Costal Vertebral Coupled Motion and the Left AIC/Right BC Pattern

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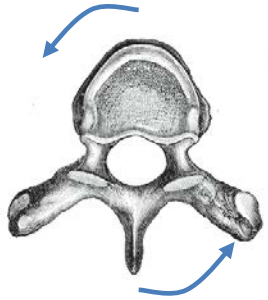
Descriptions of triplanar muscular length and function on the right versus left sides have been given to provide a deeper understanding of the left AIC/ right BC pattern suggested by the Postural Restoration Institute. These muscular adaptations have an effect on and are affected by the position of the spine and rib cage osteokinematicly. This brief description is to serve as a review of spinal and rib coupled movement as it relates to the non-pathocompensatory left AIC / right BC postural pattern.

Anatomy (basic): Twelve thoracic vertebrae make up the "back bone of the thorax". The "true" ribs (1-7) directly link to the sternum via costal cartilage anteriorly. Posteriorly, the head and tubercle of each rib articulates on the superior and transverse costal facet of each vertebrae. Ribs 8-10 ("false") indirectly connect to the sternum via a series of costal cartilage strips that blend with the 7th costal cartilage. Ribs 11-12 do not attach to the sternum. Because of the increased length of the costal cartilage distally, the lower ribs have greater ability to IR/ER than the upper ribs at the costovertebral joint.



Fryette's first law: when a lumbar or thoracic vertebrae is side bent from neutral, the vertebral body rotates towards the convexity. To avoid confusion a left vertebral rotation is described as the vertebral body rotating to the left, while the spinous process moves towards the right. For example, with a right thoracic side bend (thoracic abduction) there is a vertebral rotation towards the left.

Coupled motion between the thoracic spine and ribs can be described as such:

Thoracic flexion causes the ribs on both sides of the vertebrae to move towards internal rotation (exhalation). With thoracic extension, the opposite is true as rib rotation is towards external rotation (inhalation). When side bending of the thoracic spine occurs, there is ipsilateral rib internal rotation and contralateral rib external rotation. Similarly, during vertebral rotation there is a contralateral rib IR and ipsilateral ER. This causes an ipsilateral rib approximation. A coupled motion that occurs is a rotation towards the side of the convexity. To reiterate from the example above, with a right thoracic side-bend, there is a vertebral rotation towards the left, the costal-vertebral coupled motion would then be right rib IR with left rib ER.

Vertebral Motion	Vertebral Coupled motion	Costal Coupled Motion
Flexion	N/A	Rib IR
Extension	N/A	Rib ER
Side Bend	Contralateral vertebral rotation	Ipsilateral IR, Contralateral ER
Rotation	Contralateral Side-bend	Ipsilateral ER, Contralateral IR

In a typical left AIC/ right BC pattern, the pelvis is oriented towards the right with resulting lumbar orientation to the right. The rib cage above this lumbar base, rotates back towards the left, to compensate for the right hemi-diaphragm strength and dominant position. This rotation drives a right side bend (right thoracic abduction) and forces the right ribs towards IR and left ribs towards ER.

Once established, this pattern feeds itself because the left side of the thorax is better positioned to accept air and expand from ventilation causing further left rib ER, while the right side of the thorax is in a closed position making expansion and air flow less efficient. At this point, each and every breath facilitates the left AIC / R BC pattern by reinforcing the right side-bend and leftward rotation of the thoracic spine through the ease of movement of the left ribs towards ER and the stability of the right ribs in an IR state.

This axial skeleton position is both driven by and drives itself. Muscular, respiratory, visual, neurologic and physiologic influences assist the thorax in achieving its asymmetrical structure. Prolonged positioning, normal movement, and training around this structure then causes muscular and neuromotor (patterned) adaptations to hinder ease of reciprocation back towards the left side.