

# DESIRED PRI CLINICAL APPLICATION FOR RIGHT LOW TRAP/TRICEP & RIGHT SERRATUS ACTIVITIES

Sequence and progression of scapular-thoracic and thoracic-scapular trunk stabilization

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In order to understand why the right low trap/tricep exercises and right serratus exercises are progressed the way they are, one must first understand what should happen to the spine, diaphragm and thorax (rib cage) during the restorative process.

The typical L AIC and R BC pattern involves a pattern of pelvic, spinal and diaphragmatic orientation towards the right with the thorax rotating back to the left above the diaphragm. This left upper trunk or rib cage rotation occurs to maintain the frontal plane and in association with right upper extremity “reach” activities. This transverse plane compensation to maintain position in the frontal plane typically involves ER of the left rib cage and IR of the right rib cage, promoting a hyperinflated left side and hypoinflated right side.

The problem with this compensated position is that it disengages the right low trap, tricep and serratus anterior muscles as the right shoulder moves in to a protracted state with the IR right rib cage that is turning back to the left. The right lower trap/tricep cannot retract the scapula back on the rib cage because the rib cage is not in the correct position, which has protracted the scapula. This inactive right lower trap is not only limited in its ability to retract the scapula with right upper trunk rotation, but it is also limited in its ability to help turn or hold the spine back to the left above T12. The right lower serratus anterior cannot pull the IR ribs back into ER toward the scapula, because the scapula is not in a retracted position. In this pattern, the commonly used right upper extremity “reach” activities actually promote left upper trunk rotation (feeding right spinal orientation) instead of the desired right upper trunk rotation (which feeds the restorative left spinal orientation).

The first step these patients need to perform is restoration of pelvic and diaphragmatic position through spinal rotation to the left and they need to target activity of the left abdominal wall to maintain this position. From there, they need to “reverse” the learned neuro motor behavior of the upper thorax during diaphragmatic breathing to restore the normal rib cage mechanics. In other words, exhalation must promote a left ZOA and left rib internal rotation in association with concomitant activation of the left abdominal wall. This left abdominal wall must stay active as a critical anchor for the left half of the diaphragm during right upper trunk rotation that can now occur during the very important inhalation phase of breathing.

The right lower trap and tricep work together to retract and posteriorly tilt the scapula or to correct its resting position on the rib cage. This repositioning of the scapula on the thorax can be related to what the left hamstring does to reposition the pelvis on the femur. Once the pelvis is properly positioned, the I.C. adductor pulls the femur back towards the pelvis with proper femoral rotation. In like fashion, the serratus anterior pulls the thorax back towards the properly positioned scapula with proper rib cage rotation.

The serratus anterior attaches to the medial angle, vertebral angle and inferior angle of the scapula and extends proximally to the outer surface and upper border of ribs 1-8. Because of the attachment angle and line of pull, the lower fibers (ribs 4-8) have greater leverage to ER the ribs and the upper fibers (ribs 1-3) have greater leverage to IR the ribs. The serratus anterior is commonly understood to pull the scapula forward on the rib cage during right reach or punch

activities. What isn't commonly understood is the other half of this muscle's function, which is its influence on the rib cage. It actually externally rotates the lower ribs as it pulls the rib cage back towards the scapula during breathing and trunk rotation activities.

Once the scapula and rib cage are properly positioned with the right lower trap and tricep (left hamstring), the serratus anterior (I.C. adductor) pulls the thorax back towards the scapula as the lower ribs are guided back into ER. This I.C. adductor function of the serratus anterior must take place in order to restrain right arm reach activities without the thorax going into left trunk rotation. If the upper trunk rotates back to the left unsupported then the initial pattern (Left AIC) will return and breathing will be compromised at the right superior frontal and left inferior posterior mediastinum. In other words, the spine will orient right on a right oriented pelvis and the diaphragm will position itself toward the right as the left rib cage returns to ER and the right rib cage returns to IR in conjunction with this unsupported left upper trunk rotation.

The serratus' ability to ER the right lower ribs and IR the right upper ribs becomes an important part of correcting R BC patho-compensatory pattern or T4 syndrome. (See rib rotation and scapula rib relationships for normal and T4 patients) The right scalenes become a very active part of the R BC when the right ribs lower into IR. They seek to become inhalation muscles on a very restricted side, but only succeed in ER the top three ribs and over-activating the right subclavius muscle. This occurs as the length tension and position of the subclavius is compromised and the demand goes up, because this muscle is a scapular retractor, even though it is positioned in the front of the thorax. This syndrome can be observed when the 2<sup>nd</sup> and 3<sup>rd</sup> ribs on the right do not move away from the clavicle as well as they do on the left during exhalation.

It can also be observed in terms of frontal plane motion of the cervical spine. A patient is manifesting a R BC pathocompensatory pattern or T4 syndrome when the cervical spine does not passively side bend to the right, a common finding with R BC patients. The right scalenes have ER the top three ribs on the right and the left pec has IR the top three ribs on the left. This frontal plane raising of the right side and lowering of the left side has actually positioned the upper thoracic spine in a state of left sidebending, which shifts the frontal plane range to the left and limits right sidebending. The sidebending is not actually limited at the facet joints any more than rotation to the left is actually limited, but they both appear to be during passive assessment.

After the restorative right subclavius release is performed, the patient will need activities that promote right lower apical wall expansion and right active serratus anterior muscle activation. This expansion will decrease the inhalation demand on the upper right thorax and the serratus anterior activation will IR ribs 1-3 and ER ribs 4-8, something T4 syndrome patients desperately need.