MANIPULATIVE ASSESSMENT AND TREATMENT OF THE SHOULDER COMPLEX: CASE REPORTS

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ABSTRACT

Objective: To describe a unique method of evaluation and a conservative management plan for patients with shoulder dysfunction of mechanical origin. Possible causes for this clinical presentation and a brief review of the literature are offered.

Clinical Features: In the 3 cases described here, symptoms included acute shoulder pain, limitation of movement, positive orthopedic tests, palpable tenderness, muscle spasm and muscle weakness. The 3 cases all resulted in differing diagnoses.

Intervention and Outcome: Following the use of a proposed joint dysfunction isolation test, thrusting forms of manual adjusting procedures, electrical modalities and soft tissue therapy were applied. Three cases representing different common shoulder problems (an acute episode of a chronic problem, a progressive problem resulting in capsulitis, and a occult problem associated with a motor vehicle accident) responded favorably to treatment.

Conclusions: There is the need for a non-surgical, conservative approach to treatment of shoulder problems before considering the more aggressive treatment approaches that carry greater iatrogenic risks. The patients' signs and symptoms responded to a unique method of evaluation and manipulative therapy when other approaches had failed. The risk/benefit ratio suggests that conservative care be considered a potential option for similar conditions. (*J Chiropr Med* 2003;2:145-152)

KEY WORDS: Shoulder; Chiropractic Manipulation; Muscle Testing

INTRODUCTION

Approximately 4,000,000 people in the US seek medical care each year for shoulder problems, resulting in

nearly 1.5 million visits to orthopedic surgeons. (1) Shoulder pain and dysfunction is also a common complaint prompting patients to seek chiropractic care. Shoulder pain has also been reported to be the second leading cause occupational injury claims. (2)

The shoulder is a complex of 4 joints that allow it to be the most movable joint in the body. It must withstand the worst of our everyday work tasks as well as our recreation activities. Mobility has been developed at the expense of stability in this complex structure. Therefore, it must depend on muscle, tendons and fascia rather than bony support. (3,4) Given the complexity of the shoulder, it is not surprising that it is 1 of the most common joints presenting with dysfunctional pathology. (4) Most shoulder problems arise from direct trauma, overuse, or underuse, commonly resulting in impingements syndromes. Studies have shown that these conditions can be managed with conservative approaches, including chiropractic care. (5-8) Knowledge and understanding of the anatomy and the intricate relationships of each of the joint systems is essential for successful assessment and treatment of shoulder problems. This paper focuses on a unique form of evaluation leading to manipulative intervention in the case of shoulder dysfunction.

Functional Evaluation of the Shoulder Complex

The evaluation of the shoulder begins with a detailed history and thorough physical assessment. It is essential to determine whether the clinical picture is truly attributable to the shoulder complex itself or represents a pathologic process elsewhere, such as a cervical pathology, nerve entrapment, neurologic deficit, or a problem anywhere along the kinetic chain. (9) The history will direct how extensive the examination must be. The shoulder can be the site of pain from a variety of sources (Table 1) that must be distinguished. The examination is important to develop the diagnostic impression and to provide insight as to the biomechanical status of the patient. Provocative tests and motor, sensory and reflex testing for cervical spine and shoulder must be performed. (10,11) Active, passive and resisted shoulder ROM should be performed. These tests along with pain ratings using a visual analog scale and functional status

TABLE 1
SOURCES OF SHOULDER PAIN

- REFERRED PAIN
 - MUSCULOSKELETAL—CERVICAL SPINE, THORACIC SPINE, TRIGGER POINTS
 - VISCERAL—DIAPHRAGM, GALL BLADDER, HEART, LUNGS
- RADICULAR PAIN—CERVICAL NERVE ROOT, THORACIC OUTLET
- PERIPHERAL ENTRAPMENT
- LOCAL PAIN
 - DIRECT TRAUMA (FRACTURE, DISLOCATION, SUBLUXATION)
 - OVERUSE (TENDINITIS, SPRAIN, STRAIN, BURSITIS)
 - DEGENERATIVE (OSTEOARTHRITIS, RHEUMATOID ARTHRITIS)
 - OTHER (TUMOR, INFECTION)

questionnaires (eg, Shoulder Function Assessment Scale, (12) Shoulder Pain and Disability Index, (13) Shoulder Rating Questionnaire (14)) serve as outcome measures to monitor the effects of care.

To begin the specific shoulder assessment, the patient lies supine with the head elevated and the shoulder girdle flat on the table. Test the non-affected shoulder first to determine normal, realizing that there may be occult problems in the non-affected shoulder. The patient makes a fist, extending the elbow and raising the arm in forward flexion so it is directly above the glenohumeral joint (GH) and perpendicular to the floor (Figure 1). The radial and ulnar areas of the fist face the head direction and the foot direction respectively. The doctor stands facing the patient at shoulder level in a lunge position. The doctor's shoulders are in the same position as the patient's shoulders. The procedure is described to the patient, stating that the arm will be gently and evenly pushed in 4 different directions and that the patient will not be overpowered. The 4 directions are then gently demonstrated on the extended arm. Once the patient understands, start the examination process for each of the 4 joint complexes by saying, "I want you to resist me, but not fight me, and I want you to continue to hold your arm in the position I put it in." "Are you ready?" "Hold, resist." It is recommended that each test be repeated 3 times unless a frank weakness is encountered immediately. Watch for a "cogwheel" affect where the shoulder gets weak then strong then weak again. The more the shoulder is tested the clearer the weakness becomes. A normal functioning shoulder will not become weak nor have a cogwheel affect. It must be emphasized that this procedure is done very gently requiring no more than 50% of the patient's maximum voluntary contraction (MVC) ability. Furthermore, weakness can occur with and without pain.

Glenohumeral Joint (GH): Using the patient's right shoulder for an example, the doctor's right hand grasps the patient's radial side wrist while the doctor's left

hand holds the patient's right elbow to maintain extension. Test the GH slowly and gently by applying a steady caudal pressure looking for weakness or inability to hold with cephalic resistance (Figure 1a). If there is weakness or slippage inferiorly, a GH joint dysfunction is identified and noted in the record as AH = + indicating the likelihood of an anterior humerus (AH) misalignment.

Acromioclavicular Joint (AC): Using the patient's right shoulder as an example, the doctor's right hand grasps the ulnar side of the patient's wrist while the doctor's left hand holds the patient's right elbow to maintain extension. Test the AC slowly and gently by applying a steady pressure in a cephalic direction looking for weakness or inability to hold against resistance (Figure 1b). If there is weakness or slippage superiorly, an AC joint dysfunction is identified and noted in the record as AC = +.

Sternoclavicular Joint (SC): Using the patient's right shoulder as an example, the doctor's left hand grasps the patient's dorsum and ulnar wrist area while the doctor's right hand holds the patient's left ribcage area just inferior to the left shoulder joint, to stabilize the patient's body during the test. Test the SC slowly and gently with a steady pressure in a medial direction looking for weakness or inability to hold against resistance (Figure 1c). If there is weakness or slippage medially, a SC joint dysfunction is identified and noted in the record as SC = +.

1st Rib (1R): Using the patient's right shoulder as an example, the doctor's left hand grasps the patient's palmar and ulnar wrist area while the doctor's right hand holds the patient's left ribcage area just inferior to the left shoulder joint, to stabilize the patient's body during the test. Test the 1R slowly and gently with a steady pressure in a lateral direction looking for weakness or inability to hold against resistance (Figure 1d). If there is weakness or slippage laterally, a 1R joint dysfunction is identified and noted in the record as 1R = +.

Manipulative Treatment of the Shoulder Complex

Many forms of manual therapy exist. (15) Manual therapies, whose primary effect is on joint structures, are physical maneuvers designed to induce joint motion through non-thrust techniques (mobilization) or thrust techniques (adjustment or thrust manipulation). They are intended to treat disorders of the neuromusculoskeletal (NMS) system by decreasing pain and improving joint range and quality of motion. This leads to their common application in the treatment of NMS disorders that are associated with joint pain and/or joint hypomo-

Figure 1. (a) Patient and clinician positioning for shoulder testing procedure on the right side showing vectors of force for anterior humerus (AH) superior to inferior. (b) Patient and clinician positioning for shoulder testing procedure on the right side showing vectors of force for acromioclavicular (AC) inferior to superior. (c) Patient and clinician positioning for shoulder testing procedure on the right side showing vectors of force for sternoclavicular (SC) lateral to medial. (d) Patient and clinician positioning for shoulder testing procedure on the right side showing vectors of force for first rib (1R) medial to lateral.

bility (subluxation/dysfunction). When treating joint hypomobility and/or malposition, the adjustive thrust or mobilization is typically delivered in the direction of reduced joint motion to restore normal motion and alignment. (16) The techniques that follow are examples of high-velocity, low-amplitude thrust technique that can be applied to the shoulder for the problems

identified through the described isolation procedures above. An audible release may or may not be heard, as some of the procedures will not produce joint gapping needed for cavitation.

AH: The patient lies supine with the doctor standing at the side of the table facing the patient's abducted shoul-

der. The doctor places the caudal hand into the axilla, extending the thumb to contact the glenohumeral joint space. The doctor's cephalad hand pisiform contact is placed over the right thumb. Grasping the patient's shoulder, the doctor moves the shoulder gently to assure that the GH space is being contacted. The doctor's caudal leg supports the patient's arm during the adjustment. The doctor internally rotates the humeral head in the glenoid labrum with both hands until all the laxity is out of the joint, and there is no further internal rotation available. The doctor's caudal hand and thigh (which is supporting the patient's arm) applies distractive prestress and a brisk, short thrust is applied over the superior aspect of the humeral head (Figure 2). The direction of the thrust is inferior and slightly lateral. Re-test the shoulder using the AH testing protocol. If still weak, the AH adjustment should be repeated, using slightly more force.

AC: The patient lies supine with the doctor standing at the side of the table facing the patient's abducted shoulder. The 2nd and 3rd digits of the doctor's caudal hand are placed on either side of the patient's AC joint with the index finger over the acromion and the middle finger over the distal clavicle. The doctor moves the caudal leg forward to a position where the patient's axilla is over laying the doctor's lower thigh area, like an anvil. The patient's elbow is flexed so the hand can rest on the doctor's thigh for support and traction. As the shoulder is supported and tractioned, the doctor's cephalad hand taps the 2 fingers over the AC joint using a fist in an inferior direction (Figure 3). It does not take much of an impact to influence the joint. A mechanical adjusting instrument can be used for the very young,

Figure 2. Patient and clinician positioning for the right side showing vectors of force for AH adjustment

Figure 3. Patient and clinician positioning for the right side showing vectors of force for AC adjustment

elderly, frail or extreme pain individuals. Re-test the shoulder using the AC testing protocol. If still weak, the AC adjustment should be repeated, using slightly more force. If there is a potential AC separation, it is advisable to support the joint structure with tape strapping if there is no tape allergy.

SC: The patient lies supine with the doctor standing at the side of the table facing the patient's abducted shoulder. The doctor establishes a pisiform contact over the proximal clavicle with the caudal hand. The doctor moves the caudal leg to a position where the patient's axilla is over laying the doctor's lower thigh area, like an anvil. The patient's elbow is flexed so the hand can rest on the doctor's thigh for support and traction. The doctor's cephalic hand grasps the patient's shoulder and works with the doctor's caudal knee to traction the patient's axilla area in a lateral direction, the doctor makes a gentle thrust in an anterior to posterior with slight medial to lateral direction (Figure 4). The patient is asked to take a deep breath and hold during the adjustment. It does not take much of an impact to influence the joint. A mechanical adjusting instrument can be used for the very young, elderly, frail or extreme pain individuals. Re-test the shoulder using the SC testing protocol. If still weak, the SC adjustment should be repeated, using slightly more force.

1R: The patient lies supine with the doctor standing at the side of the table facing the patient's abducted shoulder. The doctor contacts the 1st rib just inferior to the area where the distal clavicle makes its first bend toward the AC joint with the tips of the 2nd, 3rd, and 4th fingers of their left hand, and the right hand finger tips

Figure 4. Patient and clinician positioning for the right side showing vectors of force for SC adjustment

will over lay the left hand finger tips. The fingers get just below the clavicle gently, but firmly to contact the rib. The doctor moves the caudal leg to a position where the patient's axilla is over laying the doctor's lower thigh area, like an anvil. The patient's arm is bent at the elbow and their hand is placed on the doctor's thigh for support and traction. The adjustment is a quick impulse in an anterior to posterior with slight superior direction (Figure 5). The patient is asked to take a deep breath and hold it during adjustment. It does not take much of an impact to influence the joint. A mechanical adjusting instrument can be used for the very young, elderly, frail or extreme pain individuals. Re-test the shoulder using the 1R testing protocol. If still weak, the 1R adjustment should be repeated, using slightly more force.

Figure 5. Patient and clinician positioning for the right side showing vectors of force for 1R adjustment

CASE REPORTS

Case 1

A 49-year-old white male, 5'9", 189 lbs complained of acute right shoulder pain after using a steel fence-post-driving ram. The patient had a previous, chronic right shoulder strain that was always bothersome, and required him to be careful in how he used his shoulder, especially in overhead work. Pounding the fence post exacerbated his chronic complaint into an acute complaint. He was guarded in moving his shoulder in a position of flexion and abduction. On examination, there was no obvious swelling, redness or heat in the right shoulder area. He had normal vital signs. A cervical exam was completed to rule out discogenic problems as the pain generator for his shoulder complaint. This is necessary since a majority of the shoulder muscles are uniquely innervated from the brachial plexus nerve roots C5 through T1. The patient did not have any sign of discogenic complications with any of the provocative orthopedic tests and his neurological sensation, muscle tendon reflexes, sensory dermatome, motor strength was all grossly normal. Shoulder orthopedic tests including Codman's Arm Drop, Apprehension, Dugas, and Yergason's were essentially normal but produced shoulder pain. Palpation over the coracoid process, greater tuberosity, bicipital groove, and in the subdeltoid bursa area was tender. Palpable tenderness was produced in the pectoralis minor origin, subscapularis, teres major and minor, supraspinatus and infraspinatus muscles, with some associated trigger points that referred pain into the anterior deltoid muscle and down into his upper arm. The patient's ROM was guarded and limited in flexion to 90° (N=180°) and abduction to 90° (N=180°). The other ranges of motion were more complete but guarded secondarily to muscle spasm and pain. Evaluation for shoulder dysfunction, using the unique procedures and nomenclature discussed previously, the patient had only a right AH (anterior humeral head subluxation). The other 3 shoulder positions (AC, SC, 1R) tested strong.

Treatment began with 20 minutes of interferential muscle stimulation using the 80–150 Hz setting through 4 pads: 1 anterior and 1 posterior of his shoulder joint, 1 over his supraspinatus muscle and the last over the anterior deltoid muscle so as to form the "X" pattern desired when using 4 pads. Moist heat was applied over the shoulder to help relax the muscles. The patient's right shoulder was then adjusted using the technique to correct an AH subluxation. The adjustment was somewhat painful due to the chronic nature of the problem and Biofreeze lotion was applied over the

shoulder. The patient was advised to keep his arm in a protected position (ie, supported in a sling) and to use an ice pack 20 minutes every hour to hour and a half. He was advised to lie on his side and support his arm with a pillow, internally rotating his wrist when sleeping at night. This position is thought to maintain the correct position to reduce the AH subluxation and may decrease the bursa swelling in the deltoid area.

He was seen 2 days later, noting dramatic improvement. He still had pain in the deltoid area but it was reduced. He had full ROM and his shoulder tested strong in all positions. Interferential therapy was applied to the patient's shoulder, followed by some gentle soft tissue work in the shoulder area and adjustment of his cervical spine at the C5–6 motion segment. The patient came back 1 week later for a follow-up visit and was nearly 100% improved. The patient reported that it was the first time in 8 years that he was able to work without pain and sleep throughout the night without pain. He was given shoulder stretching and strengthening rehabilitative exercises and advised to use the Codman stretch exercises if the pain should come back. He has been seen several times over the years for other conditions, but his right shoulder problem completely resolved without further problems.

Case 2

A 56-year-old white female, 5'2", 138 lbs, with normal vital signs complained of acute right shoulder pain. She had seen an orthopedic surgeon who gave her the diagnosis of "frozen shoulder" or adhesive capsulitis. She gave a history of falling on a slippery step and landing hard with her right arm outstretched behind her 9 months prior to her visit. She went to another chiropractor who saw her approximately 20 to 25 times over a number of months. She stated that some physical therapy was used and her spine and shoulder were adjusted. There was no major improvement noted and the chiropractor finally referred her to the orthopedic surgeon. On examination, motor, sensory and reflex tests were equal, symmetric and within normal limits. Cervical spine provocative tests were negative. All shoulder ranges of motion were painful and restricted. Flexion was approximately 45°, abduction was 30°, and adduction was performed very slowly to a normal of 50°. External rotation, internal rotation, and extension were all limited secondary to muscle spasm and pain. Palpation of her pectoralis major and minor, teres major and minor, subscapularis, infraspinatus, supraspinatus and serratus anterior muscles on the right side revealed acute hypertonicity and tenderness. A tentative, working diagnosis of a right adhesive capsulitis was estab-

lished. Resistive tests of her shoulder revealed dysfunction in all 4 positions, AH, AC, SC and 1R.

Treatment was initiated by having the patient laying prone over 2 large pillows with her right arm hanging down. Interferential muscle stimulation was used on her shoulder and a 4-pound weight was added to her right wrist to traction her arm and shoulder during the 20-minute shoulder treatment. A heating pack was also placed around her shoulder. After that 20-minute interferential session, deep soft tissue work was applied to the patient's tolerance, involving the entire shoulder girdle area. This was followed by very specific myofascial release methods to the pectoral muscles (specifically in the origin and insertion areas), as well as the subscapularis and teres muscle belly areas. This was done by holding a taught muscle and moving the shoulder joint in a passive range of motion to the patient's tolerance. It is painful for the patient, but slow movements improve the range of motion to a degree that is noticeable and encouraging to the patient. The myofascial technique can take 20 or more minutes. Following the myofascial release, the right shoulder was adjusted for all 4 subluxation positions using manual adjustments on the AH and activator adjustments on the other 3 AC, SC, 1R. The patient was given specific shoulder mobilization exercises, Codman's weight exercises, and advised to use hot and cold packs on her shoulder 3–5 times per day.

In 10 treatments over the course of 1 month, she was about 90% improved. Her flexion was 160°, abduction 170° and the rest of her motions almost normal. Her pain was almost gone and she could use her right shoulder in all activities. A 1-year follow up has shown that she is back to normal without re-occurrence.

Case 3

A 45-year-old deconditioned, white female, 5'4", and 185 lbs complained of chronic midthoracic pain as a result of a motor vehicle accident (MVA) 6 years previously. The MVA was a head on collision and she was the driver. She locked her hands on the steering wheel at impact and traumatized her spine and paraspinal muscles. She saw many different doctors for the treatment of these injuries. She was left with the chronic cervical and thoracic pain with muscle spasm. Continued care had only marginal success with the chronic pain. After checking this patient's shoulders, the 4 subluxation patterns were found bilaterally. This was surprising since she had never complained of shoulder problems and did not feel that her shoulders were sore when asked. The patient's shoulders were adjusted in

all 4 ways, bilaterally and the other spinal corrections were made as per chiropractic biomechanical examination. At the next visit, her midthoracic pain and cervical thoracic junction pain was markedly improved. The shoulders and the rest of her spinal complaints were treated together and for the first time in years, she became almost pain free in the spinal areas of complaint.

DISCUSSION

Several factors are important for the successful treatment of patients with shoulder joint dysfunction. (17) First, it is imperative to identify the specific joint or joints that are not functioning correctly. Secondly, changes in the specific soft tissues associated with poor shoulder-girdle mechanics must be determined including those that produce hypomobility (shortening of soft tissue), hypermobility (lengthening of soft tissue that can eventually lead to damage of the labrum), or strength imbalances across the joint. Lastly, reduction and control of inflammation and the patient's pain must be accomplished.

A non-invasive provocative test for mechanical shoulder joint problems is presented with 3 illustrative cases. Case 1 represents an example of an acute episode of a chronic shoulder problem, Case 2 represents an example of a progressive shoulder problem resulting in capsulitis, and Case 3 represents a shoulder problem that was not symptomatic but was related to the trauma of a motor vehicle accident causing continued spinal complaints. The conventional use of muscle testing procedures has been to identify motor weakness that could be related to neurologic insult or injury to the muscle. Within the chiropractic profession, manual muscle testing has also been used to evaluate spinal joint function, and the health and function of other organ systems of the body. Central to the application of these procedures is the premise that changes in muscle strength can be affected by functional and pathologic changes in other tissues of the body. (18) Muscle testing in this capacity is controversial. However, it is believed that all muscles of the body can be temporarily inhibited by stimulation or provocation of dysfunctional somatic structures characteristic of subluxated joints. When a shoulder joint is subluxated, traction to the joint capsule occurs causing aberrant neurological muscle firing patterns. Thus, when pressure is applied to the subluxated joint area, an immediate weakness is encountered. It is our opinion that this is the hypothetical mechanism of this evaluative procedure for the shoulder.

When a mechanical joint problem is identified, it is reasonable to apply manipulative therapy as a mechani-

cal form of treatment. Conservative management also includes the use of physical modalities and procedures to reduce inflammation and pain (ie, ice, interferential current), influence soft tissue tone and texture (ie., heat, ultra sound, myofascial release, stretching exercises), and joint stabilization (ie, strengthening exercises, structured rehabilitation). If this protocol does not show a positive effect within a relatively short time (3–5 treatments), suspect a rotator cuff tear and consider further assessment. In cases of adhesive capsulitis, the use of more myofascial release and modalities will be necessary and it will take more time.

This shoulder testing procedure has not been evaluated for intra-rater reliability, inter-rater reliability or validity. Reliability studies are being designed. A further identified shortcoming of this proposed shoulder assessment procedure is that it does not address the scapulothoracic articulation, which has been associated with shoulder pain and pathology. (19,20) However, identification and treatment of 1 or more of the 4 dysfunctional patterns associated with the shoulder will be likely in most patients presenting with shoulder problems.

CONCLUSION

For a treatment procedure to be considered effective and efficient, there must be improvement rates that are better than the natural history of the disorder. There is the need for a non-surgical, conservative approach to treatment of shoulder problems before considering the more aggressive and potentially hazardous approach of surgery. Unfortunately, there have been few studies of the therapeutic outcomes and expected duration of treatment using conservative management of shoulder pain syndromes. Published case presentations will offer questions and possible interventions that must be more thoroughly evaluated through larger, controlled research projects. Case presentations form the initial seeds on which larger studies will be based. The patients' signs and symptoms in these cases responded subjectively and objectively to a unique method of evaluation and manipulative therapy when other approaches had failed. This suggests that conservative care be considered a potential option for similar conditions.

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