



The modified Eden-Lange procedure for paralysis of the trapezius muscle

Trapezius felcinde modifiye Eden-Lange prosedürü: Olgu sunumu

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Trapezius kas felci, spinal aksesuar sinirin yaralanması sonucunda gelişen bir durumdur. Trapezius kasında bir fonksiyon bozukluğu skapulanın stabilizasyonunu bozarak kanatlanmasına neden olur. Yirmi beş yaşında, aktif olarak spor yapan bir üniversite öğrencisi omzunda düşüklük ve abduksiyonda ağrı yakınmasıyla başvurdu. Hastanın üç yıl önce bir düşme sonrasında yer değiştirmemiş skapula kırığı olduğu ve bir süre konservatif tedavi gördüğü öğrenildi. Sağ omuzda diğer omza göre asimetri ve düşüklük vardı. Sağ skapulanın özellikle 90° abduksiyondan sonra laterale doğru belirgin kanatlandığı izlendi. Elektromiyografide trapezius kasının izole felci saptandı. Hastaya modifiye Eden-Lange prosedürü ile rekonstrüksiyon uygulandı. İki yıllık takip sonrasında omuz asimetrisinin azaldığı, aktif abduksiyonun ağrısız olduğu ve aktif spor hayatına geri dönen hastanın sonuçtan çok memnun olduğu gözlemlendi.

Anahtar sözcükler: Aksesuar sinir/yaralanma; elektromiyografi; kas, iskelet/transplantasyon; paralizisi/cerrahi; skapula; omuz.

Trapezius muscle paralysis results from injury to the spinal accessory nerve. Impairment in the trapezius muscle function may destabilize the muscle resulting in winged scapula. A 25-year-old university student who was active in sports had complaints of shoulder drop and pain on abduction. He had a three-year history of fall resulting in a scapular fracture for which he received conservative treatment. Physical examination showed asymmetry and drop of the right shoulder. Lateral scapular winging was apparent particularly above 90° of abduction. Electromyography revealed isolated paralysis of the trapezius muscle. The patient underwent reconstruction with the modified Eden-Lange procedure. After a two-year follow-up, asymmetry in the shoulder decreased, there was no pain on active abduction, and the patient returned to active sports and was fully satisfied with the outcome.

Key words: Accessory nerve/injuries; electromyography; muscle, skeletal/transplantation; paralysis/surgery; scapula; shoulder.

Trapezius muscular paralysis is a case that results from injury of spinal accessory nerve. When the muscle is weak, the shoulder tends to fall towards the stiffen side. The normal counter of the muscle disappears, the neck and shoulder angle enlarges, and the scapula moves downwards and outwards. The levator scapula and rhomboid muscles that are the other rotator muscles of the scapula cannot prevent folding and falling down of the scapula. Clinically, the arm gets pain and gets tired when it is used for a long time. Most probably, the patient feels pain in the abductions over 90°, and sometimes loss of abduction is observed.

The aim of this study is to allow the treatment of an active sportsman with rarely seen trapezius paralysis by using Eden-Lange procedure, and therefore, to discuss the trapezius paralysis from all aspects.

Case report

A University student (25) who deals with sports (volleyball player with license) applied because of looseness in his shoulder and pain in the abduction. The complaint of the patient has been continued for about two years. The patient stated that his pains increased especially while serving and smacking, and that he could not make sports for the last three months. The medical center to which he applied advised him

muscle strengthening exercises due to rotator cuff lesion pre-diagnosis, and anti-inflammatory drugs were prescribed. In the background analysis, it was determined that he had an unchanged scapula fracture due to falling down three years ago, and he had a conservative treatment for a period of time, however his complaints appeared after that time.

Owing to his increasing complaints, the patient applied to the medical center, and it was diagnosed that there was an asymmetry and looseness in the right shoulder compared to the left shoulder (fig 1). It was observed that the right scapula developed winging, obviously, by moving towards the lateral especially after 90° abduction. The joint movement wideness of the patient was normal. The active shoulder abduction was full but it was found too much painful over 90°. No pain was observed in the forward elevation of the arm. In the EMG of the patient, the isolated paralysis was diagnosed in the trapezius muscle.

In order to stabilize the scapula, Eden-Lange procedure was applied. Under the general anesthesia the patient was placed at lateral decubit and slightly forward slant position. The trapezius muscle which was at the atrophic situation was found between the vertebra spine projecting part and scapula medial side, and even through the incision from the upper part to the lower part of the scapula. Then the stick was removed. At the lower part the levator scapula and rhomboid muscles separated from each other and were cut from the stuck point with little bone piece. Then the supraspinatus and infraspinatus muscles were peeled off from their beds to the lateral half of the scapulae. The minor rhomboid muscle was transferred to the supraspinatus fossa and the major rhomboid muscle was transferred to the infraspinatus fossa. During the said transfer, three bone anchor sutures were used for the major rhomboid and one was used for the minor rhomboid in order to be placed at 5 cm lateral from the scapula medial edge. The anchor sutures were placed obliquely from the medial to the lateral because the scapula body was too thin. The sutures were tightened when the arm was at 90° abduction and when the scapula was at reduced position. The infraspinatus and supraspinatus muscles were sewed over the rhomboid muscles.

The upper part of the spina lateral was reached through the second incision of nearly 5 cm from the post lateral corner of the acromion and 3 cm from the medial. From that point, a tunnel was opened through

the medial, and the levator scapula muscle was threaded through the fibers of trapezius muscle. Then, the muscle was fixed on the spina by a bone anchor suture allowing 5 cm from the acromion. After closing the layers adequately, the immobilization was applied with an abduction cushion.

After the operation, the arm was taken on the rack for 6 weeks. Passive range of motion exercises were started as soon as possible. The abduction cushion was put in the sixth week and the active tightening exercises started. At the end of two years of follow-up, the shoulder asymmetry decreased, the pains at the active abduction reduced and the patient restarted his active sports life with satisfaction (fig 2).

Discussion

The trapezius muscle is a large muscle that starts from the seventh cervical vertebra and extends to the twelfth thoracal vertebra. The upper part of the muscle sticks 1/3 distal of the clavicula. That part elevates the clavicula and accordingly the scapula by pulling



Figure 1. There is an asymmetry of the neck and looseness in the right shoulder with the trapezius paralysis.



Figure 2. Longitudinal incision at the midline of the spinous process and the medial rim of the scapula and transvers incision at the lateral part of the scapula over the spina scapula. Abduction pain disappeared completely in the postoperative period

obliquely, and rotates the lateral edge upwards. The medial part sticks at the acromion and forces the scapula to the abduction. The lower part insert to the base of spina allowing depression of the bone. The functional disorder at the trapezius muscle disturbs the stabilization of scapula and results in developing winging that will disturb the scapulohumeral rhythm and the shoulder belt¹. The so-called disorder shows itself especially in the abduction and partially in the forward elevation. Although the trapezius and serratus anterior muscles are the structures that complete each other in the stabilization and rotation of the scapula, the serratus cannot prevent the limitation of the abduction in the trapezius paralysis. Although there is a lack of strength in the forward elevation, there is no limitation in the movement.

Trapezius muscle is innervated by spinal accessory nerve (11th head pair). The nerve moves downward in the posterior cervical angle just below surface cervical fascia before going into the muscle. This anatomic localization allows the nerve to be exposed to the outer trauma.^[2,3] Iatrogenically, spinal accessory nerve injuries can be seen during the attempts such as surgical applications that concern posterior cervical angle, lymph node biopsies, and radical neck dissection.^[4,5] Moreover, etiological factors such as penetrating traumas, direct shocks in contact sports, traction injuries, traumas, and the cases in which the shoulder becomes under pressure can be considered.^[3] In this case, there was a stable scapula fracture because of falling on the shoulder and the complaints carried on. However, the patient did not tell the exact time of complaints. Therefore, it is not certain whether the paralysis depended on blunt trauma or the traction injury resulting from the athletic activity (volleyball) of the patient. Because regeneration is most frequently observed in the traction type nerve injuries, it is considered that this paralysis occurred most probably after the blunt trauma.

In the differential diagnosis, cervical root avulsions, long thoracic nerve lesion (serratus anterior muscle paralysis), rotator cuff lesions, glenohumeral instability, acromioclavicular lesions and biceps tendonitis must be considered.^[2] Accordingly, the patient was treated for a rotating cuff lesion first of all.

The electromyography (EMG) had a significant role while determining the level of injury in the diag-

nosis. The diagnosis should be given after following "shoulder syndrome" in parallel with EMG: Falling and asymmetry in shoulder, scapular winging and pains.^[3,5] One of the most significant finding that orients the patient to the doctor is pain. It results from the withdrawing effect of the other muscles (rhomboids, levator scapula, serratus anterior) of scapula that is deprived of balancing effect of trapezius.^[5] This pain is mostly observed at the lower edge of the scapula.^[2] At the same time, it is considered that the pain is resulted from traction impact of a shoulder that lost the muscle support, on the brachial plexus or a sensorial nerve.^[4]

In the treatment of the trapezius paralysis, exercises that increase the range of motion and physical treatment are applied.^[2,4] Conservative treatment is indicated for the patients who are considered to have neuropraxis lesions depending on traction or blunt trauma. Surgical treatment is indicated in the patients who have no sufficient return at the end of one year⁴. It is hard to obtain result by means of the conservative treatment in the patients with long-term trapezius dysfunction⁴. Teboul et al.^[6] offer surgical treatment application, if there is no return at the end of three months according to EMG and clinical applications. In surgical treatment, neurolysis is applied; in penetrating traumas, direct nervous repair or grafting is applied. In spontaneous trapezius paralysis facts and in the events that have started over twenty months, reconstructive surgery is recommended⁶. In this fact, reconstructive surgery is indicated instead of nervous surgery because three years have passed as of the beginning.

Static and dynamic applications are available in literature for the reconstructive treatment. Static procedures such as scapulothoracic fusion are just applied for the patients with neuromuscular diseases. Complications such as elongation of used fascia grafts in the meantime, disappearance of arm abduction and pseudarthrosis result in coming down of the static procedures.^[7, 8] Contralateral trapezius transfer recommended by Terzis, or dynamic procedures such as Eden-Lange are preferred.^[4,6,7]

Eden-Lange procedure is a dynamic muscle transfer operation defined by Eden in 1924 and by Lange in 1951 in chronic trapezius paralysis.^[4,9] Wiater and Bigliani⁴ modified the original technique and pointed

out that it was more effective. In this modification supraspinatus fossa is transferred instead of minor rhomboid muscle infrasupinatus, accordingly, reconstruction of medial part of trapezius is obtained, and upper edge of the medial scapula is stabilized. Major rhomboid reconstructs the lower part of trapezius, and levator scapula reconstructs the upper part. In our fact, rather satisfactory result has been obtained as a result of two years of follow-up. Scapular winging and cervix asymmetry decreased, and the abduction pain ceased. The patient has returned to his active sport life six months after the application of the procedure.

Consequently the Eden-Lange procedure is a good dynamic muscle transfer that decreases the pain of the patient and allows normal life quality in late term trapezius paralysis.

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