

## Vascular Concomitants Secondary to 1st Rib Subluxation

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Vascular compromise can be an easily overlooked cause of pain throughout the body. Common sense dictates that without proper blood flow, there will not be efficient delivery of oxygen to tissues, and without oxygen, tissues are forced through glycolytic pathways to maintain function. The end byproduct of glycolysis is lactic acid, a well-known nociceptive irritant. Moreover, the energy output and efficiency of the tissues in question also will surely suffer without oxygen to drive aerobic metabolism.

Vascular compromise can take many forms: anemia, toxicities, peripheral vascular disease, pulmonary issues, hormonal imbalances and cardiac disease. These are just some of the reasons why we may see vascular compromise of tissues due to poor oxygenation. In this article, I will discuss a form of vascular compromise that is often missed and will probably be addressed properly *only* by a well-trained chiropractic physician.

The intermediolateral cell column (IML) originates around the level of T1 and ends at L2. It is a continuous column with cross-reflexogenic pathways and connections throughout the column. The IML is a first-order neuron for the sympathetic nervous system, and it governs, among other things, the tone of arteries in the periphery. Various things fire into the IML, including mechanoreceptor input, muscle spindle afferents and nociception. It makes sense that all these systems would integrate with the amount of blood flow to specific tissues. If we fire a muscle or move a joint, this is obviously an energy-dependent activity that requires glucose and oxygen for ATP production. Without proper blood perfusion, this activity does not proceed normally, or at least not very long or very efficiently. Thus, large-diameter afferents from mechanoreceptors and muscle spindles have collaterals that fire into the IML, to increase blood flow to used body parts. Nociception will prompt a massive barrage into the IML for the very same reasons. If there is injury, the area may need white blood cells to fight infection, macrophages for cleaning or increased perfusion for flushing.

It goes without saying that ice after acute injury helps decrease swelling, by slowing blood flow into affected areas. Administering heat to an acute injury will further stimulate blood flow, as well as increase firing into the IML, which also will increase blood flow. Not a good scenario for an injured area already traumatized. Stimulus of the IML produces central constriction and peripheral dilation, meaning that blood pressure to a given site and capillary perfusion both will increase. The IML can have local stimulus from a single motor unit at one particular level, such as getting a pump into a muscle when lifting weights. Or we can have enough of a stimulus that local levels will collateralize to adjacent levels above and below, such that we may get swelling of the whole area, even though a trauma is localized to one particular area.

The first rib attaches at the sternum, turns at the base of the cervical spine and inserts at the T1 vertebral junction. The brachial plexus is intimately situated around the first rib, with the C7 and C8 nerve roots actually surrounding the rib on their way to becoming the cords of the brachial plexus. The scalene muscles are also right there, and some muscle attachments are right into the

rib, further connecting the first rib with the cervical spine. The first rib, like any other joint, can subluxate, usually in a superior and outward position. With some practice, a clinician can feel the first rib as it is more superiorly displaced in the cervical space. This may be significant in that many patients with neck pain difficult to resolve may actually have a first-rib subluxation, promoting a restricted cervical movement that is resistant to adjustments of the cervical themselves.

I have had many, many patients whose chronic neck pain resolved following a good first-rib adjustment. More importantly for this discussion is the significance of neurological input that the first rib has into the IML at the level of T1 - at the beginning of sympathetic barrage into the vascular system. As with any neurological input based on central integration, when there is an increased firing of afferents into a central neuron, we increase the likelihood of plasticity, such that the nerves will basically become so efficient at firing that they will fire at the slightest provocation. And a healthy balance of "on/off" mechanisms has been skewed in one direction. I have found that with a subluxed first rib, the nociceptive barrage into the IML is such that there may be a pronounced vasoconstriction, enough that symptoms of vascular insufficiency may be present.

When this occurs at this level, the effects are profound in that the sympathetic chain which emanates from T1 innervates the blood vessels that lead to the face and brain on the ipsilateral side of innervation. Thus, with a severely subluxated first rib, we may see such a vasoconstrictive concomitant that we will start to see head-related symptoms. We know migraines are vascular in nature for the majority of cases, as defined by prodrome symptoms and vascular concomitants. If the headache always originates on the same side, one clinical differential may be a deviated first rib on that same side. Ear symptoms, tooth pain, jaw pain, eye problems, etc., all may be related, if we are considering the effects vascular compromise of blood flow to the face and cortex may have in symptoms that are otherwise confusing.

Complexities can arise in that the cortex on the ipsilateral side of the IML is actually involved in inhibition of the IML, thus essentially "putting the brakes" on a high-firing IML, when blood flow may be too much. The cortex, of course, receives its primary stimulus through firing of the opposite side. This makes a case for not just reducing the rib on the appropriate side, but also making the stability of the opposite side important for long-term maintenance of the central changes achieved through proper reduction of this irritating subluxation. A proper evaluation of the neurological system is the only way to know which side to address as primary. But for those just starting out in the fun world of neurology, knowing about the first rib may very well make all the difference in those difficult cases no one else has been able to solve.

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