



THORACIC OUTLET DECOMPRESSION

Thesis

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in general surgery

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ABSTRACT

Key Words: Thoracic outlet, transaxillary resection of first rib, scalenectomy, cervical rib

Thoracic outlet syndrome (TOS) is a disorder referring to the clinical manifestations of the compression of great vessels and nerves at the base of the neck. The etiology of thoracic outlet syndrome (TOS) is believed to be a combination of neck trauma plus an anatomic predisposition. The diagnosis of thoracic outlet compression syndrome is usually made on the basis of an adequate history, physical examination and diagnostic tools. Treatment of TOS depends on the type, severity, and acuity of the presentation. It can be managed conservatively or surgically. In appropriately selected patients, surgical interventions can improve their quality of life over time.

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LIST OF ABBREVIATIONS

AC	Acromioclavicular
BC	Brachiocephalic
BPG	Brachial plexus gliding
CT	Computed tomography
EMG	Electromyography
MRA	Magnetic resonance angiogram
MRI	Magnetic resonance imaging
NAV	Nerve, artery and vein
NCV	Nerve conduction velocity
PTA	Percutaneous transluminal angioplasty
ROM	Range of motion
SCS	Supraclavicular scalenectomy
SSEP	Somatosensory evoked potential
TENS	Trans-cutaneous electrical nerve stimulation
TFRR	Transaxillary first rib resection
TGE	Tendon gliding exercises
TOS	Thoracic outlet syndrome
US	Ultrasonography
USA	United States of America

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INTRODUCTION

Thoracic outlet syndrome (TOS) is the name given to various clinical manifestations characterized by abnormal compression of the great vessels and nerves at the base of the neck as they pass from the mediastinum and neck to the axilla. ***(Balci et al, 2003)***

Thoracic outlet syndrome is a very confusing syndrome with controversy regarding etiology, diagnosis and management. ***(Mackinnon et al, 2002)***

The name itself is confusing and misrepresentative. Clinicians tend to call it the thoracic outlet because the structures being compressed are exiting the chest in this location. Anatomists consider this incorrect terminology, as they work from superior to inferior, and thus consider the same area to be the thoracic inlet. These controversies over semantics only add further confusion to already complex clinical problems. ***(Brantigan et al, 2004)***

Other names used, such as scalenus anticus syndrome, costoclavicular syndrome, cervical rib syndrome, subcoracoid-pectoralis minor syndrome, costoclavicular syndrome, and first-thoracic rib syndrome further confused the understanding of the pathophysiology of this condition. ***(Brantigan et al, 2004)***

The thoracic outlet is a three dimensional space bounded by the first thoracic vertebra posteriorly, the superior border of the manubrium sterni anteriorly, and the first rib and costal cartilage laterally. (*Atasoy, 2004*)

The structures passing through this area and into the upper limb are the subclavian artery, the subclavian vein and the nervous structures of the brachial plexus. (*Cooke, 2003*)

The etiology of thoracic outlet syndrome (TOS) is believed to be a combination of neck trauma plus an anatomic predisposition. (*Sanders et al, 2004*)

In many cases, an anatomical abnormality will be present and be the underlying reason for the development of symptoms of thoracic outlet syndrome. There may be occupational influences to provoke or exacerbate symptoms, such as working repeatedly with the arms at or above shoulder height. (*Cooke, 2003*)

The clinical presentation of thoracic outlet syndrome is highly variable, depending on what parts of brachial plexus is involved and to what extent the subclavian artery or vein is involved. (*Brantigan et al, 2004*)

The symptoms of thoracic outlet syndrome fit into four groups: neurological, arterial, venous and non-specific.

Neurological symptoms consist of pain, paraesthesia, anaesthesia and motor weakness, mostly involving the lower plexus (ulnar nerve) distribution. (*Samarasam et al, 2004*)

Arterial symptoms include aching, fatigue, upper limb claudication and signs of distal embolization. Autonomic vascular symptoms include pallor, excessive sweating and Raynaud's phenomenon. Venous symptoms include swelling, cyanosis of arm and acute deep vein thrombosis. (*Brantigan et al, 2004*)

There is a fourth group of patients whose presentation is characterized by pain but no clear neurological deficits or clear vascular symptoms. This type of TOS is termed *disputed neurogenic TOS*. (*Sheth et al, 2005*)

The wide variability of patient symptoms and the lack of a valid reliable test to confirm the diagnosis of TOS make it difficult to identify correctly those patients with TOS. The diagnosis of thoracic outlet compression syndrome is usually made on the basis of an adequate history and physical examination. Diagnosis is largely one of exclusion. (*Urschel et al, 2007*)

Several tests are used in the diagnosis, including nerve conduction velocity (NCV), electromyography (EMG), angiography, venography and radiographic studies of the chest