Thoracic Outlet Syndrome

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Diagnosis is the key to successful treatment...

What is Thoracic Outlet Syndrome?
National Institute of Neurological Disorders and Stroke

- Thoracic outlet syndrome (TOS) consists of a group of distinct disorders that affect the nerves in the brachial plexus and various nerves and blood vessels between the base of the neck and axilla.

What is Thoracic Outlet Syndrome?

- For the most part, these disorders have very little in common except the site of occurrence
- The disorders are complex, somewhat confusing, and poorly defined, each with various signs and symptoms of the upper limb.

True Neurologic TOS

- Only type with a clear definition that most scientists agree upon. The disorder is rare and is caused by congenital anomalies (unusual anatomic features present at birth). It generally occurs in middle-aged women and almost always on one side of the body. Symptoms include weakness and wasting of hand muscles, and numbness in the hand.

Disputed TOS

- Also called common or non-specific TOS, is a highly controversial disorder. Some doctors do not believe it exists while others say it is very common. Because of this controversy, the disorder is referred to as “disputed TOS.” Many scientists believe disputed TOS is caused by injury to the nerves in the brachial plexus. The most prominent symptom of the disorder is pain. Other symptoms include weakness and fatigue.
Arterial TOS

- Occurs on one side of the body. It affects patients of both genders and at any age but often occurs in young people. Like true neurologic TOS, arterial TOS is rare and is caused by a congenital anomaly. Symptoms can include sensitivity to cold in the hands and fingers, numbness or pain in the fingers, and finger ulcers (sores) or severe limb ischemia (inadequate blood circulation).

Venous TOS

- Also a rare disorder that affects men and women equally. The exact cause of this type of TOS is unknown. It often develops suddenly, frequently following unusual, prolonged limb exertion.

Traumatic TOS

- May be caused by traumatic or repetitive activities such as a motor vehicle accident or hyperextension injury (for example, after a person overextends an arm during exercise or while reaching for an object).

Traumatic TOS

- Pain is the most common symptom of this TOS, and often occurs with tenderness. Paresthesias (an abnormal burning or prickling sensation generally felt in the hands, arms, legs, or feet), sensory loss, and weakness also occur. Certain body postures may exacerbate symptoms of the disorder.

Thoracic Outlet Syndrome

- How could you differentiate vascular from neurogenic TOS?

Neurovascular Evaluation

Adson’s test

Your evaluation should include a complete neurovascular assessment.
Thoracic Outlet Syndrome

Sensory distribution

- Pain is the most common symptom of this TOS, and often occurs with tenderness. Paresthesias (an abnormal burning or prickling sensation generally felt in the hands, arms, legs, or feet), sensory loss, and weakness also occur. NINDS

Thoracic Outlet Syndrome

• Traumatic TOS may be caused by traumatic or repetitive activities such as a motor vehicle accident or hyperextension injury (for example, after a person overextends an arm during exercise or while reaching for an object). NINDS

Thoracic Outlet Syndrome

Cervical Rib

- True neurologic TOS is the only type with a clear definition that most scientists agree upon. The disorder is rare and is caused by congenital anomalies (unusual anatomic features present at birth). NINDS

Thoracic Outlet Syndrome

• It generally occurs in middle-aged women and almost always on one side of the body. Symptoms include weakness and wasting of hand muscles, and numbness in the hand. NINDS

Venous Thoracic Outlet Syndrome

• Neurogenic 80%
• Venous 15%
“Effort Thrombosis”
• Arterial 5%
• Female 75%

Thoracic Outlet Syndrome

Roos Test

• Abduct shoulders and externally rotate to 90° with elbow flexion at 90°.
• Open and close hands for 3 minutes.
Roos Test

- Reproduction of symptoms or a sensation of heaviness or fatigue is considered a positive test result (Safran, 2004).

Thoracic Outlet Syndrome
Wright’s Test

- Hyperabduct and externally rotate the patient’s arm while assessing the ipsilateral radial pulse.
- Considered positive if the pulse diminishes or paresthesias develop (Safran, 2004).

Brachial Plexus Irritation

- How would you differentiate a nerve root lesion from a brachial plexus lesion?

Brachial Plexus

Orthopedic Examination of the Cervical Spine

- Involves the taking of a history, performance of physical examination procedures and laboratory evaluation, which may include imaging studies.

Orthopedic Palpation

- Static palpation
- Flat palpation
  - Superficial
  - Deep
Shoulder Abduction Test

- Bakody’s sign for nerve root irritation

Cervical Compression Tests

- Foraminal compression (passive)
- Jackson’s
- Spurling’s (in favor)
- Extension/Flexion

Cervical Compression Tests

- Positive findings all indicate radicular pain

Posterior Cervical Compression

- Imbrication of zygapophyseal joints with increased pain
- Reduction of HNP and pain
Cervical Cord Compression

- Cervical compression tests will elicit signs of myelopathy rather than radiculopathy

Cervical Distraction Test

- Distraction test for nerve root, facet, or myospasm
- **Positive** test relieves pain
- **Negative** test increases pain

Neurological Examination

Three Part PNS

Suggested Reading

- Thoracic Outlet Syndrome: An Old Challenge with a New Image
- Scott Werden, MD