Manipulation under local anaesthesia for idiopathic adhesive capsulitis

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Abstract

Adhesive capsulitis which is said to be a self limiting disease is manipulated under anaesthesia and this process has been used to speed up the recovery of the disease. Twenty six patients with idiopathic unilateral frozen shoulder underwent suprascapular nerve block and intra-articular local anaesthesia with Methyl prednisolone acetate followed by manipulation of the glenohumeral joint and this randomized prospective clinical trial was performed in bone and joints hospital Barzulla Srinagar Kashmir. Differences in range of motion and pain were assessed before manipulation and at first week; 4th week; 6 weeks; 8 weeks and 12 weeks. Passive range of motion increased significantly for forward flexion, abduction, external rotation, and internal rotation. There was a significant decrease in visual analogue pain (VAS) scores between initial and follow-up assessments. This technique is very simple, safe, cost effective and minimally invasive procedure for shortening the course of an apparently self-limiting disease and improves shoulder symptoms and function.

Keywords: Suprascapular block, frozen shoulder, intra-articular local anaesthesia

Introduction

Shaffer et al. showed that 50.0% of patients treated conservatively experienced either mild pain or stiffness, or both, after an average of seven years [1]. Common cause of shoulder disability occurring in the 40 to 60-year-old age group and affects 2.0 to 5.0% of the general population is because of frozen shoulder [2]. Duplay is considered to be the first one who described in 1872, a painful, stiffening condition of the shoulder, which he termed “périarthrite scapulo-humérale”. He suggested manipulation under anaesthesia as its treatment [3]. In 1934 Codman given the name “frozen shoulder”, stating that it was characterized by insidious onset, pain near the insertion of the deltoid, inability to sleep on the affected side, painful and restricted elevation and external rotation, but normal radiological appearance [4]. Later in 1945, based upon his findings of synovial changes in the glenohumeral joint Neviaser introduced the term “adhesive capsulitis” [5]. Frozen shoulder is thought to be a self limiting disease, with complete remission occurring within two years. Etiology and the most suitable treatment of this condition is still not clear but various different modalities of treatments have been recommended and a large number of studies have demonstrated successful results. Types of treatment include supervised neglect, oral steroids, intra-articular injections, physiotherapy programmes, manipulation under anaesthesia, arthroscopic capsular release and open surgical release [6-19]. In this study we performed manipulation after local infiltration of coracohumeral ligament with local anaesthetic, intraarticular injection of local anesthetic and Methyl prednisolone acetate combined with suprascapular nerve block using similar solution. Technique of manipulation was also different from the conventional techniques described. After manipulation patients performed home exercises. Range of motion improved and there was relief in pain.

Materials and methods

Patient selection and assessment

The study was conducted in Bone and Joints Hospital Barzulla Srinagar. A total of 26 patients, who came to our Out Patient Department from June 2018 to June 2019 were selected randomly
using computer generated serial numbers after taking informed consent. Inclusion criteria were, age above 40 years, no preceding trauma in the same shoulder, Unilateral involvement, and Contralateral normal shoulder, normal blood sugar level, normal x-ray of the shoulder. We followed the criteria used by Rizk et al. for the diagnosis of frozen shoulder, which includes passive combined abduction less than 100 degree, external rotation of less than 50 degree and internal rotation of less than 70 degree [20]. The patients who did not meet the criteria were excluded from the study. Clinical assessment of both, normal and affected shoulders were done and Range of motion and pain were evaluated. Pain at rest and at extreme shoulder movements were evaluated using VAS. These were constructed of 10 centimetre lines anchored at one end by ‘0’ means no pain and at the other end ‘10’ which means severe unbearable pain with no intermediate indications. Range of motion was assessed in standing posture using Goniometer. Combined passive abduction was evaluated by measuring the angle formed by the arm and thorax after passively abducting the shoulder (Fig.1). With the arm adducted and the elbow at the side and flexed to 90degree, the angle formed by the forearm and the sagittal plane of the body was measured as Passive external rotation. Passive internal rotation of the shoulder was assessed by bringing the hand behind and determining the vertebrae level that they could reach by the thumb. All the movements were in degrees.

**Technique**

All the procedure was done in the Out patient Department (OPD) in a separate room maintaining aseptic conditions as required for minor surgical procedure.

**Intra-articular injection**

Via anterior approach a mixture of 40 mg of Depot methyl prednisolone, 7 ml of 1% xylocaine and 4 ml 0.5% Bupivacaine was introduced into the glenohumeral joint using a 21G needle. Patient was put supine and the affected shoulder was prepared with povidone iodine solution. Coracoid process was palpated, the needle was inserted one centimetre inferolateral to the coracoid. The coracohumeral ligament was infiltrated with 2 ml of mixed solution. and about 10 ml was injected in the joint.

**Suprascapular nerve block**

A mixture of 40 mg of Depot methyl prednisolone, 5 ml xylocaine 1% and 4 ml 0.5% bupivacaine was injected using the technique described by Dangoisse et al. [21] A 21G needle was introduced through the skin 2 cm cephalad to the midpoint of the spine of the scapula. The needle was advanced parallel to the blade of the scapula until bony contact was made in the floor of the suprascapular fossa where whole of the 10 ml solution was injected. This technique has previously been demonstrated to be safe and can be used to effectively block the articular branches of the suprascapular nerve.

**Manipulation**

Manipulation was first done with the patient supine, after about 10 minutes, when the desired effect of the local anaesthetic was achieved. With the shoulder adducted and the elbow extended, the distal arm was held by the surgeon to perform passive external and internal rotation of the shoulder. Each movement was held for 10 seconds and repeated for 10 times each. Now patient was asked to clamp both the hands in front of the chest. With the help of the sound hand patient was asked to lift affected arm over the head. Patients could comfortably bring the arm over head without much pain. The limb was kept in the same position for 2 minutes. Now the patient was asked to put both hands behind the head and asked to gradually bring the elbows to the level of the bed to gain external rotation. In some anxious patients the surgeon needed to assist this movement by gently pushing with the index finger. Then the patient was asked to sit on the bed and repeat the same movement at least 5 times. In sitting position patient was asked to touch the scapula with the help of other hand so as to gain internal rotation. Immediate postmanipulation evaluation of Range of Motion was done.

**Analgesia and home exercises**

Indomethacin 25 mg thrice daily, Omeprazole 20 mg twice daily and Amitriptyllin10mg at bed time for 7 days were prescribed at discharge. Additional 20 tablets of Paracetamol 500mg was also given to relieve pain on SOS basis. All patients were given verbal and written instructions regarding a home exercise program. Patients were advised to continue same manipulation movements at home at least 10 repetitions three times a day.

**Results**

Total of 26 patients ranging from 40 years to 70 years (mean 58.24) were evaluated, out of which 55.3% were female and 44.7% were male. Frozen Shoulder affected in 65% of non dominant shoulder. A marked restriction of shoulder active ROM was observed in Frozen Shoulder patients before the procedure. Patients also showed a reduction ($p< 0.05$) inactive shoulder internal rotation, external rotation and abduction of involved shoulder compared to contralateral

Table 1: Range of motion normal shoulder compared with affected shoulder

<table>
<thead>
<tr>
<th>Observations</th>
<th>Affected shoulders</th>
<th>Normal shoulders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abduction</td>
<td>59.78</td>
<td>154.65</td>
</tr>
<tr>
<td>Most Internal rotation</td>
<td>3.3</td>
<td>7.62</td>
</tr>
<tr>
<td>Most External rotation</td>
<td>17.72</td>
<td>161.04</td>
</tr>
</tbody>
</table>

Table 2: Range of motion and pain before and after 12 weeks of manipulation.

<table>
<thead>
<tr>
<th>Observations</th>
<th>Premanipulation</th>
<th>Postmanipulation 12 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extension Rotation</td>
<td>17.72</td>
<td>42.62</td>
</tr>
<tr>
<td>Internal Rotation</td>
<td>3.3</td>
<td>7.59</td>
</tr>
<tr>
<td>Abduction</td>
<td>59.78</td>
<td>154.65</td>
</tr>
<tr>
<td>Pain at rest</td>
<td>6.88</td>
<td>6.17</td>
</tr>
<tr>
<td>Pain at movement</td>
<td>7.62</td>
<td>5.66</td>
</tr>
</tbody>
</table>
normal shoulders before the procedure (Table-1).
After 12 week after the procedure, the score of shoulder internal rotation, external rotation and abduction active ROM in FS patients for involved extremity were increased ($p<0.05$) compared with the pre-procedure level. Both pain at rest and at activity were markedly decreased ($p<0.05$) (Table- 2).

Discussion
Neer et al. [22] observed, in a cadaver study, that release of the coracohumeral ligament increased external rotation both with the arm at the side and with it in 90 degrees of forward elevation Adhesive capsulitis is a common condition seen in the outpatient department characterized by pain and stiffness of shoulder. Though it is considered to be a self limiting disease but the course of disease is protracted and there is some limitation of movement [23, 5]. Patho-physiology seems obscure but certain facts has been discovered. In frozen shoulder, the main anatomical change is the thickening of coraco-humeral ligament. The coracohumeral and superior glenohumeral ligaments are considered to be structural contents of the rotator interval capsule, but each have separate origins and insertions [24]. Several authors have recommended release of the coracohumeral ligament, to increase glenohumeral motion, when a frozen shoulder is treated with open release [22, 25]. The interval capsule plays a major role in the range of certain motions, in the obligate translation, and in the allowed translation of the glenohumeral joint. The magnitude of these effects varied among shoulders, but the direction of the effect was consistent. Sectioning of the interval capsule increased the ranges of flexion, extension, adduction, and external rotation, and imbrication decreased these ranges of motion. Positions of abduction and internal rotation relaxed the interval capsule [19, 26]. This ligament restrains the joint in external rotation when shoulder is adducted. In our technique we performed gentle but firm external and internal rotation movements to stretch the shoulder capsule gently. We also infiltrated the coracohumeral ligament with 2 ml of local anaesthetic mixture to anesthetized the ligament at the time of manipulation.

Fig 2: 12 week follow up

There is always pain and stiffness in the shoulder which altogether produces vicious circle leading to progressive stiffness. The pain in frozen shoulder is neither typical of inflammatory pain nor of neurogenic type which is more severe during night [27]. These suggest of it being related to Complex Regional Pain Syndrome [28]. The suprascapular nerve supplies sensory fibres to about 70% of the shoulder joint, including the superior and posterosuperior regions of the shoulder joint and capsule, and the acromioclavicular joint [29]. We blocked suprascapular nerve using three different drugs with different actions. Xylocaine relieved pain immediately, Bupivacaine worked for 24 to 72 hours after that methylprednisolone worked for weeks. Literature shows addition of glucocorticoids in local anesthetic blocks transmission of nociceptive c fibers. The block prolonging effect of steroid is due to its local effect. The action of steroid has been related with the alteration of functions of potassium channel on the excitable tissue [30-33]. As the direct action of Bupivcaine cannot extend beyond a few hours or days there must be an effect of Depot methyl prednisolone on the underlying pathology, which owes in part to the patient’s ability to perform an adequate exercise program.

All the manipulations were active and assisted. No passive manipulations were done as passive stretching of the joint produces pain which evokes reflex contraction of antagonistic muscles. After completion of the manipulation the patients were asked to bring the affected limb over the head with the help of the other hand. All the range of movements were performed by patients themselves at home. Thus all range of motions were possible without significant pain, sometimes an audible pop could be heard as a result of breakage of adhesions. Patients were able to perform the same assisted active range of motion exercise at home regularly without pain. Study done by Ronald L. Diercks, showed that result of intensive physiotherapy involving stretching exercises up to pain threshold is worse than supervised neglect 64.0% versus 90.0%. Most non invasive therapeutic strategies are based on stretching or rupturing the tight capsule by manipulative physical therapy with success rate for achieving good to fair results [3, 28, 34]. The good result of physical therapy with intraarticular corticosteroid injections, with or without hydraulic distension, ranges from 44.0% to 80.0%. [35-38] more aggressive interventions, such as manipulation under anesthesia and arthroscopic or open release, are a popular form of therapy especially for resistant frozen shoulder. The published success rate for this therapy varies 69% to 97.0%. [34, 39-41] The study of using suprascapular nerve block for frozen shoulder showed improvement in pain and range of motion in 76.0% of patients at 12 weeks [fig2]. 42In this study we used a combined approach (Intrarticular injection of local anesthesia with corticosteroid plus coracohumeral infiltration plus Suprascapular nerve block plus gentle manipulation and active assisted range of motion exercises) to the management of FS. We have achieved significant improvements in the range of motion as well as relief of pain in our patient.

References


Jürgel J, Rannama L, Gapeyeva H et al. Shoulder function in patients with frozen shoulder before and after 4-weekrehabilitation. Medicina (Kaunas) 2005;41:30-8.


