

NEUROPATHIC PROBLEMS RELATED TO SCAPULA

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SUMMARY

Shoulder girdle muscles by means of trapezius, levator scapulae, rhomboid major et minor and serratus anterior support the scapula, participate during the hand movement. Any injury to supplying nerves leads to dysfunction of these muscles and considerable pain, deformity and loss of upper extremity function. Most persistent clinical findings refer to “winging scapula”. Most common neuropathic problems related to scapula are injury to long thoracic nerve with serratus anterior palsy. Injury to the spinal accessory nerve (trapezius palsy) leads to the lateral winging. Severe winging occurs in patients with fascio-scapulo-humeral muscular dystrophy. Mixed clinical picture of scapula problems are present during traumatic brachial plexus injury or the non-traumatic acute brachial neuritis (Parsonage-Turner syndrome). The main aim of this report is to remind surgeons to look not only into shoulder joint, but around it as well. Nerve pathology around scapula is not exceptional and should be treated appropriately.

Keywords: neuropathic shoulder, winging scapula

PROBLEMY NEUROPATII ODNOSZĄCE SIĘ DO OKOLICY ŁOPATKI

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STRESZCZENIE

Mięśnie obręczy barkowej, czworoboczny, dźwigacz łopatki, równoległoboczny większy i mniejszy oraz zębaty przedni stabilizują łopatkę, uczestniczą w stabilizacji ruchu barku, łokcia i ręki. Każde uszkodzenie nerwów w tym obszarze prowadzi do dysfunkcji unerwianych mięśni i wywołuje znaczący ból, prowadzi do deformacji i utraty funkcji kończyny górnej. Większość znaczących objawów klinicznych w tym obszarze określanych jest jako „scapula alata, winged scapula”. Najczęstsze problemy neuropatii związane z unerwieniem obszaru łopatki dotyczą nerwu piersiowego długiego z następstwem porażenia mięśnia zębatego przedniego. Uszkodzenie nerwu dodatkowego z porażeniem mięśnia czworoboczowego może prowadzić do objawu skrzydlatej łopatki. Ten symptom w ciężkiej postaci występuje u chorych z dystrofią twarzowo-łopatkowo-ramieniową. Mieszany obraz kliniczny schorzeń w okolicy łopatki, może być wynikiem pourazowego uszkodzenia splotu ramiennego lub nieurazowego, ostrego zapalenia nerwów unerwiających ramię (zespół Parsonage-Turnera). Głównym celem prezentowanego doniesienia jest przypomnienie chirurgom poszukiwania patologii nie tylko w stawie ramiennym, ale również wokół niego. Zmiany w przewodnictwie nerwów w obszarze łopatki nie są wyjątkiem w praktyce klinicznej i powinny być leczone w odpowiedni sposób.

Słowa kluczowe: neuropatie w okolicy barku, skrzydlata łopatka

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Introduction

The scapula floats on the chest wall on a bed of muscles. Shoulder girdle muscles by means of trapezius, levator scapulae, rhomboid major et minor and serratus anterior support the scapula, participate during the hand movement and these muscles, both stabilize the arm to the body and move the arm around in space. This motion is called scapulo-humeral rhythm. Any injury to supplying nerves leads to dysfunction of these muscles and considerable pain, deformity and loss of upper extremity function. Most persistent clinical findings refer to winging scapula. Most important tests to define and confirm the diagnosis are electromyography (EMG) and nerve conduction studies (ENG). They are beneficial to diagnose and quantify the degree of nerve and muscle damage as well they are also useful to assess and follow the recovery of nerves function. Most common neuropathic problems related to scapula are injury to long thoracic nerve with serratus anterior palsy. Injury to the spinal accessory nerve ("Trapezius palsy") leads to the lateral winging. Severe winging occurs in patients with the fascio-scapulo-humeral muscular dystrophy. Mixed clinical picture of scapula problems is present during the traumatic brachial plexus injury or the non-traumatic acute brachial neuritis (Parsonage-Turner syndrome). Each of these conditions should be recognized, because they require the different methods of conservative treatment as well as the different type of surgery.

Aim

The main aim of this report is to remind surgeons to look not only into the shoulder joint, but in around structures as well. The personal experiences towards neuropathic problems related to scapula are presented.

Material and methods

All patients described below were referred to treat as having the shoulder joint pathology. Main complaints were inability to completely rise the arm, the loss of strength in arm, the pain in shoulder regions. Careful examination, beginning from taking shirts off was done. Shoulders were viewed from anterior and posterior during the arm elevation to evaluate a scapula motion. Subtle malpositioning of scapular was noticed for some of patients, whereas others presented with severe picture of the scapular stability problems. Specific tests were performed to evaluate the nerve injuries. Glenohumeral joint evaluation was performed at the same time. In all cases EMG, ENG studies were applied to confirm diagnosis or reveal the occult nerve injuries in patients under suspicion.

Results

Neuropathic problems related to scapula may include injury to the long thoracic nerve (Serratus anterior muscle palsy) leading to the medial "winging", injury to the spinal accessory nerve (Trapezius muscle palsy) leading to the lateral "winging", fascio-scapulo-humeral muscular dystrophy, brachial plexus injury (acute, traumatic), acute brachial neuritis (Parsonage-Turner syndrome, Neuralgic amyotrophy).

Injury to long thoracic nerve. Loss of serratus anterior muscle function.

Idiopathic cause or traumatic injury are usually origins of neuropraxis due to the stretching or compression of the long thoracic nerve (LTN). The LTN follows a long course from the neck to the serratus anterior muscle, which is much more vulnerable than many of the other nerves of brachial plexus. No muscle atrophy and pain is reported in posterior area, around the scapula due to the overload of remaining muscles. Pain and other symptoms are related to

non-outlet impingement, similar to instability, so many patients present these symptoms with the initial mistreatments. Winging of medial-inferior scapula border is usually missed and more noticeable during resisted elevation, or “push-up” test (Figure 1). Modification of the last mentioned is “serratus wall test”, then the patient is asked to push against the wall with flat palms at waist level. A test that predicts success of tendon transfer reconstruction is the “scapular stabilising test”, during which the examiner stabilizes a scapula against chest wall with hands. It is positive when the patient reports a relief of pain and increased flexion. Most problems are resolved spontaneously within 18 months with rest and restriction of activities above scapula, avoidance of heavy lifting. The operative treatment is necessary if the patient remains symptomatic for 2 years. Most commonly used technique of treatment is the transfer of sternal head of pectoralis major tendon with augmentation with the hamstring tendon. Last modification should be done by transferring with the bone chip, without need of tendon elongation (Elhassan and Wagner 2015).

for tumours or lymph, sometimes after the carotid surgery. It appears less commonly after the direct blunt trauma or traction injury. Paralysis of trapezius muscle results in “drooping” the entire shoulder girdle, lateral-inferior displacement and “winging” of scapula (Figure 2). Pain because of overloading or even spasm due to the muscle fatigue may appear. Due to the inferior scapula displacement, the brachial plexus undergoes the tension resulting in irradiating pain and paraesthesia. Clinically, the “neck line” is asymmetric, patient abducts less than 90 degree, it is unable to shrug the shoulder. Scapular winging enhances with the resisted adduction, but not with resisted forward elevation. During the trapezius muscle weakness test, a patient is unable to lift arm off the couch than lying prone (“triangle” sign). Many people have weakness and difficulty with manual and overhead activities. In cases of iatrogenic or penetrating injuries in the early nerve exploration, the repair and grafting are considered. Initially the treatment is conservative in blunt trauma or the traction neuropraxia injury. Surgical reconstruction within 12 months after the nerve



Figure 1. Winging of medial-inferior scapula border during resisted elevation forward in the right shoulder.

Injury to the spinal accessory nerve. Loss of trapezius muscle function.

This syndrome most commonly occurs after iatrogenic injury in the posterior cervical triangle after the radical neck surgery

injury or nerve release (neurolysis) should be considered. For those patients who were diagnosed later, a modified Eden-Lange muscle transfer procedure may be indicated (Bigliani *et al.* 1996).

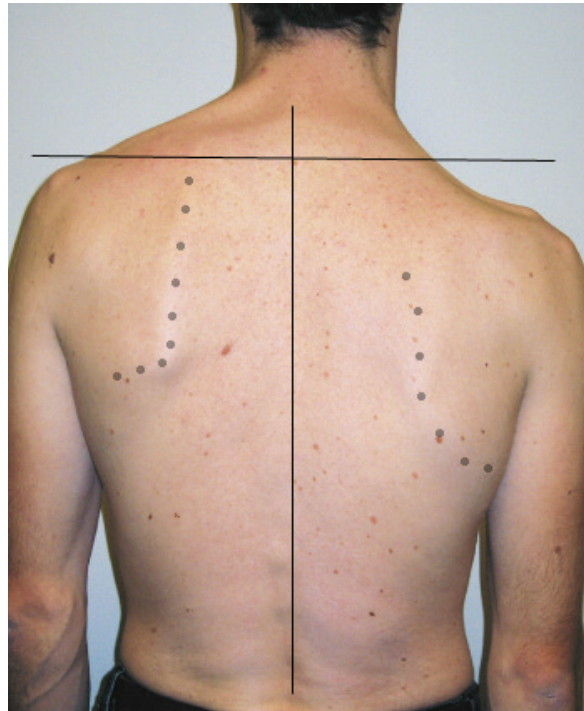


Figure 2. Paralysis of trapezius muscle in the right shoulder. Drooping entire shoulder girdle, lateral – inferior displacement, loss of shoulder contour can be observed. Right shoulder appears longer than the healthy left one.

Fascioscapulohumeral muscular dystrophy (FSHD)-weakness of all the scapula stabilisers. It is not a typical neuropathic disorder, but with the similar, clinical picture of symptoms. This syndrome is hereditary transmitted as an autosomal dominant condition, most patients show the relatively slow progression of weakness involving primarily muscles of facial expression and proximal muscles of upper extremities. Whistling and sucking through straw may be impossible, patients cannot fully bury their eyelashes when their eyes closed. Their arms become gradually weaker from adolescence on. Winging usually appears on both sides with FSHD. The patient reveals completely uncontrolled scapular winging. Atrophy of all muscles including the rhomboids, levator scapulae, latissimus dorsi, trapezius anterior and serratus anterior can be observed. Muscles that abduct glenohumeral joint (deltoid, supraspinatus, infraspinatus and subscapularis) remain strong and hypertrophic (Figure 3). The treatment is surgical and consists of scapular stabilisation with scapula-thoracic arthrodesis (Bunch and Siegel 1993).

Brachial plexus injury

Most of the nerves supplying the stabilizing muscles of scapula arise from the brachial plexus. The brachial plexus is a bundle of nerves running from the neck to the arm. It includes the nerves supplying the muscles of arm and shoulder. Sometimes a significant trauma can affect the muscles of shoulder more than the arm and lead to the “winging”. Injury to the brachial plexus above clavicle usually involves roots and trunks. Root level avulsions involve both anterior (plexus) and posterior (dorsal sensory) regions, whereas plexus injuries spare the posterior areas. Preganglionic injuries in which roots of upper plexus are avulsed from spinal cord should always be recognized (anaesthesia above the clavicle, Horner’s syndrome), because surgical repair is impossible and has limited spontaneous recovery. Initial treatment after trauma is avoiding a sling due to the propensity to acquire a fixed internally rotated and flexed shoulder or the stiff elbow. During the course of brachial plexus injuries, prognosis is guarded except with C5,



Figure 3. (a) 20-years old patient with severe winging of the right shoulder. (b) Note dystrophy of face and chest muscles, hypertrophy of deltoid muscles on both sides. (c, d) Scapulo-thoracic arthrodesis with plate and wires and its results.

C6 injuries (during birth, it's called Erb's palsy). In cases of repair of severe traction lesions in the brachial plexus, the best results were obtained with surgery delayed four to five weeks, because the preoperative assessment of the lesion is more accurate after Wallerian degeneration is detected (Sedel 1988).

Acute brachial neuritis

It is usually a benign, a self-limited disease. Aetiology is unknown and this syndrome appears sporadically but may follow the immunization or viral illness as well as the Lyme boreliosis. Without any trauma or repeated injury, initially a sharp severe pain may appear in the region of shoulder and between the shoulder blades. Progressive weakness of shoulder may develop. On physical examination, no abduction of arm, decreased muscle strength in the scapula-girdle musculature and in the infraspinatus and supraspinatus muscles can

be detected. Normal strength is usually evaluated in the elbow and hand muscles. With time following, the atrophy of shoulder musculature develops, with lowering and protrusion of the shoulder contour. The treatment is non-operative and consists of analgesics, corticosteroids and physical therapy application to prevent the pain and stiffness symptoms during the daily use of shoulder. Rate of complete recovery is estimated at 89% within 3 years (Koster 2010).

Conclusions

In most of cases of patients with the neuropathic problems related to scapula, the clinical diagnosis provides reasonable ways of their treatment. It is imperative to ask patients to take off shirts. Usually a sign of small "winging" exists, whereas the completely uncontrolled scapular winging can be present in FSHD patients. Specific tests as the resisted elevation elucidate a medial winging with revealing the serratus anterior

muscle palsy when the resisted abduction conforms the trapezius muscle palsy. No trauma in history of patients suffering from FHSN or acute brachial plexus neuritis are expected while the traumatic brachial plexitis, the long thoracic nerve or accessory nerve injuries are revealed as traumatic or iatrogenic. If pain and paralysis are not diminished after the non-operative treatment, different methods of surgeries can be considered: serratus anterior palsy treated by pectoralis major transposition after more than 2 years of conservative treatment; trapezius palsy – by modified the Eden-Lange muscle transferring after 12 month. Scapulo-thoracic arthrodesis is proposed for the patients suffering from FSHN or revisions cases after the failed previous surgery to treat a medial or lateral winging.

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