



## Quadrilateral space syndrome: a case report

### *Kuadrilateral boşluk sendromu: Olgu sunumu*

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Kuadrilateral boşluk sendromu, aksiller sinirde kuadrilateral boşluk içinde izole nöropati gelişmesidir; çok az görülen bir durumdur. Bu yazıda, sağ omzunda yeri iyi belirlenemeyen ağrı, omuz posteriorunda nokta hassasiyeti bulunması ve manyetik rezonans incelemesinde kuadrilateral boşluk içinde fibröz bant görülmesi üzerine kuadrilateral boşluk sendromu tanısı konan 27 yaşında bir erkek hasta sunuldu. Fibröz bantın eksizyonundan sonra aksiller sinirin serbest hale geldiği gözlemlendi. Hastanın şikayetlerinin ameliyattan sonra geçtiği görüldü.

**Anahtar sözcükler:** Aksilla; brakial pleksus; sinir sıkışma sendromu/cerrahi/radyografi; omuz eklemi.

Quadrilateral space syndrome is a rare entity caused by isolated compression of the axillary nerve in the quadrilateral space. A twenty-seven-year-old male patient presented with a poorly localized shoulder pain and point tenderness on the posterior aspect of the shoulder. Magnetic resonance imaging showed a fibrous band causing quadrilateral space syndrome. Surgical excision of the fibrous band was performed and the axillary nerve was released. The patient became symptom-free after surgical decompression.

**Key words:** Axilla; brachial plexus; nerve compression syndromes/surgery/radiography; shoulder joint.

Quadrilateral space syndrome (QSS) is a rare entity caused by the compression of the axillary nerve in the quadrilateral space settled at the inferoposterior of the glenohumeral joint. 25 QSS cases have been reported in literature.<sup>[1-4]</sup> No cases have been reported in Turkish literature. Patients suffer from shoulder pain of undetermined localization aggravated by abduction and external rotation, paresthesia inconsistent with dermatomal distribution over the shoulder and lateral arm, and single point tenderness in palpation of the shoulder.

This case report presents a patient with pain at the right shoulder of undistinguishable location and single point tenderness at the posterior shoulder.

### **Case report**

A twenty seven-year-old male patient suffering from right shoulder pain for the last 8 months under-

went evaluation. He had undergone physical therapy and two local injections previously for this complaint. He had no history of trauma. The range of motion at the shoulder, muscle strength and sensorial examinations were normal. There was single point tenderness with palpation at the right posterior shoulder, in an area conforming to the quadrilateral space. Abduction and external rotation of the arm exacerbated the pain without causing any sensorial alteration. Furthermore, prolonged suspension of the arm at this position aggravated the pain. There were no pulse abnormalities at the right upper extremity detected by Adson's Test. Conventional radiographic evaluation was normal. Magnetic resonance imaging (MRI) revealed a fibrous band in the quadrilateral space of the posterior shoulder (Figure 1). There was no atrophy in the shoulder muscles. His cervical MRI demonstrated type I Arnold Chiari malforma-

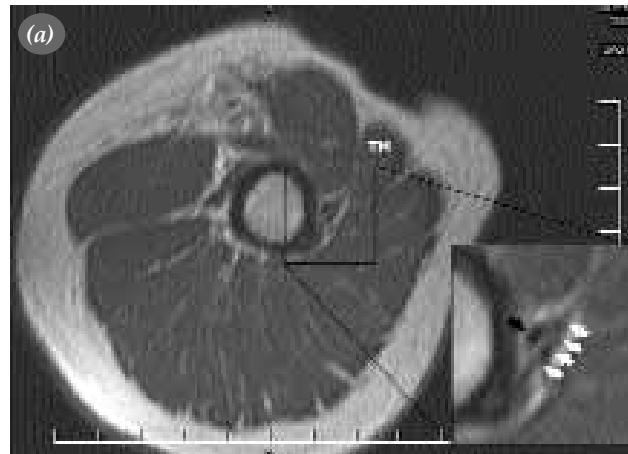
tion. According to these findings the patient was considered to be suffering from QSS. Due to lack of improvement with conservative management surgical intervention was planned.

Patient was laid on the operation table in the left lateral decubitus position. A longitudinal incision was made, beginning 2 cm distal to the acromion's posterior-lateral angle and was extended through the axilla (Figure 2a). Posterior margin of the deltoid muscle was exposed and pulled laterally. The quadrilateral space was reached advancing laterally through the teres minor muscle and the axillary nerve, exposing the posterior humeral circumflex artery. A taut fibrous band was revealed crossing the QS over the artery and the nerve (Figure 2b). Abduction and external rotation of the arm caused compression to the nerve and the artery. Complete relief of the artery and the nerve was achieved after excision of the fibrous band.

Patient's symptoms evidently improved immediately after surgery and he was prescribed shoulder exercises on the second day post-operative day.

## Discussion

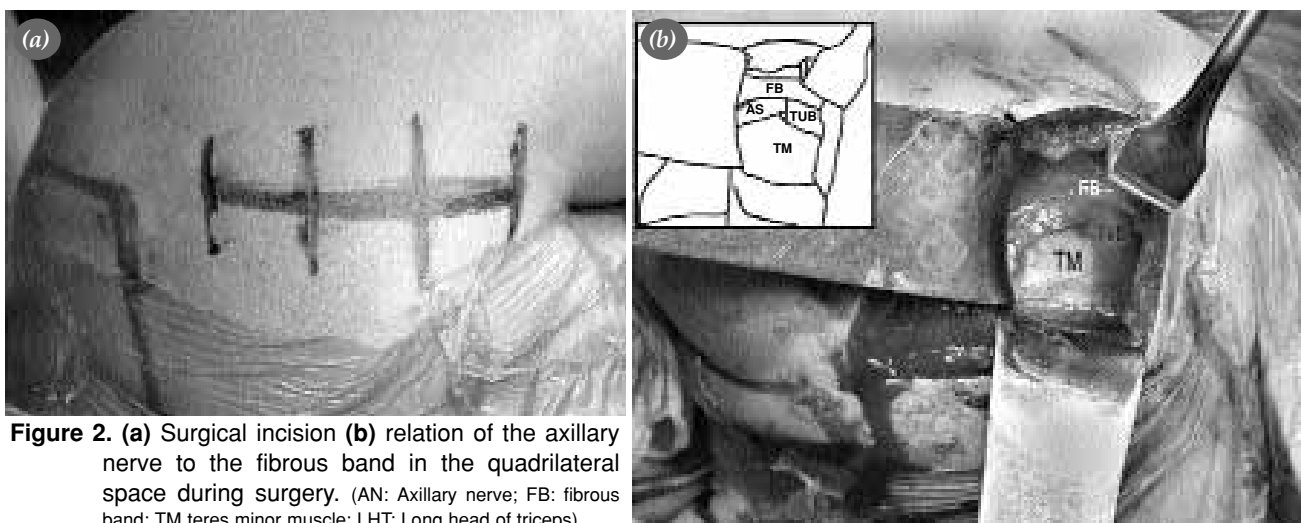
Isolated neuropathy of the axillary nerve is a rare entity reported after procedures that compress the axilla (e.g. suspension of the arm to increase exposure during laparotomy; 8 bandages used to fix below elbow forearm prosthesis to the body) and intramuscular injections to the posterior shoulder.<sup>[5]</sup> Thoracic outlet syndrome, instability of the shoulder, lesions of the rotator cuff and cervical



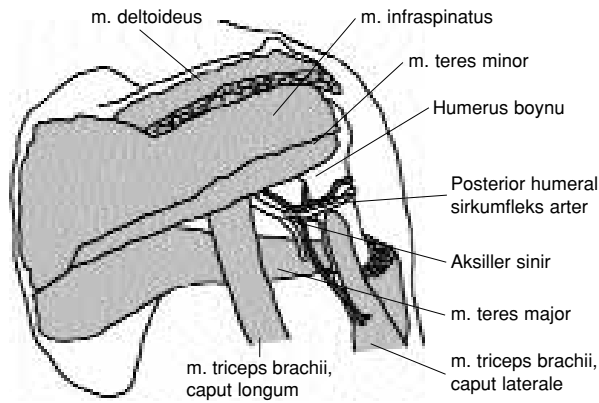
**Figure 1.** (a) T1-predominant axial contrast-enhanced MRI demonstrating the fibrous band in the quadrilateral space and its relation to the axillary nerve. (Black arrow: Axillary nerve; White arrows: Fibrous band; TM: teres minor muscle)

disc disease are among pathologies that may mimic axillary nerve neuropathy. Quadrilateral space syndrome, as initially described by Cahill and Palmer<sup>[1]</sup> is a non-traumatic cause of isolated axillary nerve neuropathy. This space at the posterior-inferior part of the shoulder joint is surrounded by teres minor muscle superiorly, teres major muscle inferiorly, long head of triceps muscle medially and the neck of the humerus laterally. The axillary nerve and the PHCA are the main structures in the space.

Compression of the axillary nerve causes the findings and symptoms of the QSS. Cahill and Palmer<sup>[1]</sup> observed the compression of the axillary nerve and the PHCA in QS due to a fibrous band



**Figure 2.** (a) Surgical incision (b) relation of the axillary nerve to the fibrous band in the quadrilateral space during surgery. (AN: Axillary nerve; FB: fibrous band; TM teres minor muscle; LHT: Long head of triceps)



**Figure 3.** Quadrilateral space.

crossing the space obliquely in 16 of 18 patients suffering from QSS. Also, this syndrome was reported to occur by compression caused by glenoid labral cyst and ganglion cyst.<sup>[2, 3, and 6]</sup> There are also previous reports suggesting that humeral exostosis can cause repeated axillary nerve compression.<sup>[4]</sup> QSS is a pathology usually seen in active individuals ranging 22 – 35 in age.<sup>[5]</sup> Francel et al.<sup>[7]</sup> have reported 5 cases of QSS between 31 and 55 years of age who have a history of trauma that may be associated with the syndrome. They also noted detecting a fibrous band in all of the subjects during surgical intervention. Moreover, micro-traumas during a game of baseball or similar sports were suggested as etiologic factors that cause axillary nerve injury in QS.<sup>[7, 8]</sup>

Four diagnostic criteria have been reported: shoulder pain with undetermined localization; paresthesia over the shoulder and lateral arm inconsistent with dermatomal distribution; tenderness over the QS with palpation and PHCA stenosis documented by arteriography while the arm is in abduction and external rotation.<sup>[1]</sup>

Patients may also suffer from muscle weakness connected with axillary nerve innervation. Muscle weakness and paresthesia may particularly be evident with prolonged suspension of the arm over the head. There may be difficulty in abduction due to muscle weakness.

Arteriography is suggested for documentation of PHCA stenosis in order to diagnose QSS.<sup>[1, 9]</sup> On the other hand, some authors find arteriography useless due to high rate of false positive results.<sup>[7]</sup> In a study performed with healthy volun-

teers, MR angiography of the hyper-abducted arms revealed PHCA stenosis in 80% of the cases.<sup>[10]</sup> In our case we did not perform arteriography.

It is reported that MRI can be used for diagnosing QSS, and atrophy in the teres minor muscle can be a significant finding supporting the diagnosis.<sup>[8]</sup> In our case, the MRI revealed a fibrous band in QS, but no atrophy of the teres minor muscle (Figure 1).

Electromyography may determine muscle denervation including fibrillation potentials in the deltoid muscle in addition to decrease in axillary nerve conduction through quadrilateral space.<sup>[11]</sup> However, electromyography is not necessary for diagnosis of QSS.<sup>[5]</sup> The electromyography performed in our case was of no particular significance.

Patients with QSS do not achieve any improvement with conservative therapy.<sup>[8]</sup> Freeing of the axillary nerve from the fibrous band is the suggested treatment to prevent compression.<sup>[1, 5, 7 and 11]</sup> Surgically, to prevent bleeding and problems that may arise from separation of the muscles, exposure of QS without cutting the deltoid and teres minor muscles is the suggested procedure.<sup>[7]</sup> In our patient, we did not separate the deltoid and teres minor muscles and decompression of the nerve was performed following the teres minor muscle laterally. No technical difficulties were encountered in the operation.

As a result, QSS must be kept in mind in young and active patients without a previous trauma history who suffer from shoulder pain with undetermined localization, paresthesia over the shoulder and lateral arm, particularly when the arm is abducted and externally rotated and having tenderness over the QS on palpation. An appropriate surgical technique is the key to early improvement.

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