**Charles University in Prague**

**Faculty of Physical Education and Sports**
**Department of Physiotherapy**

# ADHESIVE INFLAMMATION OF CAPSULE OF RIGHT SHOULDER JOINT

**Bachelor Thesis**

Author: Andreas Stevning

Supervisor: Mgr. Lenka Satrapova

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**Abstract:**

**Title:** Adhesive inflammation of capsule of right shoulder joint.

**Aim of thesis:**

In this case study of a patient with adhesive inflammation of capsule of right shoulder joint I will discuss the anatomy, kinesiology and biomechanics of the shoulder complex. I will discuss both the clinical picture of adhesive capsulitis and impingement syndrome. Then I will discuss the types of rehabilitation that will be beneficial for the patient, as well as the epidemiology and etiology of shoulder pain.

In the second part of the thesis I will discuss the examinations, rehabilitation plans and therapy progress of the patient. Conclusion and evaluation of the therapy will be included to give a picture of the success of the therapy.

**Clinical findings:**

Important findings in the initial kinesiologic examination were pain in resistance against internal rotation and against flexion of semiflexed elbow. I also found pain in the Apprehension test, Hawkins test and during Neers impingement test. Other findings were weakness and shortness of essential muscles. After obtaining the anamnesis and the full initial kinesiologic examination I concluded that the patient had a multidirectional instability of his right shoulder joint, leading to an internal glenoid impingement syndrome.

**Methods:**

In the therapy sessions with the patient I focused on relaxing the hypertonic muscles by means of post isometric relaxation, mobilization of restricted joints by manual methods, strengthening of weakened muscles and stretching of shortened muscles, as well as stabilization of the shoulder joint.

**Result:**

The patient had a decrease in the pain level of his shoulder. He had a significant improvement of strength in weakened muscles, as well as improvement of length of shortened muscles.

**Conclusion:**

The patient was very motivated and not difficult to work with. He performed his self-therapy in a satisfying manner and made good progress in important aspects. He had a satisfactory increase of range of motion, increase of muscle strength and muscle length.

**Key words:**

Shoulder joint, shoulder pain, throwing athlete, adhesive capsulitis, impingement syndrome, joint instability, physiotherapy

## Declaration

I hereby declare that this work is entirely my own, individual work based on knowledge gained from books, journals, reports and by attending lectures and seminars at FTVS.

I also declare that no invasive methods were used during the practical approach and that the patient was fully aware of the procedures at any given time.

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Prague, 2012

**Acknowledgement**

First of all I would like to thank my family and friends for always supporting me through my three years in Prague.

I would also like to thank Mgr. Zaher El Ali for guiding me through the practical approach for this thesis.

Most importantly, I would like to thank Mgr. Lenka Satrapova for supervising me through the whole process of the bachelor thesis.

Andreas Stevning

Prague, April 2012

**Table of content:**

# 1. Introduction

The patient arrived the clinic, CLPA, with the diagnosis adhesive capsulitis of right shoulder joint. He complained of pain of the shoulder, especially when throwing during baseball. The patient is a player on the U21 national team of Czech republic, so the rehabilitation of his shoulder was of big importance for him. He had been having pain on and off since September 2011, where the last five weeks had went by with no possibilities of throwing for the patient.

After starting to perform the initial kinesiologic examination, I started to suspect that the diagnosis retrieved from the doctor was not accurate. When providing the ROM examination, I noted that the patient did not have as big restriction of movement as a patient with adhesive capsulitis would have. Also, the age and the anamnesis indicated that the patient was misdiagnosed.

I chose this patient because I find the shoulder to be an interesting case, that will give me valuable experience in the future. I found the fact that the patient is a throwing athlete a benefit as I would like to work with athletes in the future. I feel that this case has given me a lot of experience in the possible shoulder pain of throwing athletes.

# 2 General part

## 2.1 Anatomy of the shoulder complex

Shoulder complex is a term that is used to include all of the structures involved with motion of the shoulder. The shoulder complex consists of the scapula, clavicle, sternum, humerus, and rib cage, and includes the sternoclavicular joint, acromioclavicular joint, glenohumeral joint, and the "scapulothoracic articulation". (14)

### Glenohumeral joint

The glenohumeral joint is a freely mobile, ball-and-socket synovial joint. The articular surface on the glenoid fossa of the scapula is shallow, but is deepened by a rim of articular fibrocartilage, the glenoid labrum. The articular surface on the head of the humerus forms about a third of a near sphere. In that way, the humerus can move in any plane with respect to the scapula. The capsule of the joint is attached round the glenoid labrum and to the anatomical neck of the humerus, except inferiorly where the attachment passes downward on to the medial aspect of the shaft. The capsule is loose inferiorly and this, with the shallow articular surfaces, permits a wide range of movements. (15)

### Sternoclavicular joint

The sternoclavicular joint provides the shoulder with the only direct attachment to the trunk. Being a synovial joint, the sternoclavicular joint has a joint capsule. It also has three major ligaments and a joint disc. The joint capsule surrounds the joint and is reinforced by the anterior and posterior sternoclavicular ligaments. The articular disk has a unique attachment that contributes to the motion of this joint. The upper part of the disk is attached to the posterior superior part of the clavicle, while the lower part is attached to the manubrium and first costal cartilage. (14)

**Acromioclavicular joint**

The acromioclavicular joint is a small synovial joint between a small oval facet on the medial surface of the acromion and a similar facet on the acromial end of the clavicle. It allows movement in the anteroposterior and vertical planes together with some axial rotation. The acromioclavicular joint is surrounded by a joint capsule and is reinforced by the acromioclavicular ligament and the coracoclavicular ligament. (3)

The clavicle is the only bony attachment between the trunk and the upper limb. The acromial end of the clavicle is flat, whereas the sternal end is more robust and somewhat quadrangular in shape. The acromial end of the clavicle has a small oval facet on its surface for articulation with a similar facet on the medial surface of the acromion of the scapula. The sternal end has a much larger facet for articulation mainly with the manubrium of the sternum, and to a lesser extent, with the first costal cartilage. The inferior surface of the lateral third of the clavicle possesses a distinct tuberosity consisting of the conoid tubercle and the trapezoid line, for attachment of the important coracoclavicular ligament. In addition, the surfaces and margins of the clavicle are roughened by the attachment of muscles that connect the clavicle to the trunk, neck and upper limb. (3)

The scapula articulates with both the humerus and the clavicle. It also provides large, flat surfaces and roughened processes for the attachment of muscles acting on the joints. The scapula consists of the coracoid process, acromial process, scapular spine, supraspinous fossa, infraspinous fossa, subscapular fossa, lateral and vertebral borders, inferior angle, glenoid fossa, supraglenoid tubercle and infraglenoid tubercle. (15)

The proximal end of the humerus consists of the head, the anatomical neck, the greater and lesser tubercles, the surgical neck and the superior half of the shaft of humerus. The greater and lesser tubercle are prominent landmarks on the proximal end of the humerus and serve as attachment sites for the four rotator cuff muscles of the glenohumeral joint. (3)

## 2.2 Kinesiology of the shoulder complex

Shoulder girdle is a term often used to discuss the activities of the scapula and clavicle and, to a lesser degree, the sternum. The sternoclavicular and acromioclavicular joints allow shoulder girdle motions, including elevation and depression, protraction and retraction, and upward and downward rotation. Five muscles attach to the scapula, the clavicle, or both, providing motion of the shoulder girdle. (14)

The shoulder joint, also called the glenohumeral joint, consists of the scapula and humerus. The motions of the shoulder joint are flexion, extension and hyperextension, abduction and adduction, medial and lateral rotation, and horizontal abduction and adduction. (Lippert, 2010) The shoulder joint consists of the gleno-humeral joint, acromio-clavicular joint and sternoclavicular joint. In addition, the scapulothoracic and subdeltoid joint are part of the shoulder joint. (20)

The cervical spine may often be connected in painful conditions of the shoulder. Shortening of muscles or restriction of joint play may provoke pain and restriction of movement of the shoulder. (20)

**Movements of the scapula**

| | |
|---|---|
| **Adduction** | Gliding movement in which the scapula moves toward the spine |
| **Abduction** | Gliding movement in which the scapula moves away from the spine, and following the contour of the thorax, assumes a posterolateral position in full abduction. |
| **Lateral or upward rotation** | Movement about a sagittal axis in which the inferior angle moves laterally and the glenoid cavity moves cranially. |
| **Medial or downward rotation** | Movement about a sagittal axis in which the inferior angle moves medially and the glenoid cavity moves caudally. |
| **Anterior tilt** | Movement about a coronal axis in which the coracoids process moves in an anterior and caudal direction while the inferior angle moves in a posterior and cranial direction. The coracoids process may be said to be depressed anteriorly. This movement is associated with elevation. |
| **Elevation** | Gliding movement in which the scapula moves cranially, as in "shrugging" shoulders. |
| **Depression** | A gliding movement in which the scapula moves caudally. This movement is the reverse of both elevation and anterior tilt. |

Table 1: Movements of the scapula (12)

**Activity of muscles during movements of shoulder joint**

| Movement | Shoulder muscles | Scapula muscles |
|---|---|---|
| Full flexion (up to 180°) | *Flexors:*<br>Anterior Deltoid<br>Biceps<br>Pectoralis major, upper<br>Coracobrachialis<br><br>*Lateral rotators:*<br>Infraspinatus<br>Teres minor<br>Posterior Deltoid | *Abductor:*<br>Serratus anterior<br><br><br><br><br>*Lateral rotators:*<br>Serratus anterior<br>Trapezius |
| Full abduction (to 180°) | *Abductors:*<br>Deltoid<br>Supraspinatus<br>Biceps, long head<br><br>*Lateral rotators:*<br>Infraspinatus<br>Teres minor<br>Posterior Deltoid | *Adductor:*<br>Trapezius, acting to stabilize scapula in adduction<br><br><br>*Lateral rotators:*<br>Trapezius<br>Serratus anterior |
| Full extension (to 45°) | *Extensors:*<br>Posterior Deltoid<br>Teres major<br>Latissimus dorsi<br>Triceps, long head | *Adductors, medial rotators and elevators:*<br>Rhomboids<br>Levator scapulae<br><br>*Anterior tilt of scapula by:*<br>Pectoralis minor |
| Full adduction to side against resistance | *Adductors:*<br>Pectoralis major<br>Teres major<br>Latissimus dorsi<br>Triceps, long head | *Adductors:*<br>Rhomboids<br>Trapezius |

Table 2: Activity of muscles during movements of shoulder joint (12)

**Range of motion of shoulder joint**

| | |
|---|---|
| Flexion | 180 |
| Extension | 45 |
| Abduction/horizontal abduction | 180/90 |
| Adduction/horizontal adduction | 0/30 |
| External rotation | 90 |
| Internal rotation | 70 |

Table 3: Range of motion of shoulder joint (12)

## 2.3 Biomechanics of the shoulder complex

### Load on the shoulder

Because the articulations of the shoulder girdle are interconnected, they function to some extent as a unit in bearing loads and absorbing shock. However, because the glenohumeral joint provides direct mechanical support of the arm, it sustains a much greater load than the other shoulder joints. (5)

### Scapulohumeral rhytm

Scapulohumeral rhythm is a concept that describes the movement relationship between the shoulder girdle and shoulder joint. The first 30 degrees of shoulder joint motion is pure shoulder joint motion. However, after that, for every 2 degrees of shoulder flexion or abduction that occurs, the scapula must upwardly rotate 1 degree. This 2:1 ratio is known as scapulohumeral rhythm. It is possible to demonstrate that the first part of shoulder joint motion occurs only at the shoulder joint, but further motion must be accompanied by shoulder girdle motion. With a person in the anatomical position, stabilize the scapula by putting the heel of your hand against the axillary border to prevent rotation of the scapula. Instruct the person to abduct the shoulder joint. Notice that the individual is only able to abduct a short distance before shoulder joint motion is impaired. (14)

Scapulohumeral rhythm enables a much greater range of motion at the shoulder than if the scapula was fixed. During the first 90° of arm elevation (in sagittal, frontal, or diagonal planes), the clavicle is also elevated through approximately 35° to 45° of motion at the sternoclavicular joint. Rotation at the acromioclavicular joint occurs during the first 30° of humeral elevation and again as the arm is moved from 135° to maximum elevation. (5)

### Biomechanics in throwing in baseball

Baseball pitching is an overhead activity, where the entire body is involved in the throw. The motion starts in the lower extremity , then transferring the force to the trunk, shoulder, elbow, wrist and hand. An alteration from the optimal in any of these

segments will affect this chain and the outcome of the throw. A big amount of force is created by this motion, which leads to a high risk for injury. (8)

Pitching is most commonly divided into five phases which are the windup, early cocking, late cocking, acceleration, and follow-through. (8)

**Windup**

The pitching starts with the windup phase, which starts with the pitcher positions the body in a way that the non-throwing arm is facing the target. The two hands are together, near the body, as he takes a step backwards with the leg contralateral to the throwing arm. The ipsilateral leg has a supporting function. Next, the body rotates 90 degrees while the contralateral leg flexes at the hip and knee. The body "winds" up so that the whole body is ready to be involved in the throw. This motion is the least demanding of the phases of the pitching. (8)

**Early cocking**

The early cocking starts with retraction of the scapula, abduction and external rotation of the humerus. The elbow is flexed and the contralateral leg starts to extend. The contralateral leg also starts hip adduction, medial rotation and extension, as well as ankle eversion and plantar flexion. The non-throwing shoulder is abducted and its elbow is extending. (8)

**Late cocking**

The late cocking begins when the contralateral foot hits the ground. When the foot hits the ground, both of the arms are elevated to about 90 degrees. In this position thers is anterior stress on the glenohumeral joint. When there is maximal external rotation and abduction, the stabilizers of the shoulder, the glenohumeral capsule and ligaments, works to limit further motion. This includes the external rotators, the subscapularis, pectoralis major and latissimus dorsi. The pectoralis minor and serratus anterior are also active in late cocking. At the end of the late cocking, the lumbar spine hyperextends to increase the external rotation. The supraspinatus and infraspinatus are particularly active in the late cocking. By the end of this motion, the internal rotators are in maximally lengthened position to benefit from the elastic energy transfer. The pelvis leads the

shoulders to face the target legs and trunk begin their acceleration for energy transfer to the arm. (8)

**Acceleration**

Acceleration starts with maximum shoulder external rotation and abduction and ends when the ball leaves the hand. This movement include scapular protraction, internal rotation and elbow extension. The capsule of the glenohumeral joint is tight to provide an elastic force, and the accelerator muscles are also maximally stretched. The serratus anterior and pectoralis major are strongly active during this phase as the arm moves forward and the scapula protracts. The subscapularis and latissimus dorsi are contracting concentrically as the arm moves into medial rotation during acceleration. (8)

**Follow-Through**

Follow-through starts when the ball leaves the hand until the supporting leg moves forward and contacts the ground to stop forward body motion. Trunk rotation and scapular motions occur and are present in varying extent depending on the style and technique of the thrower. The rotator cuff, especially the lateral rotators, must decelerate the arm after ball release and work against the momentum distraction forces occurring at the shoulder. After the ball is released, the throwing arm continues to move across the body toward the opposite hip with the scapula continuing to protract; this cross-body motion helps to minimize irritation to the rotator cuff since the concomitant scapular motion keeps the coracoacromial arch structures from impinging on the rotator cuff. (8)

It is during the follow-through that injuries to the posterior shoulder occur. The body must now dissipate the energy that has been developed to accelerate the ball. This is one reason it is important for the body to continue to move after the ball is released. An abrupt stop in arm motion will prevent this energy dissipation and cause these tremendous forces to be absorbed primarily by the shoulder. Flexing the trunk, flexing the support knee, and allowing the arm to continue along its path of movement across the body and to the opposite leg all assist in dissipating this energy and reducing distraction forces on the shoulder. (8)

## 2.4 Clinical picture of Adhesive capsulitis

Adhesive capsulitis is an idiopathic, progressive, but self-limited restriction of active and passive range of motion. The pathological process related to adhesive capsulitis involves structures intrinsic to the glenohumeral joint and surrounding it. The pathological findings of adhesive capsulitis ultimately depend on its stage of development. (4)

The diagnosis of adhesive capsulitis is divided into three stages, the painful phase, the freezing phase and the thawing phase. Each phase usually lasts from 6-9 months. (11)

**Painful phase**

During the painful phase, there is present restriction in both passive and active movements of shoulder in all planes. There is usually pain in maximal external rotation and abduction. (11)

**Freezing phase**

The most limited passive motion is almost always external rotation, with the second being passive abduction and finally passive internal rotation. Depending on the amount of stiffening, external rotation may be the only restricted passive movement. As the stiffening progresses, the other motions restricts as well. In this stage, there may be pain in isometric strength testing of the rotator cuff. Pain may be found in resisted abduction, adduction and internal rotation. It is possible that a cuff tendinitis may be associated with an adhesive capsulitis. (9)

**Thawing phase**

In this phase there is a gradual increase of motion. This phase is usually with no pain in isometric testing of the rotator cuff. Limited external rotation can be primary in a patient with a history of and presence of posterior dislocation, osteoarthritis of the glenohumeral joint. (9)

## 2.5 Clinical picture of Impingement syndrome

Pain and dysfunction due to excessive overhead use or abnormal positioning of the shoulder during overhead throwing activities are common and may result from multiple etiologies, including impingement syndromes. Primary, secondary, internal, and coracoid impingement syndromes have all been described. The treatment of shoulder problems must be carefully considered and then patiently and diligently undertaken to return the shoulder to its preinjury form. (10)

**Internal impingement**

Internal impingement is due to contact between the posterior superior glenoid labrum and the posterior aspect of the supraspinatus tendon or the superior aspect of the infraspinatus tendon, or both, at the insertion in the greater tuberosity. It is usually seen with arm use that involves abduction and the extremes of external rotation, such as those seen in the late cocking stage of pitching. It has been implicated in athletic throwing injuries and positional shoulder pain. This diagnosis is relatively new, and the pathomechanics are being elucidated. Some experts feel that an underlying instability of the shoulder leads to this glenoid impingement. Others feel that the impingement is a result of abnormal biomechanics and that the resulting injury to the superior labral complex may contribute to the development of an instability pattern. (10)

With early internal impingement, the thrower (the incidence of glenoid impingement in throwers, especially pitchers, is high) or involved patient reports the shoulder is stiff and not loosening up as it normally would. Three stages of internal impingement have been described. A decrease in pitching ability and quality should be observed carefully. At this early point, the pitcher should be removed from participation, and rehabilitation should be undertaken. If the thrower is allowed to pitch past the point of stiffness until pain is reported, then it is much harder to resolve this entity satisfactorily with conservative care. Pain is usually reported in the late cocking phase of pitching. It is important, before treatment is undertaken, to rule out other anterior instability pathology, including SLAP lesions, labral tears, and partial rotator cuff tears. The apprehension sign (at the extreme of external rotation) is positive as contact is made

between the superior labrum and the supraspinatus insertion. The relocation test may also be positive as this pressure is relieved. If the patient has unidirectional instability, slight anterior laxity may be evident. With multidirectional instability, care must be taken not to stretch aggressively, as ligamentous laxity is a component of the problem. (10)

## 2.6 Multidirectional joint instability

Multidirectional joint instability is a common condition of young throwing athletes. In these patients it is usually found increased external rotation of the shoulder and decreased internal rotation of the shoulder. When the strain on the shoulder exceeds the threshold, the capsule and the ligaments are gradually stretched. In the beginning, the dynamic stabilizers may compensate by increased activity of the muscles, but over time it will lead to strain on the rotator cuff, which will no longer be able to stabilize the head of humerus in the glenoid cavity. The situation is worsened by the fact that the scapulothoracic muscles no longer will be able to stabilize the scapula in an optimal position in relation to the humerus. (1)

As a result of this, the rotator cuff may be damaged. Direct contact between the rotator cuff and acromion and the coracoacromial ligament may occur during the end of the throwing movement, the late cocking and acceleration phase. This may lead to an inflammation of the subacromial space and damage of the bursa of the rotator cuff. This condition is called secondary impingement. In the beginning of the throwing movement, when the arm is in abduction and external rotation, the head of humerus is moved forward because of slackening of the capsule, and there will occur a conflict between the inner part of the supraspinatus and the upper dorsal part of the glenoid with damage of labrum and supraspinatus as a result. This condition is called internal impingement. (1)

Multidirectional instability in young , active patients with secondary rotator cuff injury is often difficult to diagnose. The shoulder has usually never dislocated, and the symptoms is usually pain. This condition may therefore be interpreted as a subacromial pain condition, and is easy to misdiagnose. An accurate anamnesis is important. The kinesiologic examination often results in positive apprehension test and impingement tests. It is often sign of inflammation, tendinitis and impingement of the rotator cuff with positive isometric tests. (1)

## 2.7 Rehabilitation

The rehabilitation depends on the stage and severity of the patients shoulder condition.

In a patient with adhesive capsulitis the general aim is to decrease the pain and inflammation, while increasing the shoulder range of motion.

In a patient with instability of the shoulder joint, the focus should be on regaining the stability by means of sensomotorical training, strengthening of weakened muscles, PIR of hypertonic muscles and stretching of shortened muscles.

In the throwing athlete with a joint instability, resulting in an impingement condition, the rehabilitation should be designed to bring the patient back to his respective sport, in the best possible condition, as fast as possible. In the beginning the rehabilitation should be focused on decreasing the pain of the patient, as well as corrective exercises according kinesiologic examination. Next, the physiotherapist should set up a plan to slowly and safely regain the throwing abilities, with close supervision of technique.

A strengthening program targeting the humeral and scapular rotators to treat the 3 stages of internal impingement has been proposed. The key is to identify internal impingement early and stretch to improve range of motion and decrease posterior capsular tightness, while strengthening to improve the soft tissue envelope restraint and retaining to avoid recurrence. Stretching of both the posterior capsule and posterior musculature is important. Both the capsule and the musculature can be stretched passively with the arm in 45 degrees of abduction. The patient lies supine on the table to stabilize the scapula. The patient with internal impingement often has very tight posterior soft tissue structures. Posterior pressure can be applied to the anterior humeral head area and held to stretch these posterior structures. This is done by the physiotherapist, who may feel improvement of posterior mobility with gradual constant pressure and repeated stretching treatments, leading to a gradual increase in shoulder mobility. A component of posterior stiffness may be reflexive guarding in the injured shoulder. (10)

Treatment of the overhead throwing athlete is among the more challenging aspects of orthopaedic sports medicine. Awareness and understanding of the throwing motion and the supraphysiologic forces to which the structures of the shoulder are subjected are essential to diagnosis and treatment. Pain and dysfunction in the throwing shoulder may be attributed to numerous etiologies, including scapular dysfunction, intrinsic glenohumeral pathology (capsulolabral structures), extrinsic musculature (rotator cuff), or neurovascular structures. Attention to throwing mechanics and appropriate stretching, strength, and conditioning programs may reduce the risk of injury in this highly demanding activity. Early discovery of symptoms, followed by conservative management with rest and rehabilitation with special attention to retraining mechanics may mitigate the need for surgical intervention. Prevention of injury is always more beneficial to the long-term health of the thrower than is surgical repair. (19)

## 2.8 Epidemiology and etiology

Impingement syndrome is an increasingly more common diagnosis occurring in overhead throwing athletes. (16)

Its causes are the extreme position and load on the shoulder in the throwing movement. The position of extension, abduction and external rotation is the cause of the throwing shoulder. (16)

Persistent shoulder pain can result from bursitis, tendinitis, rotator cuff tear, adhesive capsulitis, impingement syndrome, avascular necrosis, glenohumeral osteoarthritis (OA), and other causes of degenerative joint disease or from traumatic injury, either in combination or as a separate entity. Rotator cuff disorders, adhesive capsulitis, and glenohumeral OA are all common causes of persistent shoulder pain, accounting for about 10%, 6%, and 2% to 5%, respectively, of all shoulder pain. All 3 conditions have complex etiologies, but they can be diagnosed in the majority of patients on the basis of medical history, focused physical examination, and plain film radiographs. This brief review and the following articles in this supplement focus on persistent shoulder pain associated with rotator cuff disorders, adhesive capsulitis, and glenohumeral OA. (17)

According to the Bureau of Labor Statistics of the United States, shoulder pain is the second most common complaint – after back pain – reported during clinical consultation; furthermore, the prevalence of occupational shoulder pain is increasing greatly.
Disorders of the shoulder are increasingly seen in the work environment, particularly when workers are required to do repetitive overhead lifting or under conditions where static shoulder posture needs to be assumed. As clinicians, one can see that mechanical shoulder problems are not limited in their presentation to the shoulder girdle, but encompass a fairly extensive area of the upper quarter. The most common work related disorders are associated with light industry, assembly line workstations, and office environments. Persistent shoulder pain is a very common condition that often has a multifactorial underlying pathology and is associated with high societal cost and patient burden. In the year 2000, the direct costs for the treatment of shoulder dysfunction in the United States totaled $7 billion. (18)

# 3 Special Part

## 3.1 Methodology

I performed my bachelor practice at Centrum Léčby Pohybového Aparátu during the period from 06.02.12 to 17.02.12.

I worked with a patient with the condition of adhesive inflammation of the capsule of right shoulder joint.

The clinic offers a wide range of therapeutical techniques, such as electrotherapy, hydrotherapy, fitness room with available posturomed, propriomed, thera-bands, and other exercise apparatus.

In the therapy we focused on PIR, mobilization, manipulation, corrective exercises with thera-bands and propriomed, laser therapy, magnetotherapy etc.

The patient was informed by the fact that I write a thesis about his condition by signing of the informed consent.

The application form to the ethics committee was approved.

The practice was done under supervision of Mgr. Zaher El Ali.

## 3.2 Anamnesis/history

**Patient initials:** VJ

**Year of birth:** 1993

**Diagnosis:** Adhesive inflammation of capsule of right shoulder joint.

**Present state**

**Height:** 175cm

**Weight:** 78kg

**BMI:** 25.5

**Personal anamnesis:**

- Chief complaint: chronic pain of right shoulder joint. The pain that is experienced is described as sharp and occurs during movements of the shoulder, especially during throwing movement. The pain is also felt during activities of daily living, but in a lower intensity than during throwing. The pain is felt more to the posterior part of the shoulder than the anterior part, but the pain involves the whole joint.
- History of present problem: the patient has felt the pain in the shoulder during throwing since September 2011, but then with a lower intensity than what is present now. The last five weeks, the patient has experienced an increase of the pain intensity and has had to abstain from throwing. The pain is also present during normal daily activities. The patient is a baseball player, so the throwing is an important movement for him.
- Other injuries: broken fingers 4 years ago, torn fibers of quadriceps 2 years ago.
- Previous operations: no

**Pharmacotherapy:**

The patient doesn't take any medications for his condition.

**Allergies:**

No

**Abuses:**

The patient drinks alcohol occasionally. The patient does not smoke.

**Family anamnesis:**

No relevant injuries in the patients family.

**Occupational anamnesis:**

The patient is a student at the last year of high school.

**Social anamnesis:**

The patient is a baseball player on the national team of players under 21 years old of Czech republic. He also does other sports like swimming and running, but baseball is his main sport. The team has strengthening sessions, running sessions and swimming sessions during off season. The baseball team has 2 strengthening sessions pr. week. In these sessions they focus on base lifts, such as benchpress, squats and deadlifts. These sessions last for 60 to 90 minutes. It is up to each player how effective their sessions are as they are not supervised at all times.

**Previous rehabilitation:**

The patient has had treatment for the last 5 weeks. These sessions have been focused on magnetotherapy, laser therapy and mobilizations. He has also had treatment after other injuries previously, but nothing for his shoulder. He was treated for fracture of two fingers at CLPA 4 years ago. The treatment was focused on regaining mobility of the fingers through active and passive movements, as well as stimulation through sensomotoric exercises. He was treated for torn fibres of quadriceps at CLPA 2 years ago, where the focus of the therapy was to activate and increase the strength of the quadriceps as well as regaining the range of motion.

**Indication to rehabilitation:**

- Magnetotherapy 30min 8x
- PIR 6x
- Analgic exercises due to kinesiologic examination 6x
- Stabilization of shoulder girdle according to PNF
- Correction of movement stereotypes
- Instruction of autotherapy 6x
- Mobilization / soft tissue C – spine, shoulder, traction of glenohumeral joint due to kinesiologic examination
- Diadynamic current 8x

## 3.3 Initial kinesiologic examination

### Posture examination

Posterior view:

- Internal rotation of ankle joint
- Internal rotation of knees
- Abduction of the scapulas, more on left side
- Elevated shoulder on left side
- Cervical lateral flexion to left side
- Cervical rotation to right side

Lateral view:

- Semiflexion of knees
- Anterior tilt of pelvis
- Prominence of abdomen
- Lumbar hyperlordosis
- Thoracic hyperkyphosis
- Cervical hyperlordosis
- Shoulders are in forward position
- Head is in forward position

Anterior view:

- External rotation of feet
- Internal rotation of knees
- Pronation of forearms
- Flexion of fingers
- Cervical lateral flexion to left side
- Cervical rotation to right side

## Pelvis examination

Crista: same level on both sides

Spina iliaca anterior superior: same level on both sides

Spina iliaca posterior superior: same level on both sides

The level of both spina iliaca anterior superior are in 1cm lower position than the spinal iliaca posterior superior. The patient has 1cm of anterior tilt.

## Gait examination

The patient has decreased rotation of the trunk when he is walking. His shoulders have little movement. There is a small movement of flexion in the elbows. The patient has small movement of the hip in his gait. The biggest movement of the patient is in his knees. The feet are in external rotation during his gait. The length of the steps are decreased as well as the velocity of the gait.

## Examination of basic movement patterns, by Janda

### Shoulder abduction:

The patient starts the movement by raising the shoulder joint slightly. The trapezius starts contracting at the beginning of the movement. Halfway through the movement, the supraspinatus contracts. The movement of the scapula starts very early in the movement. There exists excessive abduction of the scapulas, especially on right shoulder. The providing of the movement is pathological.

**Neck flexion:**

The patient provides the movement until there is 3-4cm until the cheek reaches the chest. The movement is initiated by the contraction of the superficial flexors of the neck. The providing of the movement is pathological.

**Length measurements of extremities**

| | Left | Right |
|---|---|---|
| Length of humerus: | 30 | 30 |
| Length of forearm: | 25 | 24 |
| Length of hand: | 21 | 20 |
| Circumference of humerus: | 31 | 30 |
| Circumference of forearm: | 28 | 28 |

Table 4: Length measurement of extremities, initial examination

**ROM examination**

| | | Left | Left | Right | Right |
|---|---|---|---|---|---|
| | | Active | Passive | Active | Passive |
| Shoulder | Extention | 35 | 35 | 30 | 30 |
| | Flexion | 180 | 180 | 160 | 160 |
| | Range | 205 | 205 | 190 | 190 |
| | Abduction | 180 | 180 | 170 | 170 |
| | Adduction | 0 | 0 | 0 | 0 |
| | Range | 180 | 180 | 170 | 170 |
| | Horiz. Abduction | 90 | 90 | 90 | 90 |
| | Horiz. Adduction | 25 | 25 | 20 | 20 |
| | Range | 115 | 115 | 110 | 110 |
| | Lateral Rotation | 70 | 70 | 70 | 70 |
| | Medial Rotation | 40 | 40 | 30 | 30 |
| | Range | 110 | 110 | 100 | 100 |
| Elbow | Extention | 0 | 0 | 0 | 0 |
| | Flexion | 140 | 140 | 130 | 130 |
| | Range | 140 | 140 | 130 | 130 |

Table 5: ROM examination, initial examination

**Muscle length examination, according to Kendall**

| | |
|---|---|
| Levator scapulae | Moderate shortness both sides |
| Trapezius, upper fibres | Moderate shortness both sides |
| Pectoralis major | Moderate shortness both sides |
| Pectoralis minor | Marked shortness on both sides |

Table 6: Muscle length examination, according to Kendall, initial examination (12)

**Manual muscle strength examination, according to Kendall**

| | Left | Right |
|---|---|---|
| Rhomboids | 3 | 2 |
| Middle trapezius | 3 | 2 |
| Lower trapezius | 2 | 2 |
| Serratus anterior | 3 | 2 |
| Teres minor | 3 | 3 |
| External rotators, supine | 3 | 2 |
| Flexors of neck | 2 | |

Table 7: Manual muscle strength examination, according to Kendall, initial examination (12)

**Isometric muscle strength testing of rotator muscles, according to Cyriax**

| | Left | Right |
|---|---|---|
| Resistance against abduction | No pain | No pain |
| Resistance against external rotation | No pain | No pain |
| Resistance against internal rotation | No pain | Pain |
| Resistance against semiflexed elbow | No pain | Pain |

Table 8: Isometric muscle strength testing of rotator muscles, according to Cyriax, initial examination (2)

**Apprehension test of right shoulder**

External rotation of shoulder in supine position with 90 degrees flexion and 90 degrees abduction of shoulder. Pain.

**Relocation test of right shoulder**

Apprehension test only with pressure on the front side of the shoulder. No pain.

**Hawkins impingement test of right shoulder**

With 90 degrees of shoulder flexion and flexion of elbow, perform internal rotation. Pain beneath acromion.

**Neers impingement test of right shoulder**

Internal rotation and flexion of shoulder. Pain.

**Examination of muscle tone**

| **Muscles** | **Tonus** | **Pain** | **Triggerpoint** |
|---|---|---|---|
| Pectoralis major | Hypertone both sides | Yes | No |
| Pectoralis minor | Hypertone both sides | Pain right side | No |
| Trapezius, upper fibres | Hypertone both sides | Yes | No |
| Levator scapulae | Hypertone both sides | Yes | Both sides |
| Infraspinatus | Hypertone both sides | yes | No |
| Supraspinatus | Hypertone both sides | Yes | No |
| Subscapularis | Hypertone both sides | yes | No |
| Erector spinae | Normal in lumbar area, hypertone in thoracic area | Yes | Both sides |

Table 9: Examination of muscle tone, initial examination

**Joint play examination, according to Lewitt**

| | Left | Right |
|---|---|---|
| Cervical spine rotation C1-C2 | No restriction | No restriction |
| Cervical spine rotation C2-C3 | No restriction | No restriction |
| Cervical spine rotation C3-C7 | No restriction | No restriction |
| Cervical lateral flexion C1-C2 | No restriction | No restriction |
| Cervical lateral flexion C2-C7 | No restriction | No restriction |
| Thoracic spine into extension | Restriction | Restriction |
| Thoracic spine into flexion | No restriction | No restriction |
| Acromioclavicular joint | Restriction in dorsal direction | Restriction in dorsal direction |
| Sternoclavicular joint | Restriction in dorsal direction | Restriction in dorsal direction |
| Glenohumeral joint | Restriction in dorsal direction | Restriction in dorsal direction |
| Examination of scapula | Restriction in dorso-caudal direction | Restriction in dorso-caudal direction |

Table 10: Joint play examination, according to Lewit, initial examination (7)(13)

**Neurological examination**

**Deep tendon reflexes**

| | |
|---|---|
| Reflex of biceps(C5, C6) | normal on both sides(5) |
| Reflex of triceps(C7) | normal on both sides(5) |
| Reflex of brachioradialis(C5,C6) | normal on both sides(5) |

Table 11: Deep tendon reflexes, initial examination

**Conclusion of examination**

The patient has external rotation of both feet, internal rotation of knees, semiflexion of knees, anterior tilt of pelvis, left iliac spine is higher than the right, prominence of abdomen, lumbar hyperlordosis, thoracic hyperkyphosis, cervical hyperlordosis, shoulders in forward position, abduction of both scapulas, more on left, pronation of forearms and elevated shoulder on left side.

The patient has decreased rotation of the trunk when he is walking. His shoulders have little movement. There is a small movement of flexion in the elbows. The patient has small movement of the hip in his gait.

The patient performs the neck flexion and shoulder abduction in a pathophysiologic manner.

The patient has restricted range of motion in shoulder flexion, extension, abduction, horizontal adduction and medial rotation in right shoulder joint.

The patient has moderate shortness of levator scapulae, upper fibres of trapezius, pectoralis major and marked shortness of pectoralis minor.

The patient has weakness of rhomboids, middle trapezius, lower trapezius, external rotators and flexors of neck. He has grade fair of serratus anterior and teres minor.

The patient has pain when providing internal rotation and flexion of semiflexed shoulder against resistance. He also has pain in the apprehension test, Hawkins impingement test and Neers impingement test.

The patient has hypertone of pectoralis major, pectoralis minor, levator scapulae, upper trapezius, infraspinatus, supraspinatus, subscapularis and thoracic part of erector spinae. Pectoralis minor and levator scapulae are also painful. Subscapularis, biceps brachi and erector spinae in thoracic area are also hypertonic. Subscapularis, infraspinatus and supraspinatus are painful.

The patient has restriction of thoracic spine into extension, acromioclavicular joint into dorsal direction on both sides, sternoclavicular joint into dorsal direction on both sides and restriction of scapula in dorso-caudal direction.

## 3.4 Short-term and Long-term Physiotherapy Plan

**Short-term:**

- Laser therapy with power: 120mW, wavelength: 830nm
- Magnetotherapy for 25mins, frequency: 15, intensity: 12
- Mobilization of restricted joints by manual methods (7)
- Activation of weakened muscles by use of thera-band
- Relaxation of hypertonic muscles by use of PIR
- Stretching of shortened muscles
- Facilitate activation of upper extremity by use of PNF (6)

**Long-term:**

- Strengthening of weakened muscles
- Increase deep stabilization of shoulder joint by sensomotoric training
- Increase strength of upper extremity by Hold-Relax-Active movement by PNF (6)
- Correction of posture
- Correction of stereotype of throwing movement

## 3.5 Therapy progress

**Date:** 09.02.12

**Subjective:**

Patient had pain of his shoulder during the therapy. The pain increases during the movements of the shoulder.

**Objective of todays therapy unit:**

Decrease of pain of the right shoulder

Decrease tension of hypertonic muscles

Mobilization of restricted joints

Activation of muscles by PNF

Strengthening of weakened muscles

Instruction of self therapy

**Therapy proposal:**

Laser therapy

Magnetotherapy

PIR of hypertonic muscles

Mobilization of thoracic spine and shoulder

Activation of muscles by PNF

Strengthening of weakened muscles

Stretching of shortened muscles

Stabilization of shoulder girdle

**Procedure:**

- Laser therapy for 5min
- Magnetotherapy for 25mins
- PIR of pectoralis major
- PIR of pectoralis minor
- PIR of infraspinatus
- Mobilization of thoracic spine into extension
- Mobilization of acromioclavicular joint in dorsal direction
- PNF 1$^{st}$ diagonal extension, slow reversal
- Strengthening of rhomboids in prone position with 90 degrees abduction, forearms in pronation and retraction of the scapulas. Perform dorsal movements of the arms. 2 sets with 8 repetitions.
- Strengthening of middle trapezius in prone position with 90 degrees abduction, forearms in supination and retraction of the scapulas. Perform dorsal movements of the arms. 2 sets with 8 repetitions
- Strengthening of lower trapezius in prone position with 120 degrees abduction, supination of forearms and retraction of the scapula. Perform dorsal movements of the arms. 2 sets with 8 repetitions.
- External rotation with theraband. 2 sets with 10 repetitions.
- Pull aparts with theraband. 2 sets with 10 repetitions.
- Stretching of levator scapulae in sitting position with flexion, lateral flexion and rotation of the neck. Held for about 30 seconds.
- Stretching of upper trapezius in sitting position with lateral flexion and slight rotation of the neck. Held for about 30 seconds.

**Results:**

The patient reported a decrease of pain level after the laser therapy and the magnetotherapy. He experienced a low level of pain during the PIR of pectoralis minor and infraspinatus. He felt a release of muscle tension after providing the mobilizations of thoracic spine and acromioclavicular joint. The patient had difficulties with maintaining a correct position of the scapulas during the strengthening exercises. Patient felt a release of stiffness after stretching of levator scapulae and upper trapezius.

**Self therapy:**

The patient is instructed to stay away from throwing exercises and hard physical activity until next therapy session. I want to see if the therapy provided was beneficial at next session, and hard physical activity may interfere with the effect of the therapy.

**Date:** 10.02.12

**Subjective:**

Patient reports to feel less pain at todays therapy.

**Objective of todays therapy unit:**

Decrease of pain of the right shoulder

Decrease tension of hypertonic muscles

Mobilization of restricted joints

Activation of muscles by PNF

Strengthening of weakened muscles

Instruction of self therapy

**Therapy proposal:**

Laser therapy

Magnetotherapy

PIR of hypertonic muscles

Mobilization of shoulder joint and shoulder girdle

Activation of muscles by PNF

Strengthening of weakened muscles

Stretching of shortened muscles

Stabilization of shoulder girdle

**Procedure:**

- Laser therapy for 5min
- Magnetotherapy for 25mins, frequency: 15, intensity: 12
- PIR of upper trapezius
- PIR of levator scapulae
- PIR of supraspinatus
- Mobilization of sternoclavicular joint into dorsal direction
- Mobilization of scapula in dorso-caudal direction
- PNF 2$^{nd}$ diagonal flexion, slow reversal
- Strengthening of neck flexors in prone position with flexion of the neck. 2 sets with 8 repetitions.
- Strengthening of serratus anterior in pushups position with repetitive retraction followed by protraction of the scapula. 2 sets with 8 repetitions.
- Strengthening of external rotators in sidelying position by externally rotating the upper shoulder joint. 2 sets with 8 repetitions.
- Stretching of pectoralis major in standing position with arm in flexion, abduction and slight external rotation against wall. Held for about 30 seconds.
- Stretching of pectoralis minor in standing position with arm in flexion, abduction and external rotation against wall. Held for about 30 seconds.

**Results:**

Patient feels less pain during this therapy session than during last therapy. He is still not able to keep the scapula in correct position during strengthening of rhomboids and trapezius but it is better than during the initial kinesiologic examination. He also has difficulties with keeping correct position of scapula during stretching of pectoralis major and minor.

**Self therapy:**

- Strengthening of middle trapezius in prone position with 90 degrees abduction of arms and supination of forearms and retraction of scapulas. Perform dorsal movements of the arms. 3 sets with 8 repetitions.
- Stretching of levator scapulae in sitting position with flexion, lateral flexion and rotation of the neck. Hold for 30 seconds.
- Stretching of upper trapezius in sitting position with lateral flexion and slight rotation of the neck. Hold for 30 seconds.

**Date:** 14.02.12

**Subjective:**

The patient feels better during today's therapy. He has performed his self-therapy exercises and feel an improvement of his shoulder by those exercises.

**Objective of todays therapy unit:**

Decrease of pain of the right shoulder

Decrease tension of hypertonic muscles

Mobilization of restricted joints

Activation of muscles by PNF

Strengthening of weakened muscles

Instruction of self therapy

**Therapy proposal:**

Laser therapy

Magnetotherapy

PIR of hypertonic muscles

Mobilization of thoracic spine and shoulder

Activation of muscles by PNF

Strengthening of weakened muscles

Stretching of shortened muscles

Stabilization of shoulder girdle

**Procedure:**

- Laser therapy
- Magnetotherapy, 25min
- PIR of subscapularis
- PIR of erector spinae, thoracic part
- Mobilization of thoracic spine into extension
- Mobilization of acromioclavicular joint in dorsal direction
- PNF 1st diagonal extension, slow reversal hold
- Strengthening of rhomboids in prone position with 90 degrees abduction, forearms in pronation and retraction of the scapulas. Perform dorsal movements of the arms. 3 sets with 8 repetions.
- Strengthening of middle trapezius in prone position with 90 degrees abduction, forearms in supination and retraction of the scapulas. Perform dorsal movements of the arms. 3 sets with 8 repetitions.
- Strengthening of lower trapezius in prone position with 120 degrees abduction, supination of forearms and retraction of the scapula. Perform dorsal movements of the arms. 3 sets of 8 repetitions.
- Stretching of levator scapulae in sitting position with flexion, lateral flexion and rotation of the neck. Held for about 40 seconds.
- Stretching of upper trapezius in sitting position with lateral flexion and slight rotation of the neck. Held for about 40 seconds.

**Results:**

The patient responds well to the therapy. He feels more able to do movements after providing the mobilization of thoracic spine into extension.

**Self therapy:**

- Strengthening of external rotators in sidelying position by externally rotating the upper shoulder joint. 3 sets with 8 repetitions.
- Stretching of pectoralis major by flexion, abduction and slight external rotation of the shoulder. Hold for about 40 seconds

- Stretching of pectoralis minor by flexion, abduction and external rotation of the shoulder against wall. Hold for about 40 seconds.

**Date:** 15.02.12

**Subjective:**

There is still present pain when the patient does movements of his shoulder, but he has felt an improvement. The shoulder is less painful especially after doing the self-therapy exercises.

**Objective of todays therapy unit:**

Decrease of pain of the right shoulder

Decrease tension of hypertonic muscles

Mobilization of restricted joints

Activation of muscles by PNF

Strengthening of weakened muscles

Instruction of self therapy

**Therapy proposal:**

Laser therapy

Magnetotherapy

PIR of hypertonic muscles

Mobilization of shoulder joint and shoulder girdle

Activation of muscles by PNF

Strengthening of weakened muscles

Stretching of shortened muscles

Stabilization of shoulder girdle

**Procedure:**

- Laser therapy
- Magnetotherapy
- PIR of pectoralis major
- PIR of pectoralis minor
- PIR of infraspinatus
- Mobilization of sternoclavicular joint in dorsal direction
- Mobilization of scapula in dorsocaudal direction
- PNF 2$^{nd}$ diagonal flexion, slow reversal hold
- Strengthening of neck flexors in prone position with flexion of the neck. 3 sets with 8 repetitions.
- Strengthening of serratus anterior in pushups position with repetitive retraction followed by protraction of the scapula. 3 sets with 8 repetitions.
- Strengthening of external rotators in sidelying position by externally rotating the upper shoulder joint. 3 sets with 8 repetitions.
- Stretching of pectoralis major in standing position with arm in flexion, abduction and slight external rotation against wall. Held for 40 seconds.
- Stretching of pectoralis minor in standing position with arm in flexion, abduction and external rotation against wall. Held for 40 seconds.

**Results:**

The patient shows improvement during the strengthening exercises. He is able to maintain the scapulas in better position than previously. He also experiences less pain.

**Self therapy:**

- Strengthening of lower trapezius in prone position with 120 degrees abduction, supination of forearms and retraction of the scapula. Perform dorsal movements of the arms. 3 sets with 10 repetitions.

- Strengthening of external rotators by use of theraband. Standing position with holding one part of the theraband in each hand. Keep the elbows close to the body and rotate the forearms outwards. 3 sets with 12 repetitions.
- Stretching of pectoralis minor by flexion, abduction and external rotation against a wall. Hold for about 45 seconds.
- Stretching of levator scapula by flexion, lateral flexion and rotation of the neck. Hold position for about 45 seconds.

**Date:** 17.02.12

**Subjective:**

Patient feels improvement of strength and mobility in the shoulder joint. He reports to feel less pain than when he arrived.

**Objective of todays therapy unit:**

Decrease of pain of the right shoulder

Decrease tension of hypertonic muscles

Mobilization of restricted joints

Activation of muscles by PNF

Strengthening of weakened muscles

Instruction of self therapy

**Therapy proposal:**

Laser therapy

Magnetotherapy

PIR of hypertonic muscles

Mobilization of thoracic spine and shoulder

Activation of muscles by PNF

Strengthening of weakened muscles

Stretching of shortened muscles

Stabilization of shoulder girdle

**Procedure:**

- Laser therapy
- Magnetotherapy
- PIR of pectoralis major
- PIR of pectoralis minor
- PIR of infraspinatus
- Mobilization of thoracic spine into extension
- Mobilization of acromioclavicular joint in dorsal direction
- PNF 1st diagonal extension, hold relax active movement
- Strengthening of rhomboids by use of theraband in standing position. Arms are in horizontal position. Pull the theraband by abduction of the shoulders. 3 sets with 10 repetitions.
- Strengthening of middle trapezius in prone position with 90 degrees abduction, forearms in supination and retraction of the scapulas. Perform dorsal movements of the arms. 3 sets with 10 repetitions.
- Strengthening of lower trapezius in prone position with 120 degrees abduction, supination of forearms and retraction of the scapula. Perform dorsal movements of the arms. 3 sets with 10 repetitions.
- Stretching of levator scapulae in sitting position with flexion, lateral flexion and rotation of the neck. Held for about 40 seconds.
- Stretching of upper trapezius in sitting position with lateral flexion and slight rotation of the neck. Held for about 40 seconds.

**Results:**

The patient informs to experience less pain in his shoulder. He has been avoiding to do throwing exercises, and feels that the therapy is beneficial. He especially feels to have better performing of external rotation.

**Self therapy:**

- Strengthening of middle trapezius in prone position with 90 degrees abduction, forearms in supination and retraction of the scapulas. Perform dorsal movements of the arms. 3 sets with 10 repetitions.

- Strengthening of lower trapezius in prone position with 120 degrees abduction, supination of forearms and retraction of the scapula. Perform dorsal movements of the arms. 3 sets with 10 repetitions.
- Strengthening of external rotators by use of theraband. Standing position with holding one part of the theraband in each hand. Keep the elbows close to the body and rotate the forearms outwards. 3 sets with 12 repetitions.
- Stretching of pectoralis minor by flexion, abduction and external rotation against a wall. Hold for about 45 seconds.
- Stretching of upper trapezius by lateral flexion and slight rotation of the neck. Hold for about 45 seconds.

## 3.6 Final kinesiologic examination

Changes from initial kinesiologic examination is written with bold font.

**Posture examination**

Posterior view:

- Internal rotation of ankle joint
- Internal rotation of knees
- Abduction of the scapulas, more on left side, **scapulas are more adducted**
- Elevated shoulder on left side, **not to same extent**
- Cervical lateral flexion to left side, **closer to neutral position**
- Cervical rotation to right side, **closer to neutral position**

Lateral view:

- Semiflexion of knees
- Anterior tilt of pelvis
- Lumbar hyperlordosis
- Thoracic hyperkyphosis, **not to same extent**
- Cervical hyperlordosis
- Shoulders are in forward position, **not to same extent**
- Head is in forward position

Anterior view:

- External rotation of feet
- Internal rotation of knees
- Prominence of abdomen
- Pronation of forearms
- Flexion of fingers

- Cervical lateral flexion to left side, **closer to neutral position**
- Cervical rotation to right side, **closer to neutral position**

**Pelvis examination**

Crista: same level on both sides

Spina iliaca anterior superior: same level on both sides

Spina iliaca posterior superior: same level on both sides

The level of both spina iliaca anterior superior are in 1cm lower position than the spinal iliaca posterior superior. The patient has 1cm of anterior tilt.

**Gait examination**

The patient has decreased rotation of the trunk when he is walking. His shoulders have little movement. There is a small movement of flexion in the elbows. The patient has small movement of the hip in his gait. The biggest movement of the patient is in his knees. The feet are in external rotation during his gait. **There is greater movement of the patients trunk and shoulders during the gait.**

**Examination of basic movement patterns, by Janda**

**Shoulder abduction:**

The patient starts the movement by raising the shoulder joint slightly. The trapezius starts contracting at the beginning of the movement. Halfway through the movement, the supraspinatus contracts. The movement of the scapula starts very early in the movement. There exists excessive abduction of the scapulas, especially on right

shoulder. The providing of the movement is pathological. **The abduction movement of the scapula starts later in the abduction. There is a improvement of the movement of the scapula.**

**Neck flexion:**

The patient provides the movement until there is 3-4cm until the cheek reaches the chest. The movement is initiated by the contraction of the superficial flexors of the neck. The providing of the movement is pathological. **The patient is 3cm away from the chest.**

**Length measurements of extremities**

| | Left | Right |
|---|---|---|
| Length of humerus: | 30 | 30 |
| Length of forearm: | 25 | 24 |
| Length of hand: | 21 | 20 |
| Circumference of humerus: | 31 | 30 |
| Circumference of forearm: | 28 | 28 |

Table 12: Length measurement of extremities, final examination

**ROM examination**

| | | Left | Left | Right | Right |
|---|---|---|---|---|---|
| | | Active | Passive | Active | Passive |
| Shoulder | Extention | 35 | 35 | 30 | 30 |
| | Flexion | 180 | 180 | **170** | **170** |
| | Range | 205 | 205 | **200** | **200** |
| | Abduction | 180 | 180 | **175** | **175** |
| | Adduction | 0 | 0 | 0 | 0 |
| | Range | 180 | 180 | **175** | **175** |
| | Horiz. Abduction | 90 | 90 | 90 | 90 |
| | Horiz. Adduction | 25 | 25 | **25** | **25** |
| | Range | 120 | 120 | **115** | **115** |
| | Lateral Rotation | 70 | 70 | 70 | 70 |
| | Medial Rotation | 40 | 40 | **35** | **35** |
| | Range | 110 | 110 | **105** | **105** |
| Elbow | Extention | 0 | 0 | 0 | 0 |
| | Flexion | 140 | 140 | 130 | 130 |
| | Range | 140 | 140 | 130 | 130 |

Table 13: ROM examination, final examination

**Muscle length examination, according to Kendall**

| | |
|---|---|
| Levator scapulae | Moderate shortness both sides |
| Trapezius, upper fibres | Moderate shortness both sides |
| Pectoralis major | Moderate shortness both sides |
| Pectoralis minor | **Moderate shortness on both sides** |

Table 14: Muscle length examination, according to Kendall, final examination (12)

**Manual muscle strength examination, according to Kendall**

| | Left | Right |
|---|---|---|
| Rhomboids | **4** | **3** |
| Middle trapezius | 3 | **3** |
| Lower trapezius | **3** | **3** |
| Serratus anterior | 3 | **3** |
| Teres minor | 3 | 3 |
| External rotators, supine | **4** | **4** |
| Flexors of neck | 2 | |

Table 15: Manual muscle strength examination, according to Kendall, final examination (12)

**Isometric muscle strength testing of rotator muscles, according to Cyriax**

| | Left | Right |
|---|---|---|
| Resistance against abduction | No pain | No pain |
| Resistance against external rotation | No pain | No pain |
| Resistance against internal rotation | No pain | Pain |
| Resistance against semiflexed elbow | No pain | Pain |

Table 16: Isometric muscle strength testing of rotator muscles, according to Cyriax, final examination (2)

**Apprehension test of shoulders**

Pain

**Relocation test**

No pain

**Hawkins impingement test**

Pain beneath acromion

**Neers impingement test**

Pain

**Examination of muscle tone**

| **Muscles** | **Tonus** | **Pain** | **Triggerpoint** |
|---|---|---|---|
| Pectoralis major | Hypertone both sides, **to less extent** | Yes | No |
| Pectoralis minor | Hypertone both sides, **to less extent** | Pain right side | No |
| Trapezius, upper fibres | Hypertone both sides, **to less extent** | Yes | No |
| Levator scapulae | Hypertone both sides, **to less extent** | Yes | Both sides |
| Infraspinatus | Hypertone both sides | yes | No |
| Supraspinatus | Hypertone both sides | Yes | No |
| Subscapularis | Hypertone both sides | yes | No |
| Erector spinae | Normal in lumbar area, hypertone in thoracic area | Yes | Both sides |

Table 17: Examination of muscle tone, final examination

**Joint play examination, according to Lewitt**

| | Left | Right |
|---|---|---|
| Cervical spine rotation C1-C2 | No restriction | No restriction |
| Cervical spine rotation C2-C3 | No restriction | No restriction |
| Cervical spine rotation C3-C7 | No restriction | No restriction |
| Cervical lateral flexion C1-C2 | No restriction | No restriction |
| Cervical lateral flexion C2-C7 | No restriction | No restriction |
| Thoracic spine into extension | Restriction, **less restricted** | |
| Thoracic spine into flexion | No restriction | |
| Acromioclavicular joint | Restriction in dorsal direction, **less** | Restriction in dorsal direction, **less** |
| Sternoclavicular joint | Restriction in dorsal direction, **less** | Restriction in dorsal direction, **less** |
| Glenohumeral joint | Restriction in dorsal direction, **less** | Restriction in dorsal direction, **less** |
| Examination of scapula | Restriction in dorso-caudal direction, **less** | Restriction in dorso-caudal direction, **less** |

Table 18: Joint play examination, according to Lewitt, final examination (7)(13)

**Neurological examination**

**Deep tendon reflexes**

| | |
|---|---|
| Reflex of biceps(C5, C6) | normal on both sides(5) |
| Reflex of triceps(C7) | normal on both sides(5) |
| Reflex of brachioradialis(C5,C6) | normal on both sides(5) |

Table 19: Deep tendon reflexes, final examination

**Conclusion of final kinesiologic examination**

In the postural examination the patient has improved his thoracic kyphosis, his position of shoulders, position of head and position of scapulas.

In the gait there is greater movement of the patients trunk and shoulders.

The movement patterns of the patient has improved. In the shoulder abduction, the scapula abduction is started later in the movement. In the neck flexion the patient is closer to the chest with his chin.

The patient has improved his range of motion in shoulder flexion, shoulder abduction, horizontal adduction and medial rotation of the shoulder.

The pectoralis minor has improved to moderate shortness in the length test.

Both rhomboids, both lower trapezius, right middle trapezius, external rotators and right serratus anterior have all improved their muscle strength.

The tone of pectoralis major, pectoralis minor, levator scapulae and upper trapezius is still hypertonic, but not to the same extent as in the initial kinesiologic examination.

There is less restriction of thoracic extension, acromioclavicular joint, glenohumeral joint, sternoclavicular joint and scapula in the examination of joint play.

## 3.7 Evaluation of the effect of therapy

In the therapy sessions with the patient I have focused on relaxing hypertonic muscles, strengthening weakened muscles and stretching shortened muscles. I have observed that the patient have responded good to strengthening of the lower fixators of scapula, which have resulted in a better position of the scapula.

I feel that the strengthening exercises for the scapula fixators have been effective for this patient. The patient had weakness of these muscles, which were improved over the period of two weeks.

The stretching and PIR of shortened and hypertonic muscles lead to a release of tension of especially pectoral muscles as well as levator scapulae and upper trapezius. This release of tension lead to better position of the scapula.

The stretching of the weakened muscles and the strengthening of the weakened muscles lead to an improvement of the position of the shoulders and scapula.

The magnetotherapy and the laser therapy were an effective tool in the rehabilitation program as it lead to a decrease of pain before doing exercises, which resulted in a better providing of the exercises.

**Prognosis**

I believe the patient will be able to get back to throwing in baseball if he continues his rehabilitation plan and slowly progresses from easy throwing exercises and progresses to more demanding throws, while always paying attention not to overstrain the shoulder.

## 4. Conclusion

During my period of two weeks at CLPA I have been working with several types of patients, either in the fitness room or in the ambulance room of Mgr. Zaher El Ali. I have had a lot of practical experience with communication, corrective exercises, relaxation techniques, mobilization techniques, strengthening techniques and so on.

My thoughts around the work with my patient is first of all that I had too short time with him. Two weeks didn't feel like enough to see any big difference in this type of patient. However, the communication with this patient was excellent, and the moral and motivation of the patient couldn't have been better. He was eager to improve his condition and performed all self-therapy exercises I suggested to him.

I really enjoyed working with this patient. I find the shoulder to be interesting as it can really be difficult to diagnose the patient correctly. The diagnosis has really given me experience in the possible shoulder pain of throwing atheletes.

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# 6. Supplement

## 6.1 Approved 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:** Adhesive inflammation of capsule of right shoulder joint.

**Nature of the research project:** Bachelor thesis

**Author**: Andreas Stevning

**Supervisor**: Mgr. Lenka Satrapova

**Research project description:**
Case Study of physiotherapy treatment of a patient with the diagnosis adhesive inflammation of the capsule of right shoulder joint will be conducted under the expert supervision of an experienced physiotherapist at Centrum Léčby Pohybového Aparátu.
**Guaranteed safety to be judged by experts:**
No invasive methods will be used.
**Ethical aspects of the research:**
Prersonal data obtained during the investigation will not be published.
**Informed consent** (attached)

Date: Author's signature:

**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: 059/ 2012
Date: 17. 2. 2012

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.**

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

Official school stamp

Signature, REB Chairman

## 6.2 Informed consent form

# 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 kvyšetření a následné terapii. Dále Vás žádám o souhlas knahlížení 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:.....

## 6.3 list of tables

## 6.4 list of abbreviations

ABD- Abduction

ADD- Adduction

ADL- Activities of daily living

BMI- Body mass index

CLPA- Centrum Léčby Pohybového Aparátu Vysočany (clinic)

Cm- Centimeter

ER- External rotation

FTVS- Fakulta Telesne Vychovy a Sportu

IR- Internal rotation

Kg- Kilogram

PIR- Post isometric relaxation

PNF- Post neuromuscular facilitation

ROM- Range of motion