Thoracic Outlet Syndrome

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Abstract

Thoracic outlet syndrome (TOS) is a term used to describe a group of disorders that occur when there is compression, injury, or irritation of the nerves, and or blood vessels in the lower neck and upper chest area. Thoracic outlet is the space between your lower neck and upper chest where this grouping of nerves and blood vessels are found.

I decided to do my research paper on this subject because honestly I didn’t quite understand what TOS was, or what caused it. After the research was done, I was surprised at how many of my clients had symptoms of this disorder. I now feel that I am well versed on the subject and its causes, and now I can accommodate my clients, giving them a well rounded program to help in their rehabilitation.
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Anatomical Review

Different types of TOS and their symptoms

**Neurogenic Thoracic Outlet Syndrome**

This is the most common type, and is caused by compression of the brachial plexus.

The brachial plexus is a network of nerves that come from your spinal cord and control muscle movement and sensation in the shoulder, arm and hand.

Symptoms include…

1. Muscle wasting in the fleshy base of the thumb (Gillant-Summer hand)
2. Numbness or tingling in the arm and fingers
3. Pain or aches in the neck shoulder and hand
4. Weakening grip

**Vascular Thoracic Outlet Syndrome**

This occurs when one or more of the veins (venous thoracic outlet syndrome) or arteries (arterial thoracic syndrome) under the collarbone (clavicle) are compressed.

Symptoms include…

1. Discoloration of hand (blueish color)
2. Arm pain and swelling, possible due to blood clots
3. Lack of color (pallor) in the affected arm
4. Weak or no pulse, in the affected arm
5. Throbbing lump near the collarbone
6. Weakness of arm and neck
7. Numbness or tingling in the fingers
8. Arm fatigue with activity

Nonspecific-Type Thoracic Outlet Syndrome

This is also called disputed Thoracic Outlet Syndrome, because some doctors don’t believe it exists, while others say it is a common disorder.

Symptoms include…

1. Chronic pain in the area of the thoracic outlet that worsens with activity, but a specific cause of pain cannot be determined.

Causes of Thoracic Outlet syndrome

1. Trauma - a traumatic event, such as a car accident, can cause internal changes that then compress the nerves in the thoracic outlet. The onset of the symptoms related to a traumatic accident is often delayed.
2. Repetitive Activity - Doing the same thing repeatedly can, over time, wear on the
3. Body’s tissue. Symptoms may be noticed if the subject’s job requires continuous and repetitive movement, such as typing, working an assembly line job, lifting things above the head as you would in stocking shelves. Athletes such as baseball pitchers and swimmers, also can develop TOS from years of repetitive movement.

4. Poor Posture - Drooping shoulders, or holding the head in a forward position can cause compression in the thoracic outlet.

5. Anatomical defects - Inherited defects that are present at birth may include an extra rib located above the first rib (clavicle rib) or an abnormally tight fibrous band connecting the spine to the rib.

6. Pressure on joints due to obesity

7. Pregnancy
Prevention

TOS that goes untreated for years can cause permanent neurological damage, so it is important to have symptoms evaluated and treated early, or take steps to prevent the disorder. Regular pilates sessions are an excellent way to prevent the disorder. Individuals who are susceptible to thoracic outlet compression should avoid repetitive movements and lifting heavy objects. Maintaining a healthy weight is also beneficial in preventing or relieving symptoms. Even if symptoms are not present it is best to avoid carrying heavy bags over the shoulder, because this can increase pressure on the thoracic outlet.

Complications
If an individual does have nerve damage his or her doctor may recommend surgery, but only if other treatments, and rehabilitation have not been effective. It is always a good idea to recommend that your client see a doctor for a proper diagnosis.

Case Study

John Smith came to me complaining of pain in his neck, shoulders and hand. He was also experiencing weakness in his grip. He is 65 years old with few physical limitations other than limited flexibility. He was also feeling pressure in his thoracic outlet area at night when he tried to sleep. He is a farrier. He spends his days bent over trimming horses hooves about 5 hours a day, 4 days a week.

It was quite apparent to me that he was having classic symptoms of TOS, especially considering what he did for a living. I did suggest that he see his doctor for an evaluation, and the doctor gave him some exercises to do at home, but no physical therapy, and this is why he came to me.

I chose this program for my client because of his TOS symptoms. It is important to address the area of the Thoracic Outlet, but also very important to address the body as a whole.
Precautions and contraindications were to avoid movements aggravated by compression of the thoracic outlet region. Avoid any positions or movements that reproduce symptoms in his arm and hand.

Our goals for our sessions included…

1. Decrease compression at the thoracic outlet
2. Increase flexibility and restore normal function of scalene muscles
3. Retrain upper quadrant
4. Improve cervical and scapular stabilization
5. Improve flexibility of tight neck and shoulder muscles
6. Improve posture
7. Increase core strength

Session

**Mat warm up**

- **Pelvic curl** for mobilization of the spine and pelvic region, spinal articulation, hamstring control, pelvic lumbar stabilization, and recruitment and contraction of the core muscles
- **Supine spine twist** for Spinal rotation, abdominal control with oblique emphasis, and pelvic lumbar Stabilization (Can use a ball to support legs in table top if needed)
- **Chest lift** for abdominal strength and lumbar pelvic stability
- **Chest lift with rotation** for abdominal strength with oblique emphasis, lumbar pelvic stability, spinal mobility (if discomfort in the neck is present we replace the chest lifts)
Footwork on Reformer

Parallel heels
Parallel toes
V position toes
Open V heels
Open V heels
Calf raises
Prances
Single leg heel
Single leg toe

Working hip extensor strength, knee extensor strength and control, ankle plantar flexor strength, ankle stability, pelvic stability. *(Pad shoulder rests, so we don’t increase tension in the shoulders and neck, we also hold a dowel in with palms up)*

Abdominals on Reformer

Hundred prep for abdominal strength and shoulder extensor control

Coordination for abdominal strength, shoulder extensor control, pelvic lumbar stabilization. *(both of these exercises can be performed with head down if neck or shoulder pain exists)*
Hipwork on Reformer

Frog

Circles down

Circles up

Openings

Working on Hip adductor strength, hip extensor control, pelvic lumbar stabilization, and in the frog we are working knee extensor control

Spinal Articulation on Reformer

Bottom lift for spinal articulation hip extensor control

Stretches on Ladder barrel

Shoulder stretch 1 for shoulder extensor stretch

Shoulder stretch 2 for shoulder flexors

Full Body Integration on Cadillac

Sitting forward for abdominal control, hamstring stretch and spinal mobility

Side reach for abdominal control, oblique stretch, and shoulder adductor stretch

Standing Arm work series on Cadillac

Chest expansion for shoulder extensor strength, elbow extensor strength and trunk stabilization

Hug a tree for shoulder horizontal adductor strength, trunk stabilization

Circles up and down for scapular stabilization, increased range of motion in shoulder joint, trunk stabilization
Punches for elbow extensor strength, shoulder horizontal adductor strength, trunk stabilization

Biceps for elbow flexor strength, stretch anterior aspect of the shoulder, trunk stabilization

Leg work on Wunda Chair

Leg press standing for balance, hip extensor control, knee extensor control

Lateral flexion/rotation on Wunda Chair

Side Stretch for lateral flexor stretch, abdominal control with oblique emphasis

Back extension on Wunda Chair

Swan Basic for back extensor strength, abdominal control, scapular stabilization

Standing Roll down to finish off our session
Conclusion

Pilates is a mind-body form of conditioning. It is a holistic approach to optimizing human movement. Pilates is versatile and adaptable, so it is appropriate for nearly any patient or client. It offers a solution to individuals across the spectrum of mobility and fitness. Pilates exercises work muscles statically and dynamically, emphasizing both the concentric and eccentric muscular contractions. It is functional. Your clients deserve a customized adaptable solution when injury or chronic pain impairs movement and performance.

After 6 sessions with John his symptoms have decreased dramatically, and he is feeling much better. Although he was a little sceptical at first, he now swears by his pilates sessions! It is our goal to keep working together once a week, as consistency with his sessions is important. It is our goal to establish adequate flexibility, balanced strength and proper shoulder mechanics in our future sessions and then we can introduce more intermediate repertoire, such as Rowing back 1, Rowing back 2, Rowing front 1 and rowing front 2 on reformer, and Frog back on Wunda chair.

We are very happy with his progress, and are excited about what his future sessions will accomplish.
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