

DESIRED PRI CLINICAL APPLICATION FOR LEFT LOW TRAP AND LEFT SERRATUS ANTERIOR ACTIVITIES

Understanding Thoracic Airflow, Rib Rotation and Trunk Position with Superior T4 Syndrome

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In order to fully understand why the left low trap and left serratus anterior activities are incorporated the way they are, one must first understand thoracic airflow, rib rotation and tri-planar trunk position issues associated with Superior T4 Syndrome.

This syndrome is a pathological state of thoracic airflow and faulty rib mechanics that can develop in response to the standard airflow restrictions seen with the L AIC and R BC pattern. The typical L AIC and R BC pattern involves pelvic, spinal and diaphragmatic orientation toward the right with the upper trunk counter rotation back to the left as the left ribs move into ER (inhalation) and the right ribs move into IR (exhalation). This developing left hyperinflation contributes to the compensatory left spinal counter rotation and the left spinal counter rotation contributes to the left hyperinflation. It should be remembered that thoracic airflow, rib rotation and transverse spine position are all directly related to one another.

The Superior T4 syndrome is a pathological state of airflow and rib mechanics that develops above T4 on top of the typical R BC pattern because of right airflow restrictions. The right scalenes attempt to enhance right thoracic airflow across the IR and inhale restricted right rib cage by pulling the right upper ribs into ER (inhalation). This right upper rib ER combines with concomitant left upper rib IR (exhalation) across the hyperinflated left side as the upper thoracic spine turns back to the right. This developing right spinal counter rotation contributes to the right upper rib ER (inhalation) and the standard airflow restrictions seen with the typical R BC pattern are reversed above T4. In other words, the right lower ribs are in a state of IR (exhalation), but the right upper ribs are drawn up into a state of ER (inhalation). The left lower ribs are in a state of ER (inhalation), but the left upper ribs are moved into a state of IR (exhalation). The right side will commonly develop a very restricted right subclavius as the first and second ribs are pulled up into the clavicle by the overactive right scalenes and often needs to be manually released. This uniquely positioned scapular retractor can hold the right shoulder girdle retracted in a position that disengages both the right low trap and right serratus anterior if not properly addressed.

Passive rotation of C3-C7 back to the left usually appears more restricted with Superior T4 patients than the standard L AIC/R BC patient. This is because the upper thoracic counter rotation to the right that occurs with this syndrome prevents the cervical segments from turning back to the left because of their strong orientation toward the right. This transverse plane problem is further complicated by a related frontal plane problem. These patients will demonstrate an inability to passively sidebend C3-C7 to the right because the vertebral position was altered in the frontal plane is association with the right upper ribs moving into ER (and elevation) and the left upper ribs moving into IR (and depression). This elevation of the right upper ribs and right side of the thoracic vertebrae combines with depression of the left upper ribs and left side of the thoracic vertebrae to alter the frontal plane resting position of the upper thoracic vertebrae. This angled position to the left gives the appearance that passive cervical

sidebending is limited to the right because the segments are already sidebending to the right just to look neutral.

The basic R BC patient has two principle rehab objectives to restore the upper trunk to a balanced alternating reciprocal pattern of motion: 1) restoring L AF IR (including a tri-planar L ZOA) and 2) restoring R upper trunk rotation (including R apical chest wall expansion). Superior T4 Syndrome patients have a few additional objectives that must be added to their program. These objective include: 1) using the left low trap to help reposition the left scapula and to stabilize the left side of the spine prior to rotating it back to the right, 2) using the left serratus anterior to pull the left ribs back to assist posterior mediastinal fulfillment and 3) using the right serratus anterior to reverse the right rib cage IR/ER issues and to make sure the patient can reach with their right arm without moving into unsupported left trunk rotation. If these treatment objectives are not met before attempting to restore R upper trunk rotation then they will likely pull back into the Superior T4 pathology.

The typical Type I right shoulder and Type III left shoulder often associated with the R BC can go on to become a Type I shoulder on both sides with the development of Superior T4 Syndrome. This internal rotation of the left scapula can occur as the upper thoracic spine and the shoulder girdles counter rotate back to the right. Starting a patient's rehab with the left low trap helps reverse the Superior T4 rotation pattern across the upper thoracic spine and upper rib cage by externally rotating the internally rotated Type I left scapula. This is best done as the patient reaches forward with their right arm and back with their left. PRI right arm reach activities help direct the patient into L AF IR position and the left ZOA and can be combined with left arm reach back activities that will engage their left low trap.

Left abdominal integration in the frontal plane will also be an important consideration for Superior T4 patients because they often struggle to abduct their thorax to the left and maintain all of the frontal plan corrections needed to hold correct thoracic position. These patients are often shifted so far to the right that they develop tightness across the right latissimus dorsi, and adapt to a right abducted thoracic position that prevents both L AF IR and the frontal plane left ZOA. Besides stretching and inhibiting the overactivity of the right latissimus dorsi, these patients may also need to incorporate the integrated families of muscles called the adduction family and the abduction family to tie together the core abdominal and thoraco-scapular stabilization efforts. The Hruska Adduction (and Abduction) Lift Tests should be used frequently to help assess abdominal wall integration and the ability to control the torso during frontal plane transitions without abducting the thorax incorrectly.

Right arm reach (exhalation) activities that facilitate L AF IR, the left ZOA and left trunk rotation would be appropriate ways to start the repositioning process for the very "rotated to the right" Superior T4 patient. Frontal plane abdominal activities that incorporate adduction on the left and abduction on the right should follow with a respect for the integrated concept of left thoracic abduction. They will then need to maintain a tri-planar left ZOA while they move into restorative left arm reach (inhalation) activities to facilitate right trunk rotation with air being brought into the appropriate areas of the rib cage. Manual techniques would likely include the stated Right Subclavius, Right Sibson's, Right Intercostals, Infraclavicular Pump and the Left Pectoralis technique. Any upper half stretches that may be needed to target these stated objectives along the way should be performed to facilitate the process.