels pain during examination on the right side
Antlantooccipital joint	Anteflexion, retroflexion, lateroflexion, rotation	Not restricted

Cervical spine	Flexion, extension, lateroflexion, rotation	Not restricted

Table No39: Final Kinesiology Examinations

Examination of joint play by Lewit

3.7.13. Neurological examination

Deep tendon reflexes		
Examined part	**Right side**	**Left side**
Biceps brachii reflex (C5,C6)	Normal	Normal
Triceps brachii (C7)	Nromal	Normal
Brachioradialis (TH1,C8)	Normal	Normal

Table No40: Final Kinesiology Examinations

Neurological examination - Deep tendon reflexes

Superficial sensation		
Dermatome	**Right side**	**Left side**
C4	Normal	Normal
C5	Nromal	Normal
C6	Normal	Normal
C7	Normal	Normal
C8	Normla	Normal
TH1	Normal	Normal

Table No41: Final Kinesiology Examinations

Neurological examination - Superficial sensation

3.8.EVALUATION OF THE EFFECT OF THE THERAPY

My patient has shoulder luxation in the right shoulder joint. She had limited range of motion in the right shoulder joint, also there was restriction in the joints because of the immobilization. Moreover the patient had some weakness in her shoulder area, shortness and hypertonicity. According to my results from my initial kinesiology examination I applied the therapy to my patient.

The therapy that I choose for my patient included, Post isometric relaxation, manual therapy, soft tissue technique, strengthening exercises, stretching and sensomotoric exercises.

The therapy and the techniques that I applied to my patient were effective. Especially there was improvement of the range of motion of the right shoulder joint which was the main problem of the patient because that problem has affected the ADL activities of my patient. For the improvement of the range of motion of the right shoulder the PIR techniques were very effective.

Finally I believe that if the patient continues the mentioned therapies and the instruction that I gave to her for the improvement of ADL activities the patient will have bigger improvement of her condition.

4. CONCLUSION

During my clinical work placement at Centrum léčby pohybového aparátu, my experience was very interesting and very helpful for me on applying my knowledge that I learned during my studies. I had a very good cooperation with my supervisor PhDr. Edwin Mahr as well.

Concerning all my examination that I perform to my patient I came to the conclusion that in the end the results were enough effective to satisfied my patient. Secondly day by day my patient started to have a better mood comparing the first day that I met her.

Therapy after therapy, my patient was providing all the exercises easier than the previous therapy. She started to feel less pain, more strength and she got more trustful with me. In the beginning when I examined her the biggest abnormality that I found was the range of motion of the shoulder joint into abduction direction. She felt better when firstly, she had a better range of motion and she was performing the movements much easier. About the strength of the cuff rotator muscles in the shoulder, she was quite weak in the beginning but I was focused on increasing the muscle strength because these muscles I knew that it would help her on her daily activities as well.

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6. SUPPLEMENTS

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6.2.LIST OF FIGURES

6.3.ABBREVIATIONS

1. **BMI –** Body mass index
2. **HR –** Heart rate
3. **ADL –** Activities of daily living
4. **ROM** – Range Of Motion/movement.
5. **AO** – Atlanto – occipital joint
6. **STFR –** Sagittal, transverse, frontal, rotation method.
7. **UE** – Upper Extremity
8. **E** – Extension
9. **F** – Flexion
10. **ABD –** Abduction
11. **ADD -** Adduction
12. **F -** Frontal
13. **S** – Sagittal
14. **T –** Transverse
15. **ER** – External Rotation
16. **IR** – Internal Rotation
17. **PIR** – Post Isometric Relaxation technique, by Lewit
18. **PNF** – Post Neuromuscular Facilitation technique, by Kabat.
19. **AP –** Antero posterior.
20. **No.** – Number

6.4. APPLICATION FOR ETHICS BOARD REVIEW

CHARLES UNIVERSITY IN PRAGUE
FACULTY OF PHYSICAL EDUCATION AND SPORT
José Martího 31, 162 52 Praha 6-Veleslavín
tel. +420 2 2017 1111
http://www.ftvs.cuni.cz/

Application for Ethics Board Review

of the research project, doctoral research, master degree research, undergraduate research, involving human subjects

Project title: Case study of a patient with diagnosis Shoulder luxation

Nature of the research project: Bachelor's Thesis

Author (chief investigator): Emmanouil Kassakis

Supervisor (in case of student research): Doc., PaedDr. Dagmar Pavlů, CSc.

Research project description Case study of physiotherapy treatment of a patient with the diagnosis of shoulder luxation will be conducted under the expert supervision of an experienced physiotherapist at Centrum Lecby Pohyboveho Aparatu
Guaranteed safety to be judged by experts: safety to be judged by experts: No invasive methods will be used
Ethical aspects of the research: Personal data obtained during the investigation will not be published, draft informed consent (enclosed)

Informed consent (attached)

Date: 4.2.2014 Author's signature: Emmanouil Kassakis

Faculty of Physical Education and Sport, Charles University in Prague
ETHICS BOARD REVIEW

Ethics Board members: Doc. MUDr. Staša Bartůňková, CSc.
Prof. Ing. Václav Bunc, CSc.
Prof. PhDr. Pavel Slepička, DrSc.
Doc. MUDr. Jan Heller, CSc.

The Ethics Board at the Faculty of Physical Education and Sport, Charles University, approved the research project.
Approval number: 068/2014
Date: 18.2.2014

The Ethics Board at the Faculty of Physical Education and Sport, Charles University, reviewed the submitted research project and **found no contradictions with valid principles**, regulations and international guidelines for biomedical research involving human subjects.

The chief investigator of the project met the necessary requirements for receiving the Ethics Board approval.

Official school stamp

UNIVERZITA KARLOVA v Praze
Fakulta tělesné výchovy a sportu
José Martího 31, 162 52, Praha 6
1

Signature, REB Chairman

INFORMOVANÝ SOUHLAS

V souladu se Zákonem o péči o zdraví lidu (§ 23 odst. 2 zákona č.20/1966 Sb.) a Úmluvou o lidských právech a biomedicíně č. 96/2001, Vás žádám o souhlas k vyšetření a následné terapii. Dále Vás žádám o souhlas k nahlížení do Vaší dokumentace osobou získávající způsobilost k výkonu zdravotnického povolání v rámci praktické výuky a s uveřejněním výsledků terapie v rámci bakalářské práce na FTVS UK. Osobní data v této studii nebudou uvedena.

Dnešního dne jsem byla odborným pracovníkem poučena o plánovaném vyšetření a následné terapii. Prohlašuji a svým dále uvedeným vlastnoručním podpisem potvrzuji, že odborný pracovník, který mi poskytl poučení, mi osobně vysvětlil vše, co je obsahem tohoto písemného informovaného souhlasu, a měla jsem možnost klást mu otázky, na které mi řádně odpověděl.

Prohlašuji, že jsem shora uvedenému poučení plně porozuměla a výslovně souhlasím s provedením vyšetření a následnou terapií.

Souhlasím s nahlížením níže jmenované osoby do mé dokumentace a s uveřejněním výsledků terapie v rámci studie.

Datum:……

Osoba, která provedla poučení:……

Podpis osoby, která provedla poučení:……

Vlastnoruční podpis pacienta /tky:…….