

## Dramatical Recovery of Thoracic Outlet Syndrome After Surgery: Case Report

### Torasik Outlet Sendromunda Cerrahi Sonrası Dramatik İyileşme: Olgu Sunumu

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#### ABSTRACT

Thoracic Outlet Syndrome (TOS) is a complex of clinical symptoms characterized by the compression of vascular and neurogenic structures which are localized within the thoracic outlet region. There is no gold standard diagnostic criterion for TOS and the anamnesis and physical examination are important tools for the diagnosis. Supportive and differential examinations are often electromyography (EMG), direct cervical radiography, and neck MRI. Priority in treatment is conservative treatment consisting of medical treatment and physical therapy. Last surgical option is the surgical treatment consisting of the resection of the first costa and cervical costa, and the incision of the scalenus anterior and scalenus medius muscles. It has been reported that TOS resulting from the compression of vascular structures, improved in a very short period of time after surgery, while in TOS resulting from the compression of neurogenic structures the improvement occurs between 6 months and 1 year on average. We performed 1st costa resection on a TOS case with the compression of neurogenic structures. Contrary to the literature, complaints of our case disappeared completely within 1 week. One month after the operation, EMG findings returned to normal.

Keywords: Thoracic outlet syndrome, neurogenic symptoms, surgery.

#### ÖZ

Torasik Outlet Sendromu (TOS); torasik çıkımdaki vasküler ve nörojenik yapıların baskıya maruz kalmasıyla karakterize klinik semptomlar kompleksidir. TOS da altın standart bir tanı kriteri yoktur. Tanıda anamnez ve fizik muayenenin önemi büyüktür. Destekleyici ve ayırt edici tetkikler sıklıkla elektromiyografi, direk servikal grafi ve boyun MR ıdır. Tedavide öncelik medikal tedavi ve fizik tedaviden oluşan konservatif tedavilerdir. Son seçenek 1.kostanın ve varsa servikal kostanın çıkarılması ve skalen anterior ve skalen medius kaslarının kesilmesinden oluşan cerrahi tedavidir. Vasküler yapılar baskı sonucu gelişen TOS da cerrahi tedavi sonrasında düzelme bulguları çok kısa sürede ortaya çıkarken, nörojenik yapılar baskı sonucu oluşan TOS bulguları ortalama 6 ay ile 1 yıl arasında düzelmektedir. Biz nörojenik yapılar baskı bulgularıyla kliniğe yansıyan TOS vakamıza literatürde en fazla rastlanan transaksiller girişim yöntemiyle 1. kosta rezeksiyonu uyguladık. Literatürden farklı olarak vakamızın şikayetleri 1 hafta içerisinde tamamen kayboldu. Operasyondan 1 ay sonra ise EMG bulguları tamamen normale döndü.

Anahtar Kelimeler: Torasik outlet sendromu, nörojenik semptomlar, cerrahi

Received Date:: 06.03.2019 Accepted Date: 11.05.2019 Published Date:23.08.2019

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## Introduction

**T**OS is a complex of clinical symptoms characterized by the compression of vascular and neurogenic structures in the thoracic outlet. Structures under compression are axillary artery, axillary vein, and ulnar and median nerves. Generally, 1st Costa, cervical costa which is congenitally present in some people, as well as scalar muscles, and fibrotic bands may cause compression [1-5]. Although postoperative recovery secondary to the compression of vascular structures is based on objective data, the same approach is difficult to apply for TOS causing nerve compression. While the pathology improves quickly once vascular compression is eliminated, it takes about six months to one year for complaints and EMG findings to disappear when nerve compression is eliminated [6]. Although EMG is not the gold standard in the diagnosis and follow-up of TOS, it is the most objective diagnostic and follow-up procedure [7]. In this paper, we present a case admitted to our clinic with complaints presenting for the past three years with EMG findings consistent with TOS, which responded clinically and electrophysiologically well to surgery.

## Case Presentation

A 47-year-old female patient with complaints of numbness and loss of strength in the right arm for 3 years was admitted to Alanya Alaaddin Keyubat University, Department of Thoracic Surgery. It was found that the patient had received medical treatment several times and physical therapy was applied twice during this period, with no improvement in patient complaints. Physical examination revealed that the right arm was positive for Adson test. In the motor examination on the right arm, hand grip force was evaluated as 2/5, and finger abduction was evaluated as 1/5. Hypoesthesia was observed in the median nerve sensory field. No cervical elevation was observed in direct cervical radiographs. No pathology was observed on neck MRI. In EMG, there was a decrease in the CMAP amplitude of the ulnar nerve and a slowing of the median nerve sensory conduction velocity. The patient was treated with first costa resection using the transaxillary approach [fig. 1a, b]. The examination on postoperative first day revealed that the numbness in the hand and arm completely

disappeared, and hand grip force and finger abduction in the right arm increased to 4/5 and 3/5, respectively. Patient's follow-up on postoperative week 1 revealed that all complaints disappeared and neurological examination was normal. Control EMG was requested and scheduled on postoperative month 1. EMG findings showed that ulnar and median nerve conduction velocities were completely normal.

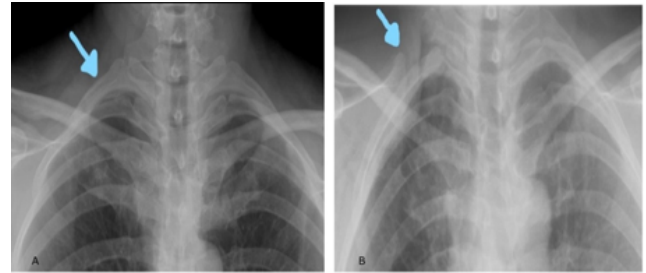


Figure 1a: before operation, presentation of first costa, Figure 1b: after operation, vision after the removal of first costa

## DISCUSSION

TOS is a complex characterized by clinical symptoms resulting from compression of the vascular and neurological structures at the thoracic outlet. Clinical reflection of TOS varies according to the structures under compression and the duration and severity of pressure [1-5]. Symptoms such as chills, coldness, pallor, bruising, and swelling on the hand may occur due to compression of vascular structures. Complaints of pain and numbness can be seen due to compression of neurological structures. In the literature, the incidence of TOS with neurological symptoms is 90%, whereas the incidence with vascular symptoms is 4-10% [8,9]. Our case was characterized with the compression of neurological structures.

There is no gold standard diagnostic method for TOS. Anamnesis and physical examination are very important in the diagnosis. Generally, these patients are examined in many departments with their current complaints and the patient group consists of patients whose complaints have not regressed despite receiving treatment many times. In order to make a diagnosis in these patients, it is important that the physician keeps TOS in mind and conducts anamnesis, physical examination, and examinations in that direction. In patient anamnesis, other vascular and neuroge-

nic pathologies that may lead to pathology in the arm should be questioned carefully and differential diagnosis should be undertaken with care [6]. Although there are tests such as costoclavicular test, abduction external rotation test, hyperabduction test that can be employed during physical examination for TOS, the most widely used test in the clinic is the Adson test. In the Adson test, while the radial pulse is checked manually on the side of complaints, the patient's jaw is placed horizontally. The patient takes a deep breath and holds it, and patient's face is turned to the side the test is being conducted on. The test is considered positive if there is a decrease or loss in the pulse at this point [9]. In all of these tests, the aim is to narrow the scalenus triangle and to make the symptoms more pronounced by increasing the compression. In our case, various medical treatments and physical therapy had been applied for a long time considering other pathologies. After a detailed anamnesis and physical examination, Adson test was found to be positive and we performed EMG on our patient to support diagnosis. EMG results were consistent with TOS. To investigate the presence of cervical elevation, we performed a two-way cervical X-ray and we found no cervical costa. We applied classical diagnostic methods for TOS during the diagnosis of our case while also applying differential diagnostic tests.

Conservative treatments are primarily applied in the treatment of TOS. Surgical treatment is the last option in patients who cannot be treated with medical therapy and physical therapy. In all treatment options, the aim is to eliminate or reduce the pressure. In this context, first costa and cervical costa –if it is present– is resected in surgical treatment while the scalenus anterior and scalenus medius muscles are cut from the connection points on the costa. During this procedure fibrotic bands are also cut if any exist. There are two main causes of postoperative complications. The first is when surgery is not performed properly, in other words, fragments causing compression are not resected sufficiently, and the second is that the adhesions that occur after surgery can cause to compression again [10]. In our case, we applied surgical treatment as the last treatment option. Using the transaxillary approach which is the most preferred approach in the literature, we resected the first costa and cut the scalenus anterior and

scalenus medius muscles during the operation. Complications of vascular injuries and brachial plexus injury that have been reported in the literature did not develop in our case. Cervical costa and fibrotic bands seen in some cases were not present in our case. When vascular compression findings are eliminated after surgery, vascular complaints improve rapidly. However, it has been reported in the literature that complaints arising from nerve compression improve between 6 months and 1 year. Patients who are operated for neural compression are usually delayed cases, and therefore, it takes a significant time for the nerve regeneration especially for cases in which the nerve has been subject to compression for a long time. Therefore, it takes a long time for the complaints to disappear completely [6]. In our case, the complaints disappeared completely within 1 week. EMG performed 1 month after the operation objectively showed that nerve conduction velocities were normalized. We did not find any cases in the literature in which complaints disappeared completely in such a short period of time while the EMG findings were completely normal.

In conclusion, although surgery is the last option in cases of TOS being with neurological compression symptoms, surgical treatment at the appropriate time may result in complete recovery in very short periods of time even in cases which have been late-diagnosed.

**Funding sources:** There is no any source of funding or financial interest in this study.

**Conflict of Interest:** The author have no conflicts of interest relevant for this article.

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**How to cite this article/Bu makaleye atıf için:**

**Aslaner O. Dramatical Recovery of Thoracic Outlet Syndrome After Surgery: Case Report.**  
**Acta Med. Alanya 2019;3(2):193-196 doi:10.30565/medalanya.536556**