Charles University in Prague
Faculty of Physical Education and Sports

Case Study of a Patient with Dislocation of Acromioclavicular Joint

Bachelor Thesis

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April 2012, Prague

Abstract

Title:

Case Study of a Patient with Dislocation of Acromioclavicular Joint.

Thesis aim:

The aim of this thesis is to discuss the rehabilitation of a patient in the state after reposition of the acromioclavicular joint with temporary K-wire transfixation. The thesis is divided into a theoretical and a practical part. In the theoretical part the kinesiology of the upper extremity and cervical spine, types of dislocations, clinical picture, and the rehabilitation is discussed. The practical part includes an anamnesis, examination, and therapy progress of a 31 year old man one week after the removal of the transfixation by K-wire.

Clinical findings:

The measurement of ROM showed a marked limitation in the movement of shoulder joint. Both flexion and abduction of the right shoulder joint was severely limited.

The active abduction was limited to 40°, and active flexion 80°. The internal and external rotation was also severely limited, both active and passively. All the movements of shoulder joint except extention were accompanied by pain.

Methods:

Methods used in the rehabilitation of this patient were active and passive movements to improve ROM. Soft tissue techniques for the scar and trigger points, and fascia techniques for restricted fascia. PIR was used for relaxation of hypertonic muscles. PNF techniques were used for strengthening of muscles included in the first diagonal. Exercises with gym ball and theraband were included for activation of the interscapular muscles. The therapy sessions lasted from 1 to 1.5 hours, and 5 sessions were completed.

Result:

The result of therapy was a decrease in pain and a significant increase in ROM. The active abduction improved from 40° to 85°, and the active flexion improved from 80° to

120°. Functional movements were also performed in a more satisfying manner, and with only slight perception of pain.

Conclusion

The case study was a very interesting, and useful experience for me as a future physiotherapist. I got to use my theoretical and practical knowledge in a real setting. It was also useful to see that the therapy I chose and applied had an positive effect on the patient.

Keywords:

AC joint dislocation, Hypertonicity, Functional movement patterns, Stretching, Soft tissue techniques, Active and passive movements, Proprioceptive Neuromuscular Facilitation, Therapeutic exercises.

Souhrn

Název

Kazuistika pacienta s luxací akromioklavikulárního kloubu

Cíl práce:

Cílem této práce je provést studii o rehabilitační péči pacienta se stavem po repozici akromioklavikulárního kloubu s dočasnou fixací pomocí K-drátu. Práce je rozdělena na část teoretickou a praktickou. V teoretické části je zahrnuta kineziologie horní končetiny a krční páteře, typy luxací, jejich klinický obraz a rehabilitace. Praktická část obsahuje anamnézu, vyšetření a průběh terapie 31letého muže, který byl ,toho času, jeden týden po odstranění fixace pomocí K-drátů.

Klinická zjištění:

Měření rozsahu pohybů prokázalo výrazné omezení pohybů v pravém ramenním kloubu. Zvláště flexe i abdukce byly v pravém ramenním kloubu značně omezené.

Aktivní abdukce byla omezena při 40°, aktivní flexe při 80°. Vnitřní i vnější rotace byly také vážně omezeny, a to aktivně i pasivně. Všechny pohyby v ramenním kloubu, kromě extenze, byly spojeny s výraznou bolestivostí.

Metody:

Metody použité při rehabilitaci tohoto pacienta byly aktivní a pasivní pohyby pro vylepšení rozsahu pohybů. Techniky měkkých tkání na jizvu, trigger pointy a na fascie se sníženou posunlivostí. PIR byla použita pro relaxaci hypertonních svalů. Techniky PNF byly užity pro posílení svalů pomocí první diagonály. Cvičení s nafukovacím míčem a therabandem byly zahrnuty pro aktivaci mezilopatkového svalstva. Terapeutické jednotky trvaly 1 až 1,5 hodiny, bylo provedeno 5 terapeutických jednotek.

Výsledky:

Výsledkem terapie bylo snížení bolesti a znatelné zvýšení rozsahu pohybů v pravém ramenním kloubu. Aktivní abdukce se zvýšila ze 40° na 85°, aktivní flexe z 80° na 120°. Funkční pohyby také byly provedeny v mnohem uspokojivější podobě a s lehce nižší bolestivostí.

Závěr: Kazuistika byla velmi zajímavá a užitečná zkušenost pro mě jako budoucího fyzioterapeuta. Musel jsem využít mých teoretických a praktických znalostí v reálných podmínkách. Bylo také zajímavé sledovat, že terapie, kterou jsem zvolil, měla pozitivní efekt na pacienta.

Klíčová slova:

Vykloubení AC kloubu, Hypertonus, Funkční pohybové vzorce, Protahování, Techniky měkkých tkání, Aktivní a pasivní pohyby, Proprioceptivní neuromuskulární facilitace, Terapeutická cvičení.

Decleration

I hereby declare that this work is entirely my own, individual work based on knowledge based 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.

Prague, April 2012

Acknowledgement

I would like to thank my mother for all the support she has given me during my stay in Prague and in life in general. Her support and interest in me can't be appreciated enough.

I would also like to thank PhDr. Edwin Mahr PhD for giving me advice, and guiding me through the practical part of the bachelor thesis.

I also offer my sincerest gratitude to my supervisor, PhDr. Jitka Čemusová, PhD, who has supported me with her knowledge throughout the writing of my thesis.

Thomas Egeland Lyse

Prague, April 2012

Contents

1. Preface

This bachelor thesis is divided into two parts. In the first part the theoretical point of rehabilitation of state after reposition of acromioclavicular joint is discussed. It is divided into separate sections discussing kinesiology of the upper extremity and cervical spine, different types of dislocations of the acromioclavicular joint, clinical picture, and types of rehabilitations with operative and non-operative methods.

In the second part of the bachelor thesis the examination and therapy of a patient with the given diagnosis is discussed. The examination and therapy is performed based on author's best knowledge. Evaluation of therapy progress and conclusions of both examinations and therapy are included to highlight the level of success of the rehabilitation.

The bachelor practice was undertaken at Centrum Léčby Pohybového Aparátu Vysočany, which is where the case study was conducted.

2. General part

2.1 Kinesiology of the cervical spine and upper extremity

Cervical spine

The cervical spine is divided into the upper and lower part. The upper cervical spine includes the first and second vertebrae (atlas and axis), but functionally the 3rd vertebrae are also included. Anatomically the lower cervical spine refers to the 3rd to 7th vertebrae, but functionally overlaps to the thoracic spine and includes Th 1 to Th 4. This is due to the long muscles binding the cervical and thoracic spine functionally together. (22)

The upper cervical spine

The upper cervical spine connects the heavy head to the first cervical vertebrae (atlas) through the atlanto-occipital joint. The movements in this joint are restricted to slight forward, backward and sideward movements, and a minimal degree of rotation. The turning of the head occurs in the atlanto-odontoid joint together with the atlas-axis joint. Keeping the middle and right initial central starting position of the head, and initiation of different head movements is realized through the deep short sub-occipital muscles and long superficial muscles. These muscles link the head and cervical spine functionally to the shoulder girdle. (22)

The lower cervical spine

Near relations exist between the lower cervical spine and upper extremities. Nerves innervating the muscles of the upper extremities passes through the inter vertebral foramina and form the cervical plexus. The cervical plexus passes through a narrow channel between the scalene muscles. The narrowing of this channel is the cause of the cervicobrachial symptoms called the thoracic outlet syndrome. This syndrome involves the blood circulation in the upper extremity and causes radicular symptoms. Similar troubles are caused through carrying heavy loads in the hands. One of the muscles that are often overloaded when carrying heavy loads is the levator scapulae. The levator scapulae connect the transversal processes of the cervical vertebrae with the upper angle

of the scapula. It elevates the scapula and influences so the position of the glenohumeral joint. (22)

The upper extremities

The upper extremities constitute a sophisticated motor organ realizing voluntary movements for grasping or manipulating objects. They may work separately or both together as one coupled organ. Both extremities are morphologically quasi symmetric but their function is asymmetric, one extremity is dominant and the other one is subdominant. (22)

The shoulder girdle

The entire shoulder girdle can be elevated, depressed, protracted and retracted, upward and downward rotated, as well as tilted. (11)

Elevation and depression

Elevation occurs when the scapula slides superiorly on the thorax, such as in shrugging of the shoulders. Depression, on the other hand, occurs when the scapula slides inferiorly on the thorax from an elevated position. (13)

Protraction and retraction

In protraction the medial border of the scapula slides anterior-laterally on the thorax away from the midline. Scapulothoracic protraction increases the extent of forward reach. Retraction of the scapula occurs in a similar but reverse fashion as in protraction. Retraction of the scapula is often performed in the context of pulling an object toward the body, such as pulling on a wall pulley, climbing a rope, or putting the arm in a coat sleeve. (13) The rhomboids and the trapezius are the muscles that dynamically balance the position of the scapula. Contraction of the rhomboid muscles pulls the scapula to the spine, and contraction of the serratus anterior pulls the scapula apart from the spine. The imbalance in this muscle sling changes the scapula position, and this influences the glenohumeral joint. (22)

Upward and downward rotation

During upward rotation the inferior angle of the scapula rotates up and away from the vertebral column, while downward rotation is the return to the resting anatomical position. (11)

Scapular tilt

Scapular tilt occurs when the shoulder joint goes into hyperextension. The superior end of the scapula tilts anteriorly and the inferior end tilts posteriorly. (11)

Movements of the shoulder girdle	**Muscles providing the movement**
Retraction	Middle trapezius, rhomboids
Protraction	Serratus anterior, pectoralis minor
Elevation	Upper trapezius, levator scapulae, rhomboids
Depression	Lower trapezius, pectoralis minor
Upward rotation	Upper and lower trapezius, serratus anterior (lower fibre)
Downward rotation	Rhomboids, levator scapulae, pectoralis minor
Scapular tilt	Pectoralis minor

Table 1 – Muscles active during movements of shoulder girdle (11)

The shoulder joint

The movement of the humeral head on the glenoid fossa must be given some additional attention. The humeral head has more articular surface than does the glenoid fossa. If the humeral head simply rotates in the glenoid fossa, it would run out of articular surface before much abduction has occurred. Also, the vertical pull of the deltoid muscle would pull the head up against the acromion process. (11)

It is the arthrokinematic motions of glide, spin, and roll that keep the head of the humerus articulating with the glenoid fossa. As abduction occurs, the humeral head rolls across the glenoid fossa. At the same time, the head glides inferiorly, keeping the head of the humerus articulating with the glenoid fossa. This is accomplished by the rotator cuff muscles. The supraspinatus muscle, in addition to the abducting the shoulder joint, pulls the humeral head into the glenoid fossa. The other rotator cuff muscles (subscapularis, infraspinatus, and teres minor) pull the head in and downward against the glenoid fossa. Another feature of shoulder abduction is that complete range of motion can be accomplished only if the shoulder joint is laterally rotated. (11)

Movements of the shoulder joint	**Muscles providing the movement**
Extension	Posterior deltoid, latissimus dorsi, teres major, pectoralis major (sternal part)
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 2 – Muscles active during movement of shoulder joint (11)

Stability of the shoulder joint

The loose fit between the head of the humerus and glenoid fossa permits extensive range of motion at the GH joint. The surrounding joint capsule, therefore, must be free of thick restraining ligaments that otherwise restrict motion. The anatomic design at the glenohumeral joint favors mobility at the expense of stability. (13)

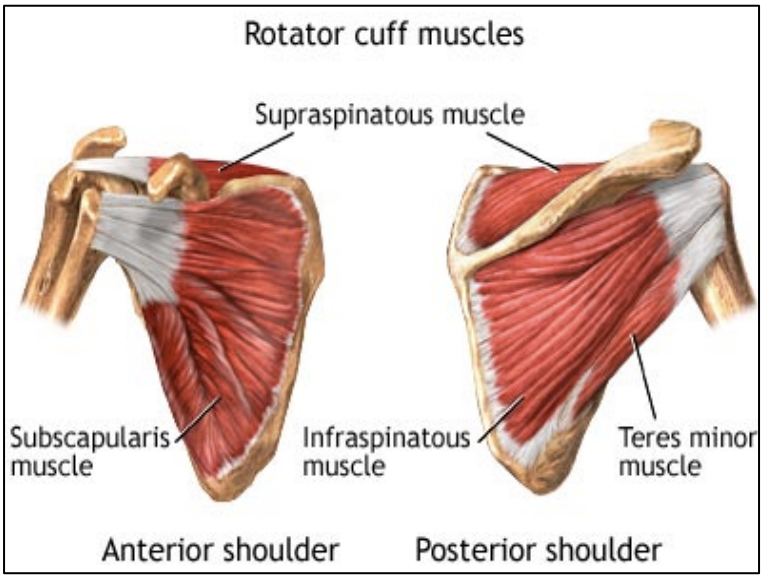

Figure 1 - Rotator cuff muscles. (4)

An essential function of the rotator cuff group is to compensate for the lack of natural stability at the GH joint. The distal attachment of the rotator cuff muscles blends into the GH joint capsule before attaching to the proximal humerus. The anatomic arrangement forms a protective cuff around the joint. Nowhere else in the body do so many muscles form such an intimate structural part of a joints periarticular structure. The dynamic stabilization is an essential function of all members of the rotator cuff. Forces produced by the rotator cuff not only actively move the humerus, but also stabilize and centralize its head against the glenoid fossa. Dynamic stability at the GH joint, therefore, requires a healthy neuromuscular system and musculoskeletal system. (13)

Companion motions of the shoulder joint and shoulder girdle

During linear movements of elevation/depression and protraction/retraction, it is possible to move the shoulder girdle up, down, forward, or backward without moving the humerus. However, shoulder joint motions must accompany the angular motions of upward and downward rotation. To rotate the scapula upward, you must also flex or abduct the shoulder joint. When there is flexion or abduction of the shoulder joint, the scapula must also rotate upward. When there is extension or adduction of the shoulder joint, the scapula returns to anatomical position, or rotates downward. Because of the complex and interrelated activities of the shoulder girdle and shoulder joint, it is difficult to discuss the function of one without discussing activities of the other. Impairment at one joint will also impair function at the other. (11)

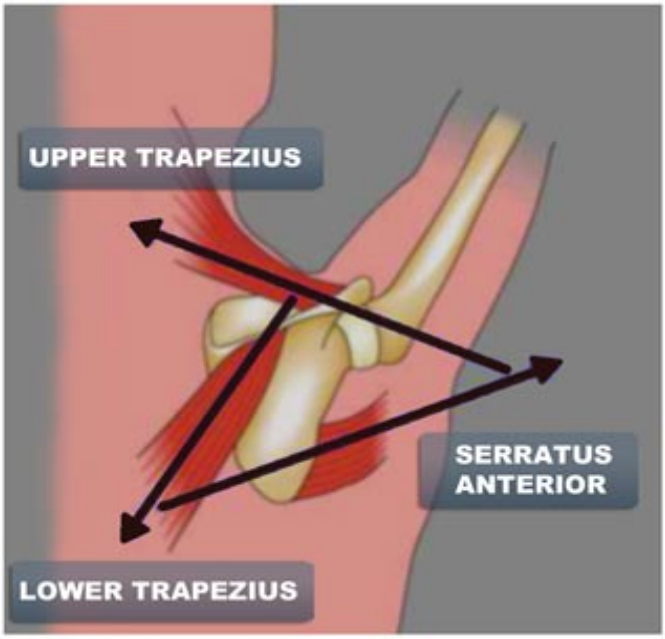

Figure 2 - Muscles providing rotation of scapula. (12)

The most important function of the shoulder is the elevation of the arm. This function depends on the relationship and contribution of the glenohumeral and scapulothoracic joints and the scapulothoracic rhythm. During full elevation of 180° only 90° takes place at the glenohumeral joint. The remaining half is the consequence of scapular rotation, clavicular movement and, finally, abduction of the humerus which is only possible when the scapula has been fully rotated. (3)

Scapulohumeral rhythm is a concept that further describes the movement relationship between the shoulder girdle and the 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 know 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 able to abduct only a short distance before shoulder joint motion is impaired. (11)

The elbow joint and the hand

This complicated joint enables the shortening of the extremity, to bring grasped objects to the face or body. The elbow also enables the throwing of objects, and to lean against the stable surface to lift the chest up in initiating the upright posture. The complex and sophisticated elbow also enables the most important function of the hand, the pronation and supination of the forearm (22)

The hand is a special feeling and grasping organ. The hand performs very sophisticated functions. Complicated bone and joint structures, and the several muscles groups operating this complicated moveable skeleton enable the functional diversity of the hand. The function of the hand constitutes a complex of different movements. All muscles work in mutual interplay between extrinsic and intrinsic muscles, which move the fingers and the wrist. (22)

2.2 Types of dislocations

Acromioclavicular sprains and dislocations are classified on the integrity of the acromioclavicular and coracoclavicular ligaments. (3)

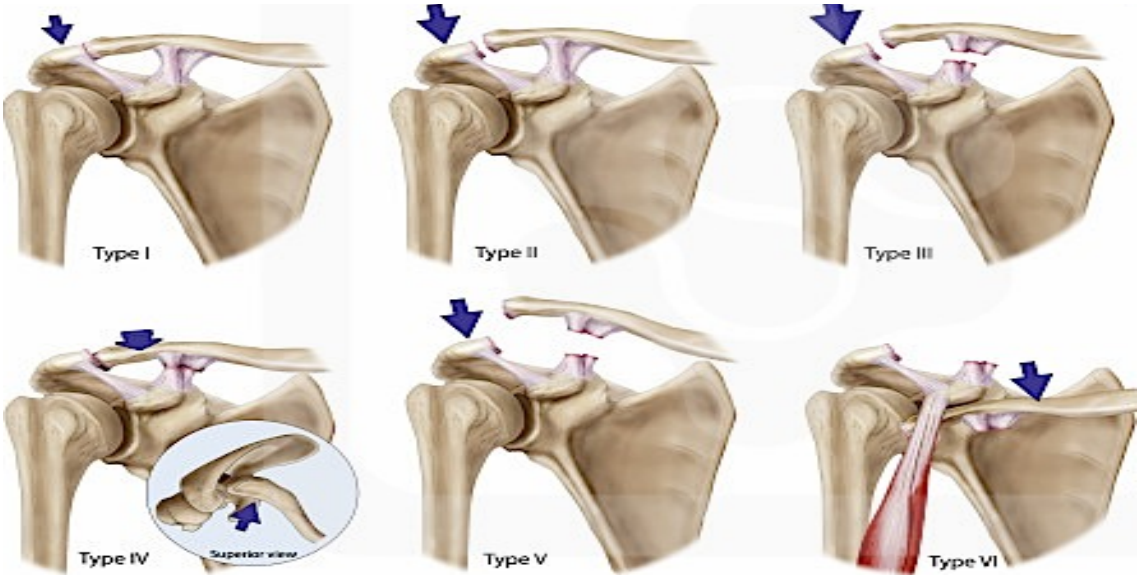

Figure 3 – Dislocation of acromioclavicular joint. (10)

Classically there are six grades of acromioclavicular dislocations. (3)

Type I	There is a partial lesion of the acromioclavicular ligament without any degree of clavicular displacement. No specific radiographic findings are present
Type II	There is cranial displacement of the clavicle, of less than half its width, due to rupture of the acromioclavicular ligament and subluxation of the clavicle.
Type III	This signifies a rupture of the coracoclavicular ligaments and results in a full dislocation. Rupture of the trapezius and deltoid is highly probable.
Type IV	The clavicle is grossly displaced posteriorly into the trapezius muscle.
Type V	Type V is a severe vertical separation of the clavicle.
Type VI	The clavicle is dislocated inferiorly into either a subacromial or subcoracoid position

Table 3 – Grades of acromioclavicular dislocations (3)

2.3 Clinical picture of dislocation of the acromioclavicular joint

In the clinical picture of dislocation of the acromioclavicular joint there is a history of an axial-loading injury to the lateral aspect of the shoulder, with pain, swelling, and tenderness increasing around the acromioclavicular joint. Prominence of the distal end of the clavicle is present on inspection, with the patient sitting and the weight of the arm unsupported, in grade 3 injuries. When the amount of displacement is in question, the integrity of the coracoclavicular ligaments is determined by having the patient flex the elbow against resistance, with the arm at the side. When the coracoclavicular ligaments are disrupted, the distal end of the clavicle will seem to rise superiorly as the acromion is pulled distally. (7)

The six types of dislocations can be differentiated in the following way.

Grade 1

In a grade 1 injury, there is minimal to moderate tenderness and swelling over the AC joint without palpable displacement of the joint. Usually there is only minimal pain with arm movements. Tenderness is not present in the coracoclavicular interspace. (14)

Grade 2

With subluxation of the AC joint, moderate to severe pain is noted at the joint. If the patient is examined shortly after injury, the outer end of the clavicle may be noted to be slightly superior to the acromion. Motion of the shoulder produces pain in the AC joint. With gentle palpation, the outer end of the clavicle may appear to be unstable and free floating. If the mid clavicle is grasped and the acromion stabilized, a to-and-fro motion of the clavicle in the horizontal plane can be detected. There should be little, if any, instability in the vertical plane. Tenderness is also noted when the physician palpates anteriorly in the coracoclavicular interspace. (14)

Grade 3

The patient with grade 3 injury, complete dislocation of the AC joint, characteristically presents with the upper extremity held adducted close to the body and supported in an

elevated position to relieve the pain in the AC joint. The shoulder complex is depressed when compared with the normal shoulder. The clavicle may be prominent enough to tent the skin. Moderate pain is the rule, and any motion of the arm, particularly abduction, increases the pain. Tenderness is noted at the AC joint, the coracoclavicular interspace, and on the superior aspect of the lateral fourth of the clavicle. The entire length of the clavicular shaft should be palpated to detect an associated clavicular shaft fracture. The lateral clavicle is unstable in both the horizontal and vertical planes. The lateral end of the clavicle can be depressed with manual pressure superiorly. This defect can also be reduced with upward pressure under the elbow. (14)

Grade 4

The patient with grade 4 injuries has essentially all the clinical findings of a grade 3 injury. In addition, examination of the seated patient from above reveals that the outline of the displaced clavicle is inclined posteriorly compared with the uninjured shoulder. Occasionally the clavicle is displaced so severely posteriorly that it becomes "buttonholed" through the trapezius muscle and tents the posterior skin. Consequently, motion of the shoulder is more painful than in grade 3 injuries. The AC joint cannot be reduced manually in this situation. The sternoclavicular joint should always be examined for an associated anterior dislocation. (14)

Grade 5

The grade 5 injuries are an exaggeration of the grade 3 injuries in which the distal end of the clavicle appears to be grossly superiorly displaced toward the base of the neck. This apparent upward displacement is the result of downward displacement of the upper extremity. The patient has more pain than with grade 3 injuries, particularly over the distal half of the clavicle. This is secondary to the extensive muscle and soft tissue disruption from the clavicle that occurs with this injury. Occasionally, there is so much inferior displacement of the upper extremity that the patient will develop symptoms of traction on the brachial plexus. (14)

Grade 6

The superior aspect of the shoulder has a flat appearance, as opposed to the rounded contour of the normal shoulder. With palpation, the acromion is prominent, and there is a definite inferior step down to the superior surface of the coracoid process. Because of the amount of trauma required to produce a subcoracoid dislocation of the clavicle, there may be associated fractures of the clavicle and upper ribs or injury to the upper roots of the brachial plexus. These associated injuries may produce so much swelling of the shoulder that the disruption of the AC joint may not initially be recognized. (14)

2.4 Rehabilitation

Non-operative treatment procedures

The patient could be immobilized for 2-3 weeks, restricted in activities, both work related and avocational for 6-8 weeks while undergoing rehabilitation. The patient should be expected to progress to return to fully duty based upon the response to rehabilitation and the demands of the job. (15)

Therapeutic exercise

Mobility exercises are initiated from the very beginning in an effort to decrease associated morbidity. Initial goals are to restore mobility by gradually progressing shoulder range of motion with supervised and home exercises and manual therapy techniques, specifically passive range of motions. Ranges of motion that may increase stress on the AC joint, specifically internal rotation behind the back, cross-body adduction, and end-rage flexion, are approached cautiously and within patients own pain threshold. (5)

Strength exercise is begun immediately and progressed according to the patient's tolerance to activity. Closed chain scapular exercises are recommended as an introductory exercise to assist in isolating scapular movements. The term closed chain refers to exercises in which the distal segment is fixed. In shoulder rehabilitation, closed-chain exercises involve movements with the hand fixed to a wall, table, or floor. These exercises unload the weight of the arm, thereby minimizing the demand of the rotator cuff musculature to support the weight of the arm. These exercises are

adventitious as they allow patients to focus on quality, appropriate movements in a safe and pain free manner. The addition of isotonic and open chain exercises can be made when the patient is able to maintain positions of forward elevation without pain or weakness. Exercise is progressed with isotonic strength exercises; focusing on the scapular and rotator cuff musculature, follow by sport, work or function-specific training. (5)

An active therapeutic exercise program should also contain elements of improving patient flexibility, posture, ADL, and sensory reeducation. (15)

Alternation of occupation and workstation

Early evaluation and training of body mechanics and joint protection and other ergonomic factors is essential. Ergonomic risk factors to be addressed include repetitive overhead work, lifting and tool use. (15)

Physical therapy

TENS can be used for short-term pain control. Therapeutic ultrasound can be used to deliver acoustic energy for therapeutic thermal or non-thermal soft tissue treatment. Indications include scar tissue, adhesions, collagen fiber and muscle spasm, and the need to extend muscle tissue or accelerate the soft tissue healing. (15)

Release muscle tension

Post-isometric relaxation (PIR) is an advantageous method for release of muscle tension and trigger points (TrPs). The procedure is as follows: the muscle is brought into a position in which it attains its maximum length without stretching. In this position the patient is asked to resist with a minimum of force. This resistance is held for about 10 seconds, after which the patient is told to relax. It is now essential to wait until the therapist senses that the patient has indeed relaxed, after which he can usually obtain a greater ROM by pure relaxation, not stretch. (9)

Soft tissue techniques

Whenever we stretch skin or any other structure there is a free range of movement where little or no resistance is met, until we take up the slack or reach the barrier. The barrier can be gradual and well sprung or restrictive and abrupt. If we then engage the barrier, we wait until we obtain release and thus normal conditions. (9)

Stretching

Stretching exercises must be performed slowly and carefully, with a fixation of the stretched position for a minute or so. During the stretch the patient's intention should be on full relaxation in order to produce a reduction of tension in the stretched muscles. (16)

Joint play and mobilization

The sole aim is to restore normal mobility of joint, including joint play, but also mobility between soft tissue layers, or soft tissue and bones (9)

Proprioceptive neuromuscular facilitation (PNF)

PNF is defined as a method of promoting the response of the neuromuscular mechanism through stimulation of proprioceptors. PNF uses so called mass movements. The mass movement is a specific combination of motions, which have a specific sequence of muscles. The mass movement patterns have a spiral and diagonal character, and closely remember the movements used in sports and in work activities. (19)

Operative treatment

The ideal operative procedure should eliminate the possibility of migration of pins or failure of acromioclavicular reduction. Late degenerative changes in the acromioclavicular joint should not be seen, and any further or secondary operative procedures should be unnecessary. In addition, the result should be cosmetically acceptable and should allow the patient to have a fully functional shoulder in a short period of time. (17)

The operative procedure to be described is primary resection arthroplasty of the acromioclavicular joint and fixation of the distal end of the clavicle in an anatomical position using the acromial end of the coracoacromial ligament. The procedure involves the repair of the acromioclavicular joint by attaching the coracoid end of the coracoacromial ligament and suturing it to the lateral portion of the clavicle after reducing the joint and transfixing it with Kirschner wire. Because of the horizontal direction of the ligament between the clavicle and acromion, the reduction could not be maintained without the use of a transfixion wire. This and any other procedure that restores the acromioclavicular joint can result in late arthralgia or degenerative arthritis. If Kirschner wires, Steinmann pins, or screws are used to maintain the reduction of the acromioclavicular joint, they are subject to migration and an attendant high degree of morbidity. Any means of fixing the clavicle to the coracoid that utilizes screws or transfixion wires usually requires that the hardware be removed at a subsequent operation. Otherwise, the shoulder motion will be impaired or the hardware will fail. (17)

3. Special Part – Case Study

3.1 Methodology

My case study took place at Centrum Léčby Pohybového Aparátu Vysočany, Prague, from 23.01.2012 until 10.02.2012. CLPA is an orthopaedic and physiotherapy based medical center. The clinic specializes in therapy of all disorders and diseases of locomotion system, including replacements of large joints, and therapy of sport injuries. The clinic also offers a complete range of therapeutic techniques, including water therapy procedures, electrotherapy, magnetotherapy and a fully equipped fitness gym.

PhDr. Edwin Mahr PhD. supervised my case study and all examinations and therapeutic procedures were done in cooperation with him.

The patient attended 5 therapy sessions during my 3 weeks in CLPA. The sessions started at 8.30am, and one therapy session lasted from 1 to 1.5 hour. Controls were performed on the beginning and end of each session. Therapeutic approaches that were used were soft tissue techniques, active and passive movements, PIR, PNF, mobilization, stretching, and exercises with theraband.

My patient gave his informed consent on participating in the bachelor case study, and the work has been approved by the Ethics Committee of the Faculty of Physical Education and Sport at Charles University, Prague.

3.2 Anamnesis

Performed 24.01.2012

Name: P.Z. Male

Date of birth: 1981

Height: 186 cm

Weight: 87 kg

BMI: 26

BP: N/A

Temperature: N/A

BF: 18 per min

Diagnosis:

S43.1. State after reposition of right acromioclavicular joint with temporary K-wire transfixation

Anamnesis

Chief complaint:

The patient's chief complaint is limited range of motion and pain in the shoulder joint. He describes the pain as sharp. The pain makes him unable to lift and carry his 1.5 year old daughter. The patient also complains about pain when waking up in the morning, he is only able to sleep on his back.

History of present problem:

The patient dislocated his right acromioclavicular joint when he fell off the bike 4 months ago. He had to wear a sling for 3 weeks. The acromioclavicular joint was transfixated with K-wire 12.10.2011. The K-wire was removed 17.01.2012.

Family history: The patient says he doesn't know about any family diseases

Medications: He doesn't take any medications

Allergies: He is allergic to penicillin

Personal/Medical history:

Diseases: The patient has had all the common childhood disorders

Injuries: No injuries

Operations: No previous operations

Abuses: Drinks alcohol occasionally

Psychosocial history:

Work: He works as a technician, which means he sits in front of a computer for a long period of time each day.

Hobbies: He plays tennis and goes cycling, but on an amateur level.

Living conditions: He lives in an apartment with his 1.5 year old daughter and wife

Associated problems: Patient is right handed but manages most ADL's himself, but is not able to carry out overhead movement.

Previous rehabilitation:

The patient attended 8 therapy sessions in November for the dislocation of right acromioclavicular joint where they focused on active movements in all planes. But because of the transfixation by K-wire he was not able to perform more than 40° of abduction.

Health document extract:

The patient's health documents were not available because the patient had given them to his medical doctor

Indications for rehabilitation:

The indication for physical therapy is to increase the range of motion of right shoulder joint, and the medical doctor at CLPA recommended it for 10 sessions. The therapy applied will be according to the findings in initial kinesiological examination.

Differential consideration:

The patient problems are caused by a trauma, so a differential consideration is unnecessary. But because of the trauma there will be a lot of reflex changes in the upper part of the body.

3.3 Initial Kinesiological examination

Performed 24.01.2012

Aspection:

Patient has a plaster over the scar. The patient was examined with the plaster on.

Postural examination:

Anterior:

- Narrow base
- Physiological arches of foot
- External rotation of both hip joints
- Internal rotation of arms
- Thoraco-brachial triangle is bigger on the left side
- Elevated right shoulder

Posterior:

- Narrow stance
- Slight valgus of left ankle
- Slight left convexity in lumbar spine
- Slight right convexity in the lower thoracic spine
- Scapula more abducted on the left side
- External rotation of lower angle of scapula on the left side
- Internal rotation of lower angle of scapula on the right side
- Elevation of right shoulder

Lateral

- Extended knees on both sides
- Hip shifted anteriorly
- Slight rotation of the trunk to the right

- Hyperlordosis of the lumbar spine

- Hyperkyphosis of the thoracic spine

- Hyperlordosis of the cervical spine

- Semiflexed elbows on both sides

- Protracted shoulders on both sides

- Forward head position

Pelvis examination:

Iliac crest: is one the same level

Anterior superior iliac spine: are on the same level

Posterior superior iliac spine: are on the same level

Scale test:

Right side	**Left side**
42 kg	45 kg
Total: 87 kg	

Table 4 – Scale examination, initial examination

Balance and proprioceptive tests

Romberg 1: Negative

Romberg 2: Negative

Romberg 3: Negative

Trendelenburg left: Negative

Trendelenburg right: Negative

Functional movements:

Both hands to head: Manages to touch head with both hands. Left with no problems or pain. The patient is able to reach the head with the right hand, but with maximal flexion of elbow and lateroflexion of head. Movement is accompanied by pain.

Hands to back from below: With the left arm the patient is able to touch the middle of the back. The right arm is barely reaching the lower back, its also painful.

Hands to back from above: Patient manages to reach the upper back with the left arm. With the right arm he is able to touch the top of the shoulder, its also painful.

Examination of sensation:

Peripheral sensation of both upper extremities in dermatome C4,C5,C6,C7,C8 and T1: The examination was performed by means of skin drag. Patients expressed sensation throughout the whole extremities on both sides, with no difference in the quality of perceived sensation.

Examination of proprioception:

Proprioception of wrist joint: The patient was able to recognize the change of movement with slow, medium and fast speed without any problems on both upper extremities.

Proprioception of elbow joint: The patient was able to recognize the change of movement with slow, medium and fast speed without any problems on both upper extremities.

Proprioception of shoulder joint: The patient was able to recognize the change of movement with slow, medium and fast speed without any problems on both upper extremities.

Special tests (2)

Apprehension test: Not possible to examine due to pain

O'Brian test: Not possible to examine due to pain

Examination of posterior instability: Not possible to examine due to pain

Palpation:

Right side		Muscles			Left side	
Tonus	**Pain**	**Trg. point**		**Tonus**	**Pain**	**Trg. point**
Hyper	No	Yes	Trapezius	Hyper	No	Yes
Normal	No	No	Deltoid	Normal	No	No
Normal	No	No	Biceps brachii	Normal	No	No
Hypo	No	No	Triceps brachii	Hypo	No	No
Hyper	No	No	Supraspinatus	Hyper	No	No
Hyper	No	No	Infraspinatus	Hyper	No	No
Hyper	Yes	Yes	Subscapularis	Hyper	No	Yes
Hyper	No	No	Erector spine	Hyper	No	No
Normal	No	No	Pectoralis major	Normal	No	No
Normal	No	No	Pectoralis minor	Normal	No	No
Hyper	No	No	Sternocleidomastoid	Hyper	No	No

Table 5 – Palpation of muscles, initial examination

Examination of fascia (20)

- A slight restriction was found in the thorax fascia in lateral direction

- A slight restriction was found in the neck fascia in both directions

- A slight restriction was found in the back fascia in caudal direction

ROM, according Kendall (8)

Note: A plastic goniometer was used for the examination of ROM

Right side			**Left side**	
Active	**Passive**		**Active**	**Passive**
		Cervical spine		
40° - 0° - 45°	40° 0° - 45°	**S**		
40° - 0° 45°	45° - 0° - 45°	**F**		
50° - 0° - 55°	50° - 0° - 55°	**R**		
		Shoulder joint		
20° - 0° - 80°	25° - 0° - 90°	**S**	30° - 0° - 170°	35° - 0° - 170°
40° - 0° - 0°	45° - 0° - 0°	**F**	160° - 0 ° - 0°	160° - 0° - 0°
X	X	**T**	90° - 0° - 25°	90° - 0° - 30°
10° - 0° - 20°	15° - 0° - 25°	**R**	60° - 0° - 50°	65°- 0° - 55°
		Elbow joint		
0° - 0° - 135°	0° - 0° - 140°	**S**	0° - 0° - 135°	0° - 0° - 140°
90° - 0° - 90°	90° - 0° - 90°	**R**	90° - 0° - 90°	90° - 0° - 90°
		Wrist joint		
60° - 0° - 70°	60° - 0° - 70°	**S**	60° - 0° - 70°	60° - 0° - 70°
15° - 0° - 35°	15° - 0° - 35°	**F**	15° - 0° - 35°	15° - 0° - 35°

Table 6 - ROM of upper extremity and cervical spine, initial examination

(X)= Not possible to examine due to pain

Muscle length test, according Kendall (8)

Right side		Left side
Marked shortness	Pectoralis minor	Marked shortness
N/A*	Pectoralis major sternal part	No shortness
N/A*	Pectoralis major clavicular part	No shortness

Table 7 – Muscle length of the upper extremity, initial examination

(*) = not possible to provide because of limited ROM and pain.

Manual muscle testing, according Kendall (8)

Right upper extremity	Muscles	Left upper extremity
N/A*	Deltoid	5
N/A*	Deltoid anterior	5
N/A*	Deltoid posterior	5
N/A*	Coracobrachialis	5
5	Biceps brachii	5
5	Triceps brachii	5
5	Brachioradialis	5
5	Supinator	5
5	Pronator teres/quadratus	5

Table 8 – Manual muscle testing, initial examination

(*)= The patient was unable to obtain the starting position due to limited ROM and pain

Examination against isometric resistance of the rotator cuff muscles of the shoulder according to Cyriax (9)

	Left upper extremity	**Right upper extremity**
Against abduction	No pain	No pain
Against external rotation	No pain	No pain
Against internal rotation	No pain	No pain
Against raising of semi flexed arm	No pain	No pain

Table 9 – Examination against isometric resistance of rotator cuff, initial examination

Joint play, according to Lewit (9)

O= No blockage X= Blockage XX= Blockage with pain XXX= Impossible to perform due to pain

No restrictions were found in the interphalangeal joints and metacarpophalangeal of the 2nd to 5th digit of both upper extremities.

No restrictions were found in the carpometacarpal, intercarpal, radiocarpal and distal radioulnar joints of both upper extremities.

No restrictions were found in elbow joint in radial direction, ulnar direction and in the proximal radioulnar joint of both upper extremities.

Shoulder joint		
	Right side	**Left side**
Ventral	O	O
Dorsal	O	O
Caudal	XXX	O
Lateral	XXX	O

Table 10 – Joint play of shoulder joint, initial examination

Scapular movements		
	Right side	**Left side**
Movement of scapula against trunk	XXX	X
Abduction with elevation	O	O

Table 11 – Joint play of scapular movements, initial examination

Sternoclavicular joint		
	Right side	**Left side**
Springing distraction	O	O

Table 12 – Joint play of sternoclavicular joint, initial examination

Acromioclavicular joint		
	Right side	**Left side**
Springing in ventero-dorsal direction	O	O
Springing in cranio-caudal direction	O	O

Table 13 – Joint play of acromioclavicular joint, initial examination

Anthropometric measurements: (20)

	Right upper extremity	**Left upper extremity**
Length of the whole extremity	78 cm	78 cm
Length of humerus	31 cm	31 cm
Length of forearm	30 cm	30 cm
Circumference		
Upper arm	31 cm	31 cm
Forearm	29 cm	30 cm

Table 14 – Anthropometric measurements, initial examination

Breathing examination: Performed in lying and sitting position

Type: Abdominal breathing

Frequency: 18 breaths per minute

Note: The thorax moves in a symmetrical way. The patient was able to breath under the hands of the therapist

Examination Conclusion:

In the postural examination one could see an elevation of the right shoulder, which might be a protective mechanism against the pain. The elevated shoulder may also explain the shifting of the trunk, evident by the bigger thoraco-brachial triangle on the left side. When looking at the scapula, the left scapula was more abducted than the right. The left lower angle was in external rotation and the right was in internal rotation, which supports the theory of a shifting of the trunk. There was also a slight left convexity of the lumbar spine, and a slight right convexity of the lower thoracic spine. This could be a possible compensation for the body shift.

The pelvis examination showed no difference between the landmarks measured, everything was in the same level. The scale test only showed a 3kg difference in loading of the lower extremities, which is not enough to say that he has a disbalance in loading.

Examination of functional movements showed a significant restriction in ROM on the right side. The patient was only able to touch the head when providing maximal flexion of the elbow joint and lateroflexion of the head. He barely reached the back when trying to touch it from below. From above he was able to touch the top of the shoulder. All movements were accompanied by pain.

In the palpation of muscles, hypertonus and triggerpoints were found in the upper trapezius and subscapularis on both sides. When palpating the subscapularis the patient also experienced pain. Hypertonus were also found in the supraspinatus on the right side, infraspinatus on both sides, the whole erector spine on both sides and the sternocleidomastoid on both sides. Hypotonus were found in the triceps brachii on both sides.

The examination of fascias showed a slight restriction in neck, back and thorax fascia.

The examination of muscle length showed a marked shortness in the pectoralis minor on both sides. The pectoralis major sternal and clavicular part was not possible to examine because of the restricted ROM.

The measurement of ROM showed a marked limitation in the movement of shoulder joint. Both flexion and abduction of the right shoulder joint was severely limited. The patient only reached 80° of active and 90° of passive flexion of the right shoulder joint. The abduction was limited to 40° of active and 45° of passive movement. External rotation was limited to 10° of active and 15° of passive movement. Internal rotation was

limited to 20° of active 25° of active movement. Horizontal adduction and abduction was impossible to measure because the patient was unable to reach the starting position. All the movements of shoulder joint except extension were accompanied by pain.

Manual muscle testing of the muscles surrounding the right shoulder joint was impossible to measure because the patient was unable to obtain the starting position due to limited ROM and pain. No weakness was found in the muscles of the left upper extremity, or in the distal parts of the right upper extremity.

The examination of joint play in the shoulder joint into ventral and dorsal directions showed no restrictions on both sides, but the joint play into caudal and lateral direction on the right side was impossible to examine because of pain. There was some restriction in the joint play of the left scapula against trunk. The joint play of the right scapula was impossible to examine because of pain. No restrictions were found in the examination of scapula into abduction with elevation on both sides. Also the sternoclavicular joint and the acromioclavicular joint were examined, but no restrictions were found.

The measurement of anthropometrics was included to see if there were any structural differences between the two upper extremities, and to see if there was any difference in trophy of the muscles. There was no difference in the length of the whole arm, humerus and forearm when comparing both sides. The circumference of both upper arms was the same. The circumference of the left forearm was slightly greater than the right.

3.4 Rehabilitation plan

Short-term rehabilitation plan for the 3 weeks in CLPA:

- Decrease hypertonus in rotator muscles of shoulder
- Decrease hypertonus and triggerpoints in upper back and neck
- Stretching of shortened muscles
- Increase ROM by active and passive movements
- Activation of muscles of the upper extremity by use of PNF (1)

Long-term rehabilitation plan for ambulatory therapy after the 3 weeks in CLPA:

- Increase strength in muscles surrounding right shoulder joint
- Increase deep stabilization of right shoulder girdle (21)
- Exercises with propriomed, and therabands with diagonals from PNF

Therapy plan:

- 3 weeks
- 1 therapy session per day, self therapy on days without therapy
- 1 to 1.5 hour therapy sessions
- Controls should be performed on the beginning, and end of each therapy session

3.5 Therapy progress

Day to day therapy:

Date: 24.01.2012 **Time:** 08.30

Status:

Subjective: The patient was under a lot of pain during this session. He complained of pain during movements into flexion, abduction, and internal and external rotation.

Objective: The patient shows great limitation of flexion, abduction, internal and external rotation of shoulder joint.

Goal of today: The goal of today is to improve range of motion. Decrease pain. Relax hypertonic muscles. Strengthening of muscles surrounding the shoulder girdle. Stretching of shortened muscles.

Therapy proposal: Soft tissue techniques for triggerpoints and fascia. PIR for the trapezius, sternocleidomastoid, subscapularis. Traction of the shoulder joint to relieve pain. Passive movements into flexion, abduction, internal and external rotation. Stretching of the pectoralis minor. The wall climb to increase ROM.

Therapy execution:

1) Soft tissue techniques for trigger points in upper trapezius

2) Soft tissue techniques for thorax and upper neck fascia

3) PIR of upper trapezius on both sides

4) PIR of sternocleidomastoid on both sides

5) PIR of subscapularis on the right side

6) Stretching of pectoralis minor on both sides

7) Postisometric traction of shoulder joint on the right side

8) Passive movements into flexion, abduction, internal and external rotation of the right shoulder joint

9) Wall climb - active motion – flexion, abduction and circumduction of the right upper extremity

Self therapy: The patient is given the shoulder pendulum as self therapy, which he will do every day. He is instructed to bend to 90° in the hip joint with his left arm on a table

or chair for support. Then let the right arm hang down towards the ground and then make small circles. He should let the momentum move the arm effortlessly for 10 circles, first clockwise and then counterclockwise.

Conclusion of today's unit: The patient had difficulties relaxing when providing the passive movements into flexion, abduction, and internal and external rotation. The PIR of the subscapularis was impossible to provide because of restricted ROM and pain. The autotherapy for subscapularis was also impossible to provide because of pain when lying on the right side. When the patient performed the wall climb one could see some increase in the active ROM.

Day to day therapy:

Date: 26.01.2012 **Time:** 08.30

Status:

Subjective: The patient feels better today. He was driving for several hours yesterday, which he says, made him feel better.

Objective:

Active flexion of shoulder joint: 85°

Active abduction of shoulder joint: 45°

Goal of today: The goal of today is to improve range of motion. Decrease pain. Relax hypertonic muscles. Strengthening of muscles surrounding the shoulder girdle. Stretching of shortened muscles.

Therapy proposal: Soft tissue techniques for triggerpoints and fascia. PIR for the trapezius, sternocleidomastoid. Traction of the shoulder joint to relieve pain. Passive movements into flexion, abduction, internal and external rotation. Stretching of the pectoralis minor. The wall climb to increase ROM. Exercise with theraband behind back to activate the lower trapezius. PNF techniques with theraband for strengthening of muscles included in the first diagonal.

Therapy execution:

1) Soft tissue techniques for trigger points in upper trapezius

2) Soft tissue techniques for thorax and upper neck fascia

3) PIR of upper trapezius on both sides

4) PIR of sternocleidomastoid on both sides

5) Stretching of pectoralis minor on both sides

6) Postisometric traction of shoulder joint on the right side

7) Passive movements into flexion, abduction, internal and external rotation of the right shoulder joint

8) Wall climb - active motion – flexion, abduction and circumduction of the right upper extremity

9) Abduction of shoulder with theraband behind back

10) PNF 1st diagonal flexion and extension patterns with theraband

Self therapy:

The patient is instructed in how to sit in front of the computer. He has to sit on a chair with proper back support and the desk has to be at the correct level. The keyboard and mouse should also be close to the body so he can relax his shoulders.

Conclusion of today's unit:

The patient's ability to relax during the passive movements was better today. During the abduction with theraband behind back the patient has the tendency to elevate the shoulders, but when instructing him to concentrate on holding the shoulders down during the movement he is able to perform the exercise correctly. Despite the patients restricted internal and external rotation of shoulder he was able to provide the PNF patterns in a correct manner.

Day to day therapy:

Date: 31.01.2012 **Time:** 08.30

Status:

Subjective: The patient feels some tension in the upper back and neck, he has had a lot to do at work the last couple of days which has caused him to sit long hours in front of the computer. But he feels no difference in the level of pain.

Objective:

The patient has now removed the plaster over the scar. The scar is 10 cm long. There is a restriction when trying to elongate the scar.

Examination of soft tissue and muscles of the upper back and neck was included because the patient complained about tension. Triggerpoint and hypertone were found in the levator scapulae.

Active flexion of shoulder joint: 95°

Active abduction of shoulder joint: 55°

Goal of today: The goal of today is to improve range of motion. Decrease pain. Relax hypertonic muscles. Strengthening of muscles surrounding the shoulder girdle. Stretching of shortened muscles. Release the restriction in the scar.

Therapy proposal: Soft tissue techniques for the scar. Soft tissue techniques for triggerpoints and fascia. PIR for the trapezius, sternocleidomastoid and levator scapulae. Traction of the shoulder joint to relieve pain. Passive movements into flexion, abduction, internal and external rotation. Stretching of the pectoralis minor. The wall climb to increase ROM. Exercise with theraband behind back to activate the lower trapezius. PNF techniques with theraband for strengthening of muscles included in the first diagonal. Exercise with gym ball to activate the interscapular muscles.

Therapy execution:

1) Soft tissue techniques for scar

2) Soft tissue techniques for trigger points in upper trapezius and levator scapulae on both sides

3) Soft tissue techniques for thorax and upper neck fascia

4) PIR of upper trapezius on both sides

5) PIR of levator scapulae on both sides

6) PIR of sternocleidomastoid on both sides

7) Stretching of pectoralis minor on both sides

8) Postisometric traction of shoulder joint on the right side

9) Passive movements into flexion, abduction, internal and external rotation of the right shoulder joint

10) Wall climb - active motion – flexion, abduction and circumduction of the right upper extremity

11) Abduction of shoulder with theraband behind back

12) PNF 1st diagonal flexion and extension patterns with theraband

13) Standing while pushing gym ball against trunk

Self therapy: The wall climb is added as self therapy in addition to the shoulder pendulum. He should do both of them every day.

Conclusion of today's unit:

The patient has now removed the plaster over the scar. Soft tissue techniques were included because there was a slight restriction when trying to elongate the scar. The ROM has also increased compared to the initial examination. A exercise with gym ball was added to activate the lower fixators of scapula because the patient has a tendency to overactivate the upper trapezius when performing active abduction of the shoulders. He felt a release of muscle tension after the PIR and soft tissue techniques for triggerpoints in the upper trapezius and levator scapulae.

Day to day therapy:

Date: 08.02.2012 **Time:** 08.30

Status:

Subjective: The patient has been sick the last week, but he feels much better now. Even though he has been sick he has been able to do the self therapy. The patient says he also feels less pain when waking up in the morning.

Objective:

Active flexion of shoulder joint: 110°

Active abduction of shoulder joint: 70°

Goal of today: The goal of today is to improve range of motion. Decrease pain. Relax hypertonic muscles. Strengthening of muscles surrounding the shoulder girdle. Stretching of shortened muscles. Release the restriction in the scar.

Therapy proposal: Soft tissue techniques for the scar. Soft tissue techniques for triggerpoints and fascia. PIR for the trapezius, sternocleidomastoid. Traction of the shoulder joint to relieve pain. Passive movements into flexion, abduction, internal and external rotation. Stretching of the pectoralis minor. The wall climb to increase ROM. Exercise with theraband behind back to activate the lower trapezius. PNF techniques with theraband for strengthening of muscles included in the first diagonal. Exercise with gym ball to activate the interscapular muscles.

Therapy execution:

1) Soft tissue for scar

2) Soft tissue techniques for trigger points in upper trapezius

3) Soft tissue techniques for thorax and neck fascia

4) PIR of trapezius on both sides

5) PIR of sternocleidomastoid on both sides

6) Stretching of pectoralis minor on both sides

7) Postisometric traction of shoulder joint on the right side

8) Passive movements into flexion, abduction, internal and external rotation of the right shoulder joint

9) Wall climb - active motion – flexion, abduction and circumduction of the right upper extremity

10) Abduction of shoulder with theraband behind back

11) PNF 1st diagonal flexion and extension patterns with theraband

12) Standing while pushing gym ball against trunk

Conclusion of today's unit:

Even though the patient has not been able to come to therapy the last week because he has been sick he has been able to do the self therapy at home. He now feels less pain when waking up in the morning. The examination shows a 15° increase in both active flexion and active abduction of the shoulder joint. This shows that the therapy is proceeding in the right direction.

Day to day therapy:

Date: 10.02.2012 **Time:** 08.30

Status:

Subjective: The patient feels a lot better today. He says less pain is present during the movement of shoulder joint.

Objective:

Active flexion of shoulder joint: 125°

Active abduction of shoulder joint: 85°

Since the the pain has decreased and the ROM has increased it was possible to examine the movement of scapula against trunk. A slight restriction was found in the lateral direction on the right side.

Goal of today: The goal of today is to improve range of motion. Decrease pain. Relax hypertonic muscles. Strengthening of muscles surrounding the shoulder girdle. Stretching of shortened muscles. Release the restriction in the scar. Reduce restricted joint play.

Therapy proposal: Soft tissue techniques for the scar. Soft tissue techniques for triggerpoints and fascia. PIR for the trapezius, sternocleidomastoid. Traction of the shoulder joint to relieve pain. Passive movements into flexion, abduction, internal and external rotation. Stretching of the pectoralis minor. The wall climb to increase ROM. Exercise with theraband behind back to activate the lower trapezius. PNF techniques with theraband for strengthening of muscles included in the first diagonal. Exercise with gym ball to activate the interscapular muscles. Joint play techniques to reduce the restriction of movement of scapula against trunk. Water therapy for muscle relaxation.

Therapy execution:

1) Subaqual massage, 37° for 10 minutes (18)

2) Soft tissue for scar

3) Soft tissue techniques for trigger points in upper trapezius

4) Soft tissue techniques for thorax and neck fascia

5) PIR of trapezius on both sides

6) PIR of sternocleidomastoid on both sides

7) Stretching of pectoralis minor on both sides

8) Postisometric traction of shoulder joint on the right side

9) Passive movements into flexion, abduction, internal and external rotation of the right upper extremity

10) Mobilization of the scapula against trunk on both sides (9)

11) Wall climb - active motion – flexion, abduction and circumduction of the right upper extremity

Conclusion of today's unit:

Since the patients ROM has significantly increased it was possible to examine the movement of scapula against trunk. A slight restriction was found in the lateral direction. He felt a release in the movement during the therapy. The triggerpoints and hypertone of the upper trapezius has also decreased. Water therapy was also included for muscle relaxation. He felt a release in the muscles after therapy. The therapy was ended after a while to make time for the final kinesiological examination.

3.6 Final Kinesiological Examination

Performed 10.02.2012

Changes from the Initial Kinesiological Examination is marked with bold letters

Aspection:

The patient has a 10 cm long scar over the right acromioclavicular joint

Postural examination:

Anterior:

- Narrow base
- Physiological arches of foot
- External rotation of both hip joints
- Internal rotation of arms
- Thoraco-brachial triangle is **slightly** bigger on the left side
- Elevated right shoulder, **not as marked as on the initial examination**

Posterior:

- Narrow stance
- Slight valgus of left ankle
- Slight left convexity in lumbar spine
- Slight right convexity in the lower thoracic spine
- **Both scapulas are at the same distance from the spine**
- **Slight** external rotation of lower angle of scapula on the left side
- **Slight i**nternal rotation of lower angle of scapula on the right side
- Elevation of right shoulder, **not as marked as on the initial examination**

Lateral

- Extended knees on both sides
- Hip shifted anteriorly
- Slight rotation of the trunk to the right

- Hyperlordosis of the lumbar spine
- Hyperkyphosis of the thoracic spine
- Hyperlordosis of the cervical spine
- Semiflexed elbows on both sides
- Protracted shoulders on both sides
- Forward head position

Pelvis examination:

Iliac crest: is one the same level

Anterior superior iliac spine: are on the same level

Posterior superior iliac spine: are on the same level

Scale test:

Right side	Left side
42 kg	45 kg
Total: 87 kg	

Table 15 - Scale examination, final examination

Balance and proprioceptive tests

Romberg 1: Negative

Romberg 2: Negative

Romberg 3: Negative

Trendelenburg left: Negative

Trendelenburg right: Negative

Functional movements:

Both hands to head: Manages to touch head with both hands. Left with no problems or pain**. Patient is able to touch the head with the right arm in a good manner. Slight pain is noted at the end of movement.**

Hands to back from below: With the left arm the patient is able to touch the middle of the back. **The right arm is able to reach the lower back, pain is noted at the end of movement.**

Hands to back from above: Patient manages to reach the upper back with the left arm. **With the right arm he reaches the spine of the scapula.**

Examination of sensation:

Peripheral sensation of both upper extremities in dermatome C4,C5,C6,C7,C8 and T1: The examination was performed by means of skin drag. Patients expressed sensation throughout the whole extremities on both sides, with no difference in the quality of perceived sensation.

Examination of proprioception:

Proprioception of wrist joint: The patient was able to recognize the change of movement with slow, medium and fast speed without any problems on both upper extremities.

Proprioception of elbow joint: The patient was able to recognize the change of movement with slow, medium and fast speed without any problems on both upper extremities.

Proprioception of shoulder joint: The patient was able to recognize the change of movement with slow, medium and fast speed without any problems on both upper extremities.

Special tests (2)

Apprehension test: Not possible to examine due to pain

O'Brian test: Not possible to examine due to pain

Examination of posterior instability: Not possible to examine due to pain

Palpation:

Right side		**Muscles**			**Left side**	
Tonus	**Pain**	**Trg. point**		**Tonus**	**Pain**	**Trg. point**
Hyper	No	**No**	Trapezius	Hyper	No	**No**
Normal	No	No	Deltoid	Normal	No	No
Normal	No	No	Biceps brachii	Normal	No	No
Normal	No	No	Triceps brachii	**Normal**	No	No
Hyper	No	No	Supraspinatus	Hyper	No	No
Hyper	No	No	Infraspinatus	Hyper	No	No
Hyper	**No**	Yes	Subscapularis	Hyper	No	Yes
Hyper	No	No	Erector spine	Hyper	No	No
Normal	No	No	Pectoralis major	Normal	No	No
Normal	No	No	Pectoralis minor	Normal	No	No
Hyper	No	No	Sternocleidomastoid	Hyper	No	No

Table 16 – Palpation of muscles, final examination

Examination of fascia and scar (20)

- A slight restriction were found when trying to elongate the scar

- A slight restriction was found in the thorax fascia in lateral direction

- A slight restriction was found in the neck fascia in both directions

- A slight restriction was found in the back fascia in caudal direction

ROM, according to Kendall (8)

Note: A plastic goniometer was used for the examination of ROM

Right side			**Left side**	
Active	**Passive**		**Active**	**Passive**
		Cervical spine		
40° - 0° - 45°	40° 0° - 45°	**S**		
40° - 0° 45°	45° - 0° - 45°	**F**		
50° - 0° - 55°	50° - 0° - 55°	**R**		
		Shoulder joint		
30° - 0° - **120**°	25° - 0° - **125**°	**S**	30° - 0° - 170°	35° - 0° - 170°
85° - 0° - 0°	**90**° - 0° - 0°	**F**	160° - 0 ° - 0°	160° - 0° - 0°
X	X	**T**	90° - 0° - 25°	90° - 0° - 30°
25° - 0° - **40**°	**35**° - 0° - **50**°	**R**	60° - 0° - 50°	65°- 0° - 55°
		Elbow joint		
0° - 0° - 135°	0° - 0° - 140°	**S**	0° - 0° - 135°	0° - 0° - 140°
90° - 0° - 90°	90° - 0° - 90°	**R**	90° - 0° - 90°	90° - 0° - 90°
		Wrist joint		
60° - 0° - 70°	60° - 0° - 70°	**S**	60° - 0° - 70°	60° - 0° - 70°
15° - 0° - 35°	15° - 0° - 35°	**F**	15° - 0° - 35°	15° - 0° - 35°

Table 17 – ROM of upper extremity and cervical spine, final examination

(X)= Not possible to examine due to pain

Muscle length test, according to Kendall (8)

Right side		**Left side**
Marked shortness	Pectoralis minor	Marked shortness
N/A*	Pectoralis major sternal part	No shortness
No shortness	Pectoralis major clavicular part	No shortness

Table 18 – Muscle length testing, final examination

(*) = not possible to provide because of limited ROM and pain.

Manual muscle testing, according to Kendall (8)

Right upper extremity	**Muscles**	**Left upper extremity**
3	Deltoid	5
3	Deltoid anterior	5
3	Deltoid posterior	5
3	Coracobrachialis	5
5	Biceps brachii	5
5	Triceps brachii	5
5	Brachioradialis	5
5	Supinator	5
5	Pronator teres/quadratus	5

Table 19 – Manual muscle testing, final examination

Examination against isometric resistance of the rotator cuff muscles of the shoulder according to Cyriax (9)

	Left upper extremity	**Right upper extremity**
Against abduction	No pain	No pain
Against external rotation	No pain	No pain
Against internal rotation	No pain	No pain
Against raising of semi flexed arm	No pain	No pain

Table 20 - Examination against isometric resistance of rotator cuff, final examination

Joint play, according to Lewit (9)

O= No blockage X= Blockage XX= Blockage with pain XXX= Impossible to perform due to pain

No restrictions were found in the interphalangeal joints and metacarpophalangeal of the 2nd to 5th digit of both upper extremities.

No restrictions were found in the carpometacarpal, intercarpal, radiocarpal and distal radioulnar joints of both upper extremities.

No restrictions were found in elbow joint in radial direction, ulnar direction and in the proximal radioulnar joint of both upper extremities.

Shoulder joint		
	Right side	**Left side**
Ventral	O	O
Dorsal	O	O
Caudal	XXX	O
Lateral	XXX	O

Table 21 – Joint play of shoulder joint, final examination

Scapular movements		
	Right side	**Left side**
Movement of scapula against trunk	**X**	X
Abduction with elevation	O	O

Table 22 – Joint play of scapular movements, final examination

Sternoclavicular joint		
	Right side	**Left side**
Springing distraction	O	O

Table 23 – Joint play of sternoclavicular joint, final examination

Acromioclavicular joint		
	Right side	**Left side**
Springing in ventero-dorsal direction	O	O
Springing in cranio-caudal direction	O	O

Table 24 – Joint play of acromioclavicular joint, final examination

Anthropometric measurements (20)

	Right upper extremity	**Left upper extremity**
Length of the whole extremity	78 cm	78 cm
Length of humerus	31 cm	31 cm
Length of forearm	30 cm	30 cm
Circumference		
Upper arm	31 cm	31 cm
Forearm	29 cm	30 cm

Table 25 – Anthropometric measurement, final examination

Breathing examination: Performed in lying and sitting position

Type: Abdominal breathing

Frequency: **20 breaths per minute**

Note: The thorax moves in a symmetrical way. The patient was able to breath under the hands of the therapist

3.7 Evaluation of the Effects of Therapy

Posture

	24.01.2012	10.02.2012
Anterior		
	Thoraco-brachial triangle is bigger on the left side	**Thoraco-brachial triangle is slightly bigger on the left side**
	Elevated right shoulder	**Elevated right shoulder, not as marked as on the initial examination**
Posterior		
	Scapula more abducted on the left side	**Both scapulas are at the same distance from the spine**
	External rotation of lower angle of scapula on the left side	**Slight external rotation of lower angle of scapula on the left side**
	Internal rotation of lower angle of scapula on the right side	**Slight internal rotation of lower angle of scapula on the right side**
	Elevation of right shoulder	**Elevation of right shoulder, not as marked as on the initial examination**

Table 26 – Postural evaluation, final examination

Functional movements

24.01.2012	Movements	10.02.2012
The patient is able to reach the head with the right hand, but with maximal flexion of elbow and lateroflexion of head. Movement is accompanied by pain.	Both hands to head	**Patient is able to touch the head with the right arm in a good manner. Slight pain is noted at the end of movement.**
The right arm is barely reaching the lower back, its also painful	Hans to back from below	**The right arm is able to reach the lower back, pain is noted at the end of movement.**
With the right arm he is able to touch the top of the shoulder, its also painful.	Hands to back from above	**With the right arm he reaches the spine of the scapula.**

Table 27 – Functional movements, evaluation

Palpation

24.01.2012 Right side		Muscles			10.02.2012 Right side	
Tonus	**Pain**	**Trg. point**		**Tonus**	**Pain**	**Trg. point**
Hyper	No	Yes	Trapezius	Hyper	No	**No**
Hyper	No	No	Triceps brachii	**Normal**	No	No
Hyper	Yes	Yes	Subscapularis	Hyper	**No**	Yes

Table 28 – Palpation of muscles, evaluation

Examination of fascia and scar (20)

24.01.2012 Right side	10.02.2012 Right side
The scar was not possible to examine because it was covered by a plaster	**A slight restriction were found when trying to elongate the scar**

Table 29 – Examination of fascia and scar, evaluation

ROM, according to Kendall (8)

24.01.2012 Right upper extremity			10.02.2012 Right upper extremity	
Active	**Passive**		**Active**	**Passive**
		Shoulder joint		
20° - 0° - 80°	25° - 0° - 90°	**S**	**30° - 0° - 120°**	**25° - 0° - 125°**
40° - 0° - 0°	45° - 0° - 0°	**F**	**85° - 0° - 0°**	**90° - 0° - 0°**
X	X	**T**	X	X
10° - 0° - 20°	15° - 0° - 25°	**R**	**25° - 0° - 40°**	**35° - 0° - 50°**

Table 30 – ROM of upper extremity, evaluation

Muscle length test, according to Kendall (8)

24.01.2012 Right side	Left side		10.02.2012 Right side	10.02.2012 Left side
Marked shortness	Marked shortness	Pectoralis minor	**Moderate shortness**	**Moderate shortness**
N/A*	No shortness	Pectoralis major clavicular part	**No shortness**	No shortness

Table 31 – Muscle length testing, evaluation

Manual muscle testing, according to Kendall (8)

24.02.2012 **Right upper extremity**	**Muscles**	**10.02.2012** **Right upper extremity**
N/A*	Deltoid	**3**
N/A*	Deltoid anterior	**3**
N/A*	Deltoid posterior	**3**
N/A*	Coracobrachialis	**3**

Table 32 – Manual muscle testing, evaluation

Joint play, according to Lewit (9)

O= No blockage X= Blockage XX= Blockage with pain XXX= Impossible to perform due to pain

Scapular movements, right side		
	24.01.2012	**10.02.2012**
Movement of scapula against trunk	XXX	**X**

Table 33 – Joint play of scapular movements, evaluation

To improve the ROM passive and active movements was used. In the beginning the patient had difficulties relaxing when I was providing the passive movement. But already the next therapy session the patient's abilities to relax were better. The wall climb was a great exercise to improve the active ROM, by the support of the wall the ROM increased instantly.

PIR and soft tissue techniques was used to release hypertonus and triggerpoints in muscles, as this could be a reason for the patients pain. This was effective in releasing the triggerpoints of the upper trapezius.

I included an exercise with gym ball and an exercise with theraband to activate the interscapular muscles. The reason for this was to improve the position of the scapulas, as an impairment of the shoulder girdle may cause an impairment of the shoulder joint. The position of the scapulas was improved when comparing the initial and final examination, and so was the ROM of the shoulder joint.

For future therapy, exercises focused on increasing the deep stabilization of the shoulder girdle should be applied. This can be done with the help of a gym ball or the posturomed. Linear and diagonal movements with the propriomed can also be used.

Prognosis

Taking in consideration the patients significant improvement during the 3 weeks of therapy I think the patient will be able to fully recover from the dislocation of acromioclavicular joint. But this will only happen if the patient continues to follow the rehabilitation plan given by the therapist.

4. Conclusion

My patient came to the clinic my second day of the practice. This gave me a great opportunity to follow the therapy progress from the very beginning. I have never worked with a patient with this kind of diagnosis before. So this was a new and interesting experience for me. I got to use techniques I have learned, and only practiced on my classmates, on a real patient. It was also interesting and useful to see that the therapy methods that I chose and applied gave positive results.

I was at the rehabilitation department at Centrum Léčby Pohybového Aparátu Vysočany for two weeks. This gave me the opportunity to work with patients in all ages with different diagnosis both in the ambulance room and the fitness gym. The physiotherapists that worked in the fitness gym were also very helpful in giving advice and guidance. They also showed me new and useful exercises that I will take with me in my future work as a physiotherapist. I'm grateful that they took the time to explain me in detail how to perform these exercises, and why these exercises can be useful for the patients.

All in all these two weeks has been very useful for me as a future physiotherapist. I have been able to practice my theoretical and practical knowledge under the supervision of a experienced physiotherapist. I have also had the opportunity to follow the therapy progress of a patient with a diagnosis that I have not experienced before my stay at CLPA.

5. List of Literature

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6. List of tables

7. List of figures

8. List of abbreviations

AC joint – Acromioclavicular joint
ADL – Activities of daily living
CLPA – Centrum Léčby Pohybového Aparátu Vysočany
FTVS – Fakulta Telesne Vychovy a Sportu
GH joint – Glenohumeral joint
K-wire – Kirschner wire
N/A – Not available
PIR – Post Isometric Relaxation
PNF – Proprioceptive Neuromuscular Fasciliation
ROM – Range of motion
TENS – Transcutaneous electro nerve stimulation
TrPs – Trigger points

9. Supplement

9.1 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
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Application for Ethics Board Review

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

Project title: State after reposition of acromioclavicular joint with temporary K-wire transfixation.

Nature of the research project: Bachelor thesis

Author: Thomas Egeland Lyse

Supervisor: PhDr. Jitka Čemusová, PhD.

Research project description:
Case Study of physiotherapy treatment of a patient with the diagnosis state after reposition of acromioclavicular joint with temporary K-wire transfixation will be conducted under the expert supervision of an experienced physiotherapist at Centrum Léčby Pohybového Aparátu.
No invasive methods will be used. Presonal data obtained during the investigation will not be published.
Guaranteed safety to be judged by experts: rationale for the use of invasive methodologies, procedures minimizing the risk to subjects
Ethical aspects of the research: Personal dates will not 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: 036/2012
Date: 30. 1. 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.

Official school stamp

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

Signature, REB Chairman

9.2 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:.....