CHIROPRACTIC MANAGEMENT OF A 46-YEAR-OLD TYPE 1 DIABETIC PATIENT WITH UPPER CROSSED SYNDROME AND ADHESIVE CAPSULITIS

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ABSTRACT

Objective: To discuss the treatment of a patient with type 1 diabetes presenting with chronic neck and shoulder pain by using chiropractic manipulation and an active rehabilitation program with emphasis on correcting postural imbalances.

Clinical features: A 46-year-old insulin dependant (type1) diabetic female presented with neck and right shoulder pain of 6 to 8 months duration. Her history included similar left-sided complaints 2 years prior at which time she underwent 3 months of rehabilitation at a local medical center, which improved her condition. Over time her pain resolved but the residuals of restricted left shoulder range of motion remained. The patient had postural changes consisting of forward head posture, rounded shoulders and internally rotated arms.

Intervention and outcome: Treatment included spinal manipulation, ultrasound and active rehabilitation consisting of at home exercises initially and followed with in office low-tech rehabilitation. Rehabilitation was primarily aimed at improving postural abnormalities, muscle imbalances and abnormal movement patterns. The patient improved with this course of treatment.

Conclusion: Chiropractic care including active rehabilitation may be helpful in treating diabetic patients suffering from chronic neck and shoulder problems. (J Chiropr Med 2004;3:138–144)

Key Indexing Terms: Manipulation, Chiropractic; Neck Pain; Shoulder Pain; Diabetes; Posture, Rehabilitation

INTRODUCTION

Good posture and muscle balance are essential to normal biomechanics within the musculoskeletal system. Studies have shown relationships between neck and shoulder problems and postural abnormalities, muscle imbalances and abnormal movement patterns.[1–5] Muscle imbalance is a situation in which some muscles become short and tight (overactive) and other muscles become weak (inhibited). These imbalances occur for different reasons including, but not limited to: effects of gravity, repetitive tasks and prolonged stressful postures, but there are typical predictable patterns that occur, as described by Vladimir Janda.[6] According to Janda these muscle imbalances develop between 2 groups of muscles termed postural and phasic muscles.

In this model, postural muscles tend to become short, tight and overactive and phasic muscles become weak and inhibited. Sedentary lifestyle in our modern society results in overuse of postural muscles, which become short, tight and overactive and for the same reason phasic muscles tend to become weak from disuse. When muscle imbalance occurs in the upper body, Janda refers to this as an "upper crossed syndrome" because topographically when the weak and tight muscles are connected they form a cross. Some of the imbalances seen in this situation are presented in Table 1.

Corresponding postural abnormalities are also present with these upper body muscle imbalances, and are best evaluated with the patient standing. Such abnormalities include: 1) forward head posture related to weakness of deep neck flexors and tight sternocleidomastoid (SCM) and suboccipital muscles; 2) rounded shoulders related to weakness of scapular stabilizers and tight pectoralis muscles; and, 3) internally rotated arms related to tight pectoralis and subscapularis muscles and possibly weak infraspinatus muscles.

As a result of these muscle imbalances, altered movement patterns are typically observed. When a movement pattern is altered, the sequence of activation of different muscles involved in a specific movement is changed and becomes abnormal. The short and tight muscles are overactive and tend to contract sooner than normal. On the other hand,

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JOURNAL OF CHIROPRACTIC MEDICINE

TABLE 1
MUSCLES INVOLVED IN UPPER-CROSSED SYNDROME

SHORT TIGHT (OVERACTIVE) MUSCLES	WEAK (INHIBITED) MUSCLES
SUBOCCIPITALS	DEEP NECK FLEXORS
STERNOCLEIDOMASTOIDS	LOWER SCAPULAR STABILIZERS
UPPER TRAPEZIUS	MIDDLE AND LOWER TRAPEZIUS,
LEVATOR SCAPULAE	SERRATUS ANTERIOR, RHOMBOIDS
PECTORALIS	
SUBSCAPULARIS	

the weakened muscles become inhibited and may contract slower than normal. Therefore, the order in which the muscles contract may be altered and can be observed by the clinician.

These faulty movement patterns place additional abnormal stress on the musculoskeletal system and can cause problems beyond a localized region of the body. When an "upper crossed syndrome" exists we frequently see 2 "altered movement patterns", one dealing with altered cervical flexion and the other dealing with altered shoulder abduction.

The following tests can be performed in order to visualize these problems in the patient.

The cervical flexion test (Fig 1) assesses to see if the deep neck flexors are weak and the sternocleidomastoid muscles are overactive. The patient is supine and asked to slowly raise the head to look at their feet. If the deep neck flexors are weak and the SCM muscles are overactive the jaw will jut forward (chin poking) at the beginning of the movement with hyperextension of the upper cervical region.

Jull's test is performed with the patient in the supine position (Fig 2). The patient's head is pre-positioned 1 centimeter off the table with the chin tucked and the patient is instructed to hold that position without raising or lowering the head. This test is positive if the patient's chin pokes, the head shakes or the head rises up or falls.[7]

The shoulder abduction test assesses for overactive upper trapezius and levator scapulae muscles and weak scapular stabilizer muscles. The patient is seated with the elbow flexed 90 degrees, which controls for undesired rotation of the arm. The patient is instructed to abduct the arm. If the shoulder elevates prior to 60 degrees of arm abduction the test is positive for an abnormal movement pattern.

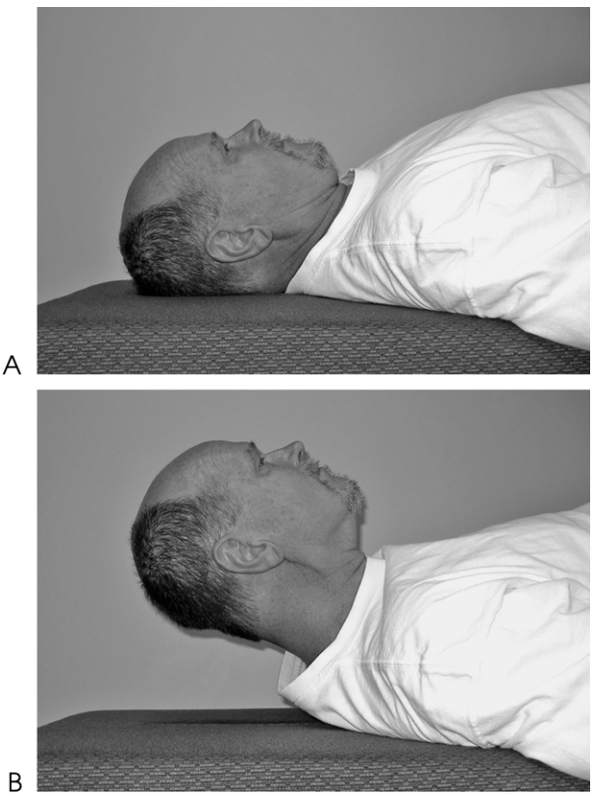

Figure 1. The cervical flexion test. 1A the patient is in the starting position and asked to slowly raise his or her head to look at their feet. 1B demonstrates a positive test indicating weak deep neck flexors and overactive sternocleidomastoid muscles.

Normal shoulder abduction requires a very complex sequence of coordinated muscular events. Generally, a positive test suggests overactive upper trapezius and levator scapulae muscles and weak scapular stabilizer muscles, especially the lower trapezius and latissimus dorsi muscles. Excessive vertical motion of the scapula has been shown to be common in shoulder pain patients.[8]

By performing these movement tests, clinicians are able to observe imbalances and abnormal motions related to faulty muscle substitution. These abnormalities place unusual stressors upon the locomotor system, which affect the tendons, muscles, ligaments and joints in a negative fashion. It should also be noted that once the movement pattern and firing order of the muscles have changed they are stored in the central nervous system as an engram and, after the muscle imbalances have been corrected, normal movement needs to be practiced to re-program a normal engram.[9] Otherwise, even

Figure 2. Jull's test. 2A demonstrates the pre-position for Jull's test is shown. 2B a positive test is demonstrated, showing a chin poked posture.

though the muscle imbalances are corrected the abnormal movement pattern will remain and continue to disturb normal function. The following case demonstrates the practical application of these principles.

CASE REPORT

History

A 46-year-old insulin dependant female patient complained of right neck and shoulder pain of insidious onset for the past 6 to 8 months. She related that the symptoms progressively worsened and pain was a constant throbbing ache ranging from 4 to 7 intensity (on a 1 to 10 scale), with an average intensity of 6. She further related that 2 years prior she had similar left sided symptoms and had 3 months of physical therapy and rehabilitation at a local physical therapy center, which improved her condition. Over time her pain resolved but she had significantly restricted left shoulder ranges of motion.

Examination

A physical examination was performed which included postural and palpatory evaluation and orthopedic and neurological testing. The neurological examination was negative. Postural evaluation revealed forward head posture, rounded shoulders, internally rotated arms and the right shoulder was high. Palpatory evaluation revealed tight upper trapezius, levator scapulae, sternocleidomastoid and suboccipital muscles. Motion palpation demonstrated restricted extenion plane of motion in the lower cervical region. Tenderness was produced over the supraspinatus tendon insertions bilaterally. Shoulder depressor test was positive on the right side. With the exception of range of motion (ROM) studies other cervical orthopedic tests were negative.

Shoulder ROM studies revealed virtually all planes of motion, active and passive, were restricted bilaterally, especially abduction (Tables 2 and 3). All planes of motion produced pain in the right shoulder and all motions produced pain in the left shoulder with the exception of adduction and flexion.

Cervical ROM revealed decreased motion in all planes (table 4) and pain was produced with extension and right rotation. Jull's neck flexion test was positive and shoulder abduction test was positive bilaterally.

TABLE 2
RIGHT SHOULDER RANGE OF MOTION (DEGREES)

DATE:	8/13/03	9/5/03	10/20/03	*1/5/04	2/25/04	4/28/04	CHANGE
ABDUCTION	90	130	147	143	150	152	+62
ADDUCTION	30	35	32	35	35	44	+14
FLEXION	90	132	136	130	143	155	+65
EXTENSION	40	34	34	32	42	45	+5
INT. ROT.	30	35	35	32	35	54	+24
EXT. ROT.	70	56	52	70	72	78	+8

TABLE 3
LEFT SHOULDER RANGE OF MOTION (DEGREES)

DATE:	8/13/03	9/5/03	10/20/03	*1/5/04	2/25/04	4/28/04	CHANGE
ABDUCTION	90	140	179	139	143	156	+66
ADDUCTION	50	41	42	38	43	56	+6
FLEXION	140	136	147	128	161	156	+16
EXTENSION	45	46	51	48	61	61	+16
INT. ROT.	25	37	38	29	38	51	+26
EXT. ROT.	55	68	68	75	77	72	+17

TABLE 4
CERVICAL RANGES OF MOTION (DEGREES)

DATE:	8/13/03	9/5/03	10/20/03	1/5/04	2/25/04	4/28/04	CHANGE
FLEXION	50	49	59	60	60	60	+10
EXTENSION	35	44	50	29	47	55	+20
R LAT. FLEXION	20	24	30	31	29	32	+12
L LAT. FLEXION	20	30	29	31	34	38	+18
R ROTATION	60	70	68	68	74	73	+13
L ROTATION	75	76	73	62	78	80	+5

Prior imaging studies were obtained and reviewed including normal left shoulder radiographs and magnetic resonance imaging (MRI) that revealed findings consistent with left rotator cuff tendinitis. Right shoulder radiographs were taken again at the time of evaluation and were normal. A new MRI of the right shoulder revealed mild degenerative changes of the acromioclavicular joint. Cervical spine radiographs demonstrated a loss of the normal lordotic curvature, a forward head posture and hyperextension in the cervico-occipital region. A loss of the normal cervical lordotic curvature evidenced on a radiograph has been shown to have a relationship with a forward head posture as found on a visual postural examination.[10]

The patient was requested to complete a physical activity readiness questionnaire (PAR-Q), neck disability index, shoulder injury questionnaire, visual analog scale and a pain drawing. Upon review and scoring of the patient's questionnaires, an outcome assessment baseline was established.

Management

A clinical treatment regimen began consisting of cervical spinal manipulation, therapeutic ultrasound and home exercise protocols. It has been shown that home exercises can be effective in reducing symptoms and improving function in patients with shoulder pain.[11] Spinal manipulation in the lower cervical region was supine diversified technique and aimed at restoring extension mobility to that region. It should be noted that often when a patient has a forward head posture, the lower cervical lordosis is typically reduced, as was observed with this patient, and the examiner will usually find a loss of normal extension ROM in the lower cervical spine.

Cervical ROM exercises were given with emphasis placed on extension because extension was the most restricted range for this patient. She was instructed to perform neck extension exercises with the chin in a tucked position as this forces the lower cervical spine to move into extension. Shoulder passive ROM exercises helped stretch the joint capsule and shortened surrounding musculotendinous structures. Stretching was initiated for the pectoralis, upper trapezius, levator scapulae, subscapularis and scalene muscles. The patient was advised to hold these static stretches for 30 seconds three times daily. Neck retraction exercises were started to strengthen the deep neck flexors and to stretch the tight suboccipital muscles, as well as to help retrain the central nervous system (eg, develop a new engram) to a more normal head posture. Neck retractions were performed 10 repetitions 5 times daily. Exercises were reviewed frequently with the patient to assure good technique was utilized.

Within 3 weeks of initiating treatment, cervical ROMs and bilateral shoulder ROMs were improved, especially cervical extension and shoulder abduction, and pain had lessened from 6/10 to 4/10 intensity (Tables 2–6).

TABLE 5
SHOULDER INJURY SELF-ASSESSMENT SCORES

DATE:	SCORE:
8/14/03	40.0%
9/5/03	28.3%
10/17/03	28.3%
*1/7/04	41.7%
2/25/04	23.3%
4/28/04	16.6%

* PATIENT HAD AN ACUTE EXACERBATION OF HER NECK AND SHOULDER PAIN ON 12/30/03 AND AS OF 1/7/04 HER ACUTE EPISODE HAD NOT TOTALLY RESOLVED.

TABLE 6
NECK DISABILITY INDEX SCORES

DATE:	SCORE:
8/14/03	42.0%
9/5/03	42.0%
10/17/03	33.3%
*1/7/04	54.0%
2/25/04	36.0%
4/28/04	10.0%

* PATIENT HAD AN ACUTE EXACERBATION OF HER NECK AND SHOULDER PAIN ON 12/30/03 AND AS OF 1/7/04 HER ACUTE EPISODE HAD NOT TOTALLY RESOLVED.

At this time, additional strengthening exercises were added including external rotation with Therabands to strengthen the external rotators as external rotation of the humerus is necessary for the greater tuberosity of the humerus to pass under the coracoacromial arch.[12] This was important as this patient's postural evaluation revealed internal arm rotation. Rowing exercises with bands helped to strengthen the middle and lower trapezius and rhomboid muscles. Push up plus exercises were used to strengthen the serratus anterior muscles. Supraspinatus pulls using an elastic band were given because the supraspinatus muscle depresses the head of the humerus as the shoulder is abducted to allow the greater tuberosity to pass under the coracoacromial arch. Isometric neck flexion exercises were performed with the chin in a tucked position to isolate the deep neck flexors (longus colli and longus capitus) instead of the sternocleidomastoid muscles. The patient continued her home exercise program and received a diminishing frequency of spinal manipulation. After 3 months, the patient still experienced improvement but this improvement was gradual and following re-evaluation it was decided to begin low tech in-office rehabilitation protocols.

The in-office protocols were similar to her home exercise program. Exercise began with a 5-minute warm up on a stationary bike and included proprioceptive exercises using a gym ball. The proprioceptive exercises were implemented to instill better neurological control for improved coordination of muscle function. Over the course of 5 weeks, the patient had 10 sessions of in-office rehabilitation during which time she had only a small amount of additional improvement and she was having some difficulty making her sessions so we decided to continue her home exercise program.

A review of the clinical outcome measures demonstrates improvement of the patient's outcome measures. Initially in August 2003, she had constant neck and right shoulder pain that ranged from 4/10 at best to 7/10 at worst, with 6/10 average intensity. She had gradual continued improvement of symptoms and function, with the exception of a short period of time where she experienced an acute exacerbation while extending her head in the shower. This set back had not resolved at the time of her January 2004 re-examination, where the outcome assessment show this increase in symptoms. At the final evaluation in April 2004, her neck pain was only present approximately 10% of the time and ranged from 2/10 at best to 4/10 at worst, with 3/10 her average pain intensity level. Her right shoulder pain was still constant but only ranged from 1/10 at best to 2/10 at worst with 1/10 the average intensity. The patient also related at the time of her final evaluation that she was able to sleep in a side lying posture, on either side, for the first time in over 2 years. Along with symptomatic improvement, she had a significant amount of functional and physiological improvement (Tables 2–6).

DISCUSSION

This particular case was challenging because of two complicating factors. The first factor was that the patient's condition was chronic. Secondly, she is an insulin dependent diabetic with a 21 year history of diabetes and a fasting blood glucose level that typically ran between 150 to 300 mg/dl. It is recognized that diabetic patients have a much higher incidence of limited joint mobility and shoulder problems than non-diabetics.[13,14] It has been reported that most patients with adhesive capsulitis recover within 2 years whether treated or not. However, it should be noted that this patient's left shoulder ROM loss was already of 2 years duration at the time we initiated care and some patients do not self-resolve. It has also been shown that the duration of a shoulder

problem can be correlated with the duration of diabetes mellitus.[13,15]

The diagnosis for this patient's shoulder complaint was adhesive capsulitis. In this condition dense capsular adhesions and contracture of the surrounding musculotendinous structures cause restriction of motion, especially external and internal rotation as well as abduction.[16] The most impressive finding on physical examination is severe loss of motion in all planes, both active and passive, with pain in all ranges of motion. Other findings consistent with capsulitis for this patient were: insidious onset of symptoms, inability to sleep on affected side, and negative radiographic findings. The diagnosis of adhesive capsulitis is made based on clinical findings. While adhesive capsulitis is the most common shoulder problem among diabetics, a significant number of diabetics with shoulder pain have tendinitis without joint restriction.[17] Her left shoulder MRI showed findings consistent with tendinitis and her right shoulder MRI showed mild right A-C joint arthritis. These MRI findings were not significant enough to produce impingement. While she does have a mixed diagnosis regarding her shoulders, adhesive capsulitis is by far the most significant diagnosis clinically.

The emphasis of exercise protocols for shoulder capsulitis is typically on passive stretching of the shoulder capsular structures. With this patient, the emphasis was on correcting her upper body postural abnormalities to attempt to normalize function in her neck, upper body and shoulder regions. Treatment goals for patients with this type of condition should focus on improving functional integrity and not only on pain relief.

Manipulation under anesthesia (MUA) for adhesive capsulitis is a somewhat controversial treatment but recent studies show that most patients do get pain relief and near normal ranges of motion following this technique.[18–21] However it is agreed that it should only be considered when conservative treatment has failed and it has been shown to be an ill advised treatment for diabetics as there is a high incidence of failure using MUA on diabetics with adhesive capsulitis.[22,23]

The patient experienced an acute episode of neck pain that had not resolved at the time of her January 2004 re-examination. Therefore, her examination and outcome assessment findings reflect this acute exacerbation and in retrospect, I should have waited until her acute episode resolved before her progress was re-evaluated. With the exception of this single evaluation, other evaluations demonstrated steady improvement.

CONCLUSION

The prevalence of diabetes mellitus is increasing dramatically in the United States and throughout the world. The incidence of this condition is projected to increase to epidemic proportions in the next quarter century. There are currently twenty million persons with diabetes in the United States of whom more than 5 million remain undiagnosed.[24,25] It is safe to assume that all practitioners including doctors of chiropractic will be seeing larger numbers of diabetic patients in the future.

Typically a practitioner will associate shoulder pain in a diabetic to adhesive capsulitis; however, a significant number of diabetics with shoulder pain have tendinitis without joint restriction.[17] There are studies that show a relationship between muscle imbalances, postural abnormalities and shoulder problems.[26–30] It has been shown that posture training improves symptoms in these patients.[5] The pathophysiological relationship between diabetes and impaired healing is complex. Vascular, neuropathic, immune function and biochemical abnormalities each contribute to altered tissue repair.[31–33] The significance in this case is that "upper crossed syndrome" creates abnormal stressors in the cervical spine, the temporalmandibular joint and the shoulders which sets the stage for a number of problems that will probably affect a diabetic patient more adversely than a non-diabetic.

No firm conclusion should be derived from the outcome of a single case study. However, this report suggests that chiropractic manipulation and active rehabilitation focusing on postural imbalances for a diabetic patient with chronic neck and shoulder complaints may provide a positive response.

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