International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2013): 4.438

Different Mobilization Technique in Management of Frozen Shoulder

Dr. Jayanta Nath (MPT, Ph.D Scholar)[1]

[1]SSUHS, Department of orthopaedics GMC&H, Assam, India
Physiotherapist at Jugijan Model Hospital (Govt of Assam), Industrial Area, P/O Mangaldai, Dist: Darrang, Assam, PIN: 784125, India

Abstract: ***Adhesive capsulitis also known as frozen shoulder, is a condition characterized by pain and significant loss of both active range of motion (AROM) and passive range of motion (PROM) of the shoulder. Frozen shoulder usually affects patients aged 40-70, with females affected more than males, and no predilection for race. There is a higher incidence of frozen shoulder among patients with diabetes (10-20%), compared with the general population (2-5%). There is an even greater incidence among patients with insulin dependent diabetes (36%), with increased frequency of bilateral shoulder involvement.[8] This paper reviews the various mobilization technique like Midrange mobilization (MRM), endrange mobilization (ERM), and mobilization with movement (MWM) by Maitland, Kaltenborn, and Mulligan and other soft tissue technique like myofascial release, Active Release Therapy (ART), for management of patients with frozen shoulder***.

Keywords: Frozen shoulder, mobilization technique, pathology of frozen shoulder

1. Introduction

Adhesive capsulitis, also known as frozen shoulder, is a condition characterized by pain and significant loss of both active range of motion (AROM) and passive range of motion (PROM) of the shoulder. The term “Periarthritis” first described by a French doctor ES Duplay in 1872. The term “frozen shoulder” was first introduced by Codman in 1934. The peak age is 56, and the condition occurs slightly more often in women than men. In 6-17% of patients, the other shoulder becomes affected, usually within five years, and after the first has resolved. The non-dominant shoulder is slightly more likely to be affected.While many classification systems are proposed in the literature, frozen shoulder is most commonly classified as either primary or secondary. Primary frozen shoulder is idiopathic in nature, and radiographs appear normal. Secondary frozen shoulder develops due to some disease process, which can further be classified as systemic, extrinsic, or intrinsic. Systemic secondary frozen shoulder develops due to underlying systemic connective tissue disease processes, and causes include diabetes mellitus, hypo- or hyperthyroidism, hypoadrenalism. Extrinsic secondary frozen shoulder occurs from pathology not related to the shoulder, such as cardiopulmonary disease, CVA, cervical disc pathology, humeral fracture, and Parkinsons. Intrinsic secondary frozen shoulder results from known shoulder pathology, including but not limited to rotator cuff tendinopathy, GH arthropathy, and AC arthropathy.[3]

Frozen shoulder usually affects patients aged 40-70, with females affected more than males, and no predilection for race. There is a higher incidence of frozen shoulder among patients with diabetes (10-20%), compared with the general population (2-5%). There is an even greater incidence among patients with insulin dependent diabetes (36%), with increased frequency of bilateral shoulder involvement.[8]

While the etiology of frozen shoulder remains unclear, several studies have found that patients with frozen shoulder had both chronic inflammatory cells and fibroblast cells, indicating the presence of both an inflammatory process and fibrosis[3]. Frozen shoulder typically lasts 12 to 18 months with a cycle of 3 clinical stages, the freezing, frozen and thawing stages. These stages last on average 6 months, but the time frames are variable. The freezing stage is also known as the painful inflammatory phase. Patients present with constant shoulder pain and range of motion (ROM) limitations in a capsular pattern (external rotation (ER)> abduction (ABD)> flexion (FLX)> and internal rotation (IR)). In the second phase, the frozen or stiff phase, the pain progressively decreases as does shoulder motion and individuals commonly experience increased restrictions in function. In the last phase, the thawing phase, patients gradually regain shoulder movement and experience progressively less discomfort [11].

Three phases of clinical presentation

Painful freezing phase
Duration 10-36 weeks. Pain and stiffness around the shoulder with no history of injury. A nagging constant pain is worse at night, with little response to non-steroidal anti-inflammatory drugs

Adhesive phase
Occurs at 4-12 months. The pain gradually subsides but stiffness remains. Pain is apparent only at the extremes of movement. Gross reduction of glenohumeral movements, with near total obliteration of external rotation

Resolution phase
Takes 12-42 months. Follows the adhesive phase with spontaneous improvement in the range of movement. Mean duration from onset of frozen shoulder to the greatest resolution is over 30 months.

2. Pathogenesis

The aetiology of frozen shoulder remains unclear. The disease process particularly affects the anterosuperior joint capsule and the coracohumeral ligament.[5] Arthroscopy shows a small joint with loss of the axillary fold and tight anterior capsule, mild or moderate synovitis, and no adhesions.[6] Neviaser and Neviaser have described an arthroscopic four stage classification for the frozen shoulder,[5] and Hannafin et al have described a correlation between the arthroscopic stage, the clinical examination, and the histological appearance of the tissues. Disagreement prevails about whether the underlying pathological process is an inflammatory condition, a fibrosing condition,[1] or even an algoneurodystrophic process. Evidence shows a synovial inflammation with subsequent reactive capsular fibrosis.A dense matrix of type I and type III collagen is laid down by fibroblasts and myofibroblasts in the joint capsule. Subsequently, this tissue contracts. Increased growth factors, cytokines, and expression of matrix metalloproteinases in capsular biopsy specimens obtained from patients with primary and secondary frozen shoulder indicate that these are involved in the inflammatory and fibrotic cascades seen in frozen shoulder. Cytokines and growth factors are involved in the initiation and termination of repair processes in musculoskeletal tissues through regulating fibroblasts, and the remodelling process is controlled by matrix metalloproteinases and their inhibitors. An association between frozen shoulder and Dupuytren's disease has been identified,[1,12] and this may be related to matrix metalloproteinase inhibitors.

3. Treatment point of view

Recent evidence has not been able to conclude which treatment technique, whether physical therapy, home exercise program, cortisone injection, manipulation, or surgery, is most effective.[10] Therefore the decision to begin and continue with formal physical therapy should involve input from the physician, the patient preference, and physical therapist after initial evaluation. Patients who may benefit more from formal physical therapy include those with higher disability levels, higher anxiety levels, lower educational levels, and those who have less social support.[3] While evidence regarding the use of intra-articular cortisone injections is conflicting as well, some studies do indicate they provide better short-term (4-6 week) pain reduction than other forms of treatment [9.] Given this information, if this is not offered to patients before referral to physical therapy and they do not demonstrate progress within 3-6 weeks, referral for evaluation for an injection should be considered.[3]

Prognosis:
Adhesive capsulitis can last 12 to 18 months, with 3 distinct phases. The first phase can last 2-9 months, the second phase 4-12 months and the last phase, the thawing phase, from 6-9 months.

Although the pathogenesis of FSS(Frozen shoulder syndrome) is unknown, several authors have proposed that impaired shoulder movements are related to shoulder capsule adhesions, contracted soft tissues, and adherent axillary recess. Cyriax suggested that tightness in a joint capsule would result in a pattern of proportional motion restriction (a shoulder capsular pattern in which external rotation would be more limited than abduction, which would be more limited than internal rotation). Based on the absence of a significant correlation between jointspace capacity and restricted shoulder ROM, contracted soft tissue around the shoulder may be related to restricted shoulder ROM. Vermeulen and colleagues indicated that adherent axillary recess hinders humeral head mobility, resulting in diminished mobility of the shoulder. Furthermore, they documented that abnormal scapular motion existed in patients with FSS despite improvement in glenohumeral motion following a 3-month period of physical therapy intervention. Apparently, impaired shoulder movements affect function. In longitudinal follow-up studies lasting from 6 months to 2 years, significant numbers of patients with FSS demonstrated moderate functional deficits. To regain the normal extensibility of the shoulder capsule and tight soft tissues, passive stretching of the shoulder capsule and soft tissues by means of mobilization techniques has been recommended, but limited data supporting the use of these techniques are available. Midrange mobilization (MRM), endrange mobilization (ERM), and mobilization with movement (MWM) techniques have been advocated by Maitland, Kaltenborn, and Mulligan, but they did not base their suggestions on research. Additionally, few studies have described the use of these techniques in patients with FSS.

4. Various Mobilization Technique Option

Mid-Range Mobilization
An MRM technique was performed on the involved shoulder, as described by Maitland and Kaltenborn. With the subject in a relaxed supine position, the humerus was moved to the resting position (40° of abduction). While the humerus was held in this position, 10 to 15 repetitions of the mobilization techniques were applied.

End-Range Mobilization
In addition to the MRM technique, ERM has been recommended. The intent of ERM was not only to restore joint play but also to stretch contracted periarticular structures. We used the techniques described by Vermeulen et al and Maitland as follows. At the start of each intervention session, the physical therapist examined the subject's ROM to obtain information about the endrange position and the end-feel of the glenohumeral joint. Then, the therapist's hands were placed close to the glenohumeral joint, and the humerus was brought into a position of maximal range in different directions. Ten to 15 repetitions of intensive mobilization techniques, varying the plane of elevation or varying the degree of rotation in the endrange position, were applied.

Mobilization With Movement
The use of MWM for peripheral joints was developed by Mulligan. This technique combines a sustained application of a manual technique "gliding" force to a joint with concurrent physiologic (osteo-kinematic) motion of the joint, either

actively performed by the subject or passively performed by the therapist. The manual force, or mobilization, is theoretically intended to cause repositioning of bone positional faults. The intent of MWM is to restore pain-free motion at joints that have painful limitation of range of movement.

The MWM technique was performed on the involved shoulder as described by Mulligan. With the subject in a relaxed sitting position, a belt was placed around the head of the humerus to glide the humerus head appropriately, as the therapist's hand was used over the appropriate aspect of the head of the humerus. A counter pressure also was applied to the scapula with the therapist's other hand. The glide was sustained during slow active shoulder movements to the end of the pain-free range and released after return to the starting position. Three sets of 10 repetitions were applied, with 1 minute between sets.

Scapular mobilization

Subjects lay on their sound side on the bed. The therapist stood before the patient's affected shoulder, placing the index finger of one hand under the medial scapular border, the other hand grasping the superior border of the scapula. The scapula was moved superiorly and inferiorly for superior and inferior glide, and then the scapula was rotated upward and downward for scapular rotation. Additionally, the physiotherapist put the ulnar fingers under the medial scapular border and distracted the scapula from the thorax. These patterns were chosen to increase scapular posterior tilt. Ten sets of 10 repetitions were applied, with rest intervals of 30 s between sets (Wooden, 2001; Surenkok et al., 2009).

Maitland mobilization is a widely used therapeutic technique used to treat various intra articular and periarticular disorders. Grades I and II of Maitland mobilization techniques are primarily used for treating joints limited by pain. The oscillation may have an inhibitory effect on the perception of painful stimuli by repetitively stimulating mechanoreceptors that block nociceptive pathways at the spinal cord or brain stem levels. These nonstretch motions help to move synovial fluid to improve nutrition to the cartilage whereas Grades III and IV are primarily used as stretching manoeuvres[2] .Appropriate selection of mobilization technique for treatment can only take place after a thorough assessment and examination.

Application of Maitland Mobilisation [2]

Passive Accessory Movements

The following passive accessory movements were tested and treated accordingly

<u>Gleno-Humeral Joint:</u>

· Antero –Posterior glide
· Postero – Anterior glide
· Caudal glide
· Distraction or Lateral glide

<u>Sterno – Clavicular Joint:</u>

· Antero – Posterior glide
· Postero – Anterior glide
· Caudal glide
· Cephalad glide

<u>Acromio – Clavicular Joint</u>

· Antero – Posterior glide
· Posterior – Anterior glide
· Caudal glide
· Cephalad glide

Passive Physiological Movements

The following passive physiological movements were tested and treated accordingly

· Flexion
· Extension
· Abduction
· Internal and External rotation

<u>MWM GH joint in abduction</u>

Mobilizations with movements integrate well with muscle imbalance correction of these movement abnormalities. If the patient's problematic movement is abduction a corrective AP or longitudinal caudad glide on the head of the humerus can be sustained while the patient actively abducts the arm. The therapist's opposite hand fixates the scapula so that the glide of the humerus is relative to the scapula. It is important to ensure that the AP glide is applied at right angles to the plane of the glenohumeral joint. The resulting movement must be pain-free. The patient can also be encouraged to activate specific muscles. For example, once a patient has been taught to activate a weak trapezius in isolation, the abduction MWM can be performed while encouraging correct recruitment of this muscle through the movement pattern.Pain-free repetitions ensure sufficient corrective afferent input from the joint receptors and resulting reflex changes in muscle recruitment. A home programme of appropriate correct movement patterns (Sahrmann SA 2002) with the addition of taping will ensure prolonged and automatic pattern correction.

<u>MWM GH joint in flexion</u>

Similar glides can be applied if glenohumeral flexion is the symptomatic movement. A belt is usually used to glide the humeral head backward in the treatment plane, as the use of the therapist's hand over the anterior aspect of the head of the humerus will block the movement. A counter pressure is applied to the scapula from behind. It is essential that the belt is maintained at right angles to the plane of the joint. The belt position on the therapist should be lower than the glenohumeral joint; this ensures that the belt does not elevate the humeral head and impinge on superior structures. The belt and therapist position must be altered so that when the glide is applied the flexion is facilitated.

5. Electrical Stimulation Technique Option

Shoulder Flexion & Abduction(Dr. Lucinda Baker, PT, PhD, Electrode Placement &Functional Movement)

Electrode Placement & Functional Movement:

Electrode placements for shoulder flexion and abduction can be seen here with one electrode over the anterior deltoid and the other over the middle deltoid. The acromion is marked with the marker. In our first placement the negative electrode of the asymmetric waveform is placed over the anterior deltoid and you can see the resultant stimulation is one of dominantly flexion. The therapist is now putting the stimulator on pause and he is going to switch the polarity so that the middle deltoid electrode is now the negative electrode and the anterior deltoid will become the positive electrode. You can see the resultant stimulated contraction is one of dominant abduction. Placing the stimulator on pause, the electrode leads are being disconnected. A second stimulator that is programmed with a symmetric biphasic waveform is being connected. And now as the therapist increases the amplitude you will notice that both electrodes, anterior and middle deltoid, are equally excitable resulting in a motion that would be referred to as scaption, a combination of flexion and abduction

pulse width: 300μsec
hz: 35
waveform: Asymmetric/Symmetric
stimulation grade: N/A

6. Chiropractic Management Option

Management technique: medical(ref: Chiropractic management of shoulder pain and dysfunction of myofascial origin using ischemic compression techniques. Guy Hains, DC. J Can Chiropr Assoc 2002; 46(3)). Green recently carried out a systematic review of the 31 clinical trials investigating the effectiveness of various therapeutic interventions for shoulder pain. These included anti inflammatory medications, intra-articular cortisone injections, physiotherapy, manipulation under anesthesia, hydrodilation and surgery. According to Green, only sub-acromial cortisone injections were found to be more effective than placebo to increase abduction. This led Green to conclude that there was little scientific evidence to support the effectiveness of many of the most commonly used medical therapies for shoulder pain. Similarly, Hanten et al. Posited that, although ice, heat, ultrasound and massage are routinely used for temporary relief for patients with trigger points, there are no controlled studies that support their use to decrease pain in symptomatic patients. Roubal et al. reported on their results for patients experiencing adhesive capsulitis using glenohumeral gliding manipulation under anesthesia. In that study, 8 patients (4 men and 4 women ranging in age from 31 to 55 years) with symptoms of adhesive capsulitis from 3 to 16 months duration underwent interscalene brachial nerve block and were immediately sent for manipulation by a physiotherapist. The authors reported that all patients experienced improvement in shoulder flexion, abduction, external and internal rotation, as well as overhead activities, dressing activities, and hair care. In addition, patients prior to manipulation reported positive impingement signs. None of these patients had positive impingement signs postmanipulation and at the time of discharge. Unfortunately, the authors did not comment on whether or not patients experienced any adverse effects as the result of the anesthesia. Management techniques: chiropractic Favoring techniques that are low-tech, non-invasive and hands-on, chiropractors typically use cryotherapy, mobilization, manipulation and soft tissue techniques for the management of disorders of the spine and peripheral joints. Among the most popular method of treatment of myofascial pain syndromes is ischemic compression. This approach, also known as Pennel's technique, Nimmo technique, trigger point therapy or acupressure has been used by chiropractors and other manual therapists for at least 40 years. ' According to the 2000 Job Analysis of the National Board of Chiropractic Examiners, over 90% of chiropractors use trigger point therapy for passive adjustive care, 68% use acupressure, and 40% report using NIMMO or Receptor tonus technique. It should also be mentioned chiropractors often provide patient education, lifestyle modifications and ergonometric suggestions to augment the care administered in office. Several studies have demonstrated that inactivation of TPs or TSs often alleviates the pain the patient is experiencing immediately, although some studies suggest that these results may last for up to 2 years. Travel and Simons are among the leading experts in the area of trigger point therapy, and they have described the characteristic pain pattern associated with different muscle groups. Active trigger points in the supraspinatus muscle, for example, often produce a deep pain in the medial region of the deltoid. Trigger points of the infraspinatus muscle often cause pain in the anterior region of the deltoid, and TPs of the teres minor muscle often lead to pain in the posterior deltoid. Trigger points originating from deltoid muscle itself often result in local pain. Leahy has provided a slightly different method to treat myofascial symptoms, especially those causing mechanical compromise of peripheral nerves.First described as a myofascial release technique, Leahy now refers to his soft therapy method as Active Release Therapy (ART). The distinguishing feature of ART is that, unlike other myofascial techniques, ART requires the patient to perform particular actions while the practitioner applies a static pressure along the length of the affected muscle. In one study, Leahy et al. reported that this technique is very effective for peripheral nerve entrapment conditions such as carpal tunnel and thoracic outlet syndromes. The only reported side effect is considerable pain or discomfort that may exceed the pain tolerance of some patients. Example of ischemic compression technique During clinical-practice, the author has found it to be most beneficial to exam the entire shoulder complex, and to provide ischemic compression to any trigger points elicited. The author relies on both his palpatory skills and patient reaction to static pressure in order to identify the muscle groups in need of treatment, and has developed specific protocols. According to the author, the anatomical locations mentioned below are the focus of most of the major irritation points in shoulder pain. Once the TGs and TSs are localized only these points are treated at each visit.

1. Supraspinatus (Figure 2): While prone, the patient's arm is flexed, pronated and placed on his or her head. The patient's arm is allowed to rest on the practitioner's knee. The practitioner then applies digital pressure along the posterior aspect of the clavicle, with special attention given to elicited trigger points.

2. Deltoid (Figure 3): The patient's arm is placed in the same position as it is for the supraspinatus. The practitioner applied digital pressure along the entire surface of the deltoid.

3. Teres minor (Figure 4): While prone, the patient's arm is flexed and braced along the side of his or her body. Using his or her thigh, the practitioner can brace the patient's arm in this position while applying digital pressure along the inferolateral aspect of the scapula.

4. Infraspinatus (Figure 5): The patient's arm is placed in the same position as it is for treatment of the teres minor muscle. The practitioner applies pressure along the region below the spine of the scapula.

5. The coracoid process (Figure 6): The patient is placed in supination, the arms along the side of the body. The therapist uses his thigh to maintain pressure on the patient's arm in order to ensure that the arm is fully relaxed. This position is the same for the examination of the whole front part of the shoulder.

6. The tendon of the long head of the biceps (Figure 6): The tendon originates from the upper edge of glenoid cavity and transverse anterior to the head of the humerus along the bicipital groove. TSs are often located along that tendon over a length of 2 to 3 centimeters. During each of these maneuvers, the practitioner applies digital pressure to areas of elicited pain for between 5 and 15 seconds. The practitioner should begin with light, firm pressure and gradually increase it until the pressure reaches the patient's maximum pain tolerance. Pressure should be evenly applied and only once to each trigger point each treatment session. Elicited pain to the area of the chief complaint confirms the diagnosis. In general, the duration of applied digital pressure varies inversely with the number of elicited trigger points. For example, if many trigger points are elicited, each should be held for less time than if few trigger points were found. This is because there are limits to what a patient can endure in any treatment session. Leahy recommends treatment schedules not exceed every other day to permit tissue healing between appointments. Treatments are continued until trigger points are no longer elicited with digital palpation. In the author's experience, this may require in chronic cases 15 to 30 treatments. Besides minor pain or tenderness of limited duration in the area treated, no serious side effects are associated with this type of therapy. In addition, the application of ischemic compression for myofascial trigger points is not very strenuous on the practioner.

7. Conclusions

Frozen shoulder is a common, sometimes painful, but ultimately self limiting, condition that is usually managed in the primary care setting with a combination of analgesics, injections, and physiotherapy. Formal investigations are usually normal, and the diagnosis is essentially clinical. Most cases can be managed in the primary care setting. Educating patients plays an important part in the management of the condition. A minority of patients require referral to an orthopaedic specialist, where manipulation under anaesthesia is the most common method of treatment. Arthroscopic surgical release has proved itself to be useful in refractory cases. Irrespective of the treatment given, a high proportion of patients with frozen shoulder do not regain a full range of motion.

Figure 1: Arthroscope view of a shoulder with synovitis

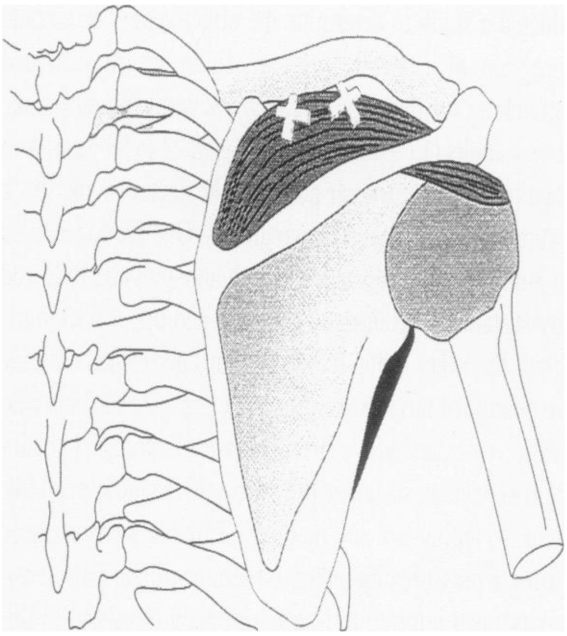

Figure 2: Supraspinatus

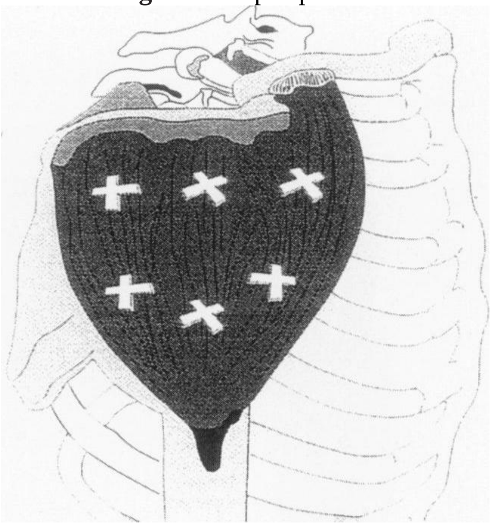

Figure 3: Deltoid

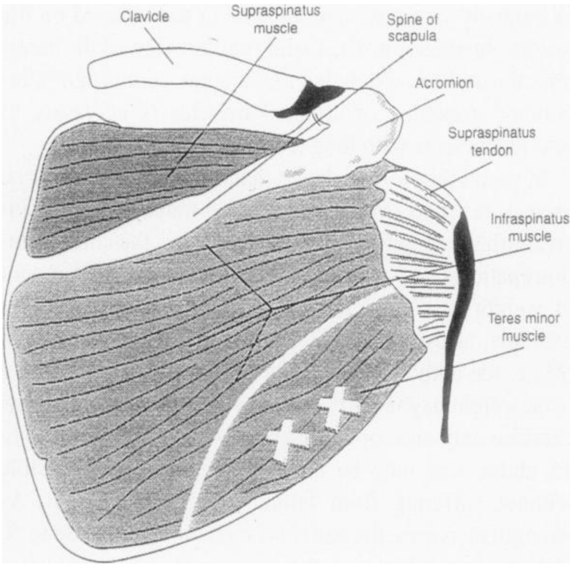

Figure 4: Teres Minor (Posterior view of shoulder)

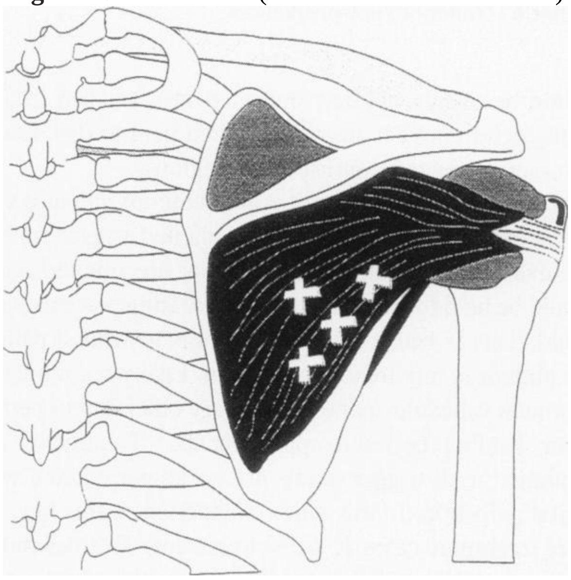

Figure 5: Infraspinatus

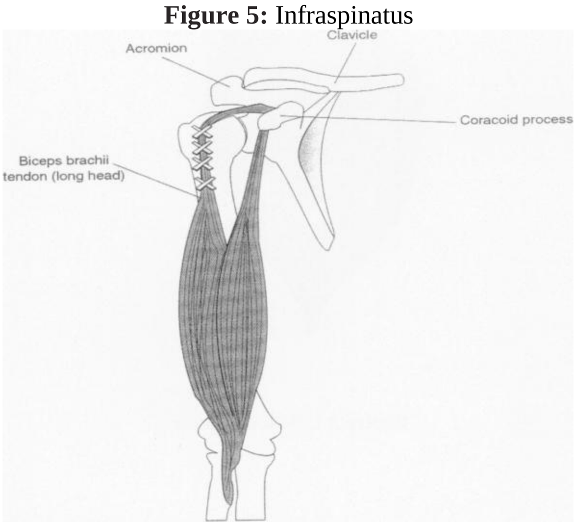

Figure 6: Anterior view of shoulder (Long head of biceps)

References

[1] Bunker TD Anthony PP. The pathology of frozen shoulder. A Dupuytren-like disease. J Bone Joint Surg Br .1995;77:677-83.

[2] G. D. Maitland. Peripheral Manipulation.3rd edition. Butterworth- Heinemann; 1991.

[3] Kelley MJ, McClure PW, Leggin BG. Frozen Shoulder: Evidence and a Proposed Model Guiding Rehabilitation. Journal of Orthopaedic and Sports Physical Therapy. February 2009;39(2):135-136-148.

[4] Kissner C, Colby LA. Therapeutic Exercise: Foundations and Techniques. 3rd ed. Philadelphia: F.A. Davis Company:278-280.

[5] Neviaser RJ, Neviaser TJ. The frozen shoulder: Diagnosis and management. Clin Orthop Relat Res. 1987;(223):59-64.

[6] Ogilvie-Harris DJ, Wiley A. Arthroscopic surgery of the shoulder: a general appraisal. J Bone Joint Surg (B) 1986;68-B:201-7.

[7] Ozaki J, Kakagawa Y, Sakurai G, Tamai S Recalcitrant. chronic adhesive capsulitis of the shoulder. Role of contracture of the coracohumeral ligament and rotator interval in pathogenesis and treatment. J Bone Joint Surg 1989;71(A):1511-5.

[8] Pearsall AI, MD. Adhesive Capsulitis. eMedicine. 2008. Accessed 06/01/09.

[9] Ryans I, Montogmery A, Galway R, Kernohan WG, McKane R. A randomized controlled trial of intra-articular triamcinolone and/or physiotherapy in shoulder capsulitis. Rheum.2005;44(4):529--535.

[10] Rookmoneea M et al. The effectiveness of interventions in the management of patients with primary frozen shoulder. The Journal of Bone S Joint Surgery (Br). 2010;92-B(9):1267--1272.

[11] Saidoff DC, McDonough AL. Critical Pathways in Therapeutic Intervention: Extremities and Spine. St. Louis: Mosby; 2002:134-144.

[12] Smith SP, Devaraj VS, Bunker TD. The association between frozen shoulder and Dupuytren's disease. J Shoulder Elbow Surg.2001;10:149-51.

Author Profile

Dr.Jayanta Nath is currently working as a physiotherapist at Jugijan Model Hospital (Govt Of Assam). He did BPT from Srinivas college of physiotherapy and research Mangalore and MPT in the specialization of orthopaedics and sport physiotherapy from Rajiv Gandhi University Of Health Sciences Bangalore in 2012. Presently he is pursuing Ph.D in the same field. He has 4 International Publications. His interested areas of research are, Musculoskeletal and sport physiotherapy, manual therapy.