Original Article

The multidisciplinary conservative approach in treatment of TOS

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Objective: The aims of this study were to evaluate the efficacy of conservative treatment in patients with and without cervical ribs and Thoracic Outlet Syndrome (TOS). From so many kinds of conservative treatment in literature, we used a multidisciplinary approach (correction of posture, maximizing muscle endurance and power, stretch shorten muscles, massage for trigger points and maximize thoracic span with stomach breathing) to get more effective treatment and a longer time of relief with less duration and more long-term relief.

Methods: Twenty six female patients with or without cervical ribs, pain and numbness were included in this study. They were assessed in terms of posture, muscle testing and shortness in muscles in all part of the body. Initial pain status were recorded and after eight weeks treatment including posture correction, their pain were assessed again with visual analogue scale that 0 was no pain and 10 was intolerable pain.

Results: In 100 % of patients initial pain score were more than 5 in visual analogue scale. 23.1% of cases showed reduced pain scores to lower than 5 scales. Age was not a significant factor (p=0.93) on pain reducing. Type of posture was independent from pain and pain diminishing (0.004). Cervical rib was effective in initial pain (p=0.08) and degree of diminishing pain (p=0.236). Initial pain of 57.1% of patients with cervical rib was 10 due to visual analogue scale (VAS). In 33.3 % of the persons with bilateral cervical rib we saw more than 5 degree in diminishing pain. In the 85.7% patients with unilateral cervical rib, we had more than 5 degree diminishing pain and we saw this in all of the non cervical rib TOS.

Conclusions: Faulty posture can cause narrowing of the thoracic outlet space and may lead to pain and numbness, and some other symptoms. Correction of posture despite of cervical rib can widen the space and reduces pressure on vessels and nerves. Postural correction and long time follow up must be considered in order to get longtime relief.

Key words: thoracic outlet syndrome, pain, conservative treatment, posture

Introduction

Thoracic outlet syndrome (TOS) is caused by compression of the nerves and vessels of the upper extremity. The thoracic outlet is a space between the neck and shoulder through which the nerves, arteries, and veins travel. Any narrowing or scarring in the space leads to painful symptoms and signs.

The compression can be extrinsic in nature, meaning adjacent structures, such as muscles, bones, or ligaments adjacent to the neurovascular bundle or intrinsic in nature, meaning a stretch injury or repetitive activities are aggravating the brachial plexus [1].

TOS may result from a variety of anomalies, including cervical ribs, anomalous fascial bands, and abnormalities of the origin or insertion of the anterior or middle scalene muscles. Vascular forms of TOS are much less common than neurogenic (nTOS), which accounts for 95% of all TOS cases. nTOS includes a wide and rather vague spectrum of occasionally disabling upper extremity symptoms typified by arm discomfort/pain, paresthesis of the inner surface of the hand and forearm, and weakness and atrophy of the thenar and intrinsic hand muscles in rare cases(2). Treatment may be either operative or non-operative. The first non-operative treatment protocol for TOS was described by Peet et al. (3) in 1956. Treatment consisted of massage, application of moist heat, strengthening of the shoulder elevators and pectoralis muscles stretching.

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A review of last 20 years studies on conservative treatment (4) showed that treatment measures mainly prescribed in studies consisted of multidisciplinary care, orthosis application plus exercise, exercise or a combination of exercise and physical modalities and/or other interventions. Conservative treatments are used mostly on disputed TOS; it is presumed that due to occurrence of pain in middle age in the cervical rib patients, it should be consequence of faulty posture and imbalance in muscles of shoulder girdle. Because all part of body skeletal system are unique, abnormality in any parts can affect other parts. So we used exercises not only for shoulder girdle, but also in other parts like pelvic girdle, knees and feet. The purpose of this study is comparing application of postural correction in TOS.

Materials and methods

Twenty six TOS patients with or without cervical rib, pain and numbness, who were referred to Iran Hand Rehabilitation Center in a period of 6 months, were included in the study. The patients with vascular TOS were excluded from the study.

In the first visit evaluation of pain, posture, muscle power, shortness and deformities was performed according to Kenndile posture evaluation form. Pain was assessed by visual analogue scale. Posture were assessed with a relax standing, with a straight line which pass anterior to lateral maleol, between femur trochanters, in front of knees, middle body, shoulder joint, cervical ribs and parietal lobes .Then key muscles of posture were analyzed . Postures are categorized as kyphotic, lordotic, kypho-scleiotic, kypho-lordotic and sway back.

All the patients underwent a treatment plan, including posture correction program, maximize muscle endurance and power, stretch shorten muscles, maximize thoracic span with stomach breathing, and massage for trigger points. The pain status re-assessed after eight weeks of treatment and diminishing pain were compared in two forms of TOS.

Results

All of the patients were female with mean age of 35.62+/- 7.08 and variance 60.88. Cases with unilateral and bilateral cervical rib were 53.8% and 23.1%, respectively. In first evaluation all cases had forwarded head. Abdominal muscle weakness and anterior tilt were seen in 80% of patients and most of the patients had hip extensors weakness. In postural evaluation 53.8% were kypholordotic and 38.5% kypho-scleiotic and the remaining had scoliosis or sway back. 23.1% of patients had pain for less than 6 months and the rest had pain for more than 6 months. In 100 % of the cases initial pain were more than 5 in visual analogue scale. After treatment 23.1% showed diminishing in pain scale to less than 5.

Age had no effect on diminishing pain ($p=0.93$), besides age had no relation with initial pain ($p=0.71$). In chi-square test, we found that kind of posture was independent from pain and pain diminishing (0.004).

Cervical rib showed significant correlation with initial pain status ($p=0.08$) and degree of diminishing pain ($p=0.236$). Pelvic tilt had no relation to the degree of pain reduction ($p=0.567$).

Initial pains in 57.1% of patients with cervical rib were 10 due to VAS. Pain duration had no correlation with initial pain status and degree of pain reduction ($p=0.93$).

In 33.3 % of persons with bilateral cervical rib and in 85.7% of patients with unilateral cervical rib, pain reductions was more than 5 degrees and abut non-cervical rib cases, they all experienced such a relief.

Discussion

TOS is often categorized into two specific clinical entities: Vascular TOS and Neurological TOS (6, 7 and 8) and further sub-divided into arterial and venous TOS under the vascular umbrella and true neurological TOS and symptomatic TOS (sTOS) under the neurological heading (Fig. 1).

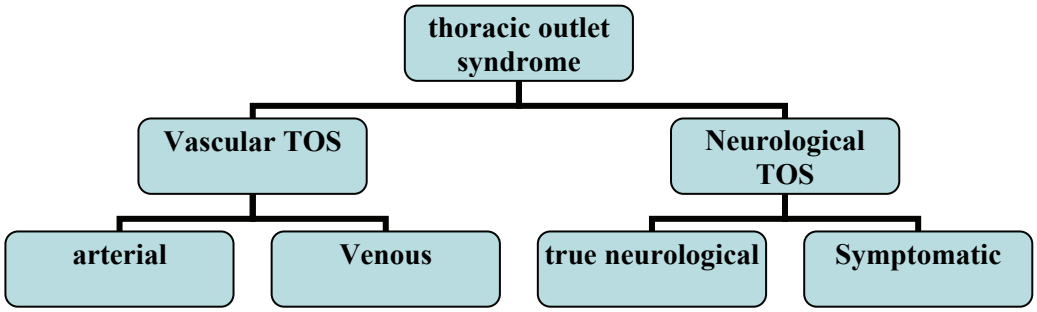

Fig. 1. Sub-types of thoracic outlet syndrome

In the absence of any acute or progressive neurological or vascular lesion, conservative treatment is often recommended as the first step of management for all sub-types of TOS and surgery is only considered if the conservative measures fail (8 and 9).

In a systematic review (4), 7 studies of 1997 till 2007 introduced different conservative methods. Lindgren et al. (10) showed that 88% of their patients experienced symptom relief, but they did not mention the conservative plan and details. The results by Maillis et al. (11) showed that surgery or conservative treatment were both beneficial for approximately half of the patients. The results may imply that the treatment protocol used is not effective, since this study provided the most discouraging results for both treatment options of all the studies found.

Nakatsuchi et al. (12) applied orthosis and exercises and reported the orthosis was more effective for distal symptoms. Pain disappeared or improved in 67% of patients, numbness in 85%, sensory in 84%, and motor disturbance in 80%. Proximal symptoms relieved in 65% of patients. Maillis et al. (11) used of harness and exercise and reported only 20% of the conservatively treated patients had pain relief.

Kenny et al. (13) used progressive resisted shoulder elevation exercises. In his study all patients improved, with a significant decrease in pain in hands, arms and neck. In the remaining studies, treatment approach were similar and comprised exercises including shoulder elevation, stretching of muscles in the shoulder girdle, trigger point injections and patient education.

It seems obvious that the length of follow-up period is attributed to the final results. The longest follow-up (33 months) belongs to Maillis et al. (11) which is the only study that clearly shows more positive results for patients than the control surgery group. In our study we have only 2 months follow up and for persistent pain relief longer follow up is required.

We used pain as an outcome index, but in some studies other outcome measures were reported. Nakatsuchi et al. (12) produced positive results regarding more objective outcome criteria than subjective satisfaction, such as pain and numbness. Other studies used subjective satisfaction, frequency of return to work, range of motion restoration, and grip strength as their outcome measures.

Nearly all studies have mentioned positive results at a significant extent following conservative treatment. Exercise, the combination of an orthosis and exercise (active and passive approach) have produced positive effects as well as exercise included in a multidisciplinary approach with patient education. A multidisciplinary approach including exercise as the main component appears to be the most effective strategy.

We found that diminishing in pain were seen in all patients but it was more obvious in disputed TOS, so correcting posture can reduce pain in all patients suffering pain and numbness in upper extremity, and the result was independent from age and type of posture.

The positive results of multidisciplinary rehabilitation are considered due to the fact that through multidisciplinary care the patient receives therapy not only in shoulder girdle, but in other part of his body, as a whole. Therefore, treatment should also include rehabilitation strategies that have been proven to be effective using objective outcome criteria.

Research could also focus on different conservative treatment methods to apply the more effective options, so as to shorten treatment duration as much as possible, and researchers could also investigate which therapeutic strategies provide more long-term relief.

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