

# Spine - Health and Disease

## Scar tissue and The Spine

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Scar tissue can occur within the spine secondary to trauma, inflammation, infection, and surgery. Another term for scar tissue is fibrosis. Fibrosis can occur within many different regions of the spine such as around the spinal joints (facets), within muscles, between the spinal membranes (dura), within the epidural space of the spinal canal and essentially between any two adjacent dissimilar tissues. The most common location is within the epidural space. This is the space in the spinal canal outside the membranes that surround the spinal cord and spinal nerves. Scar tissue can develop in the epidural space after any open surgical procedure or minimally invasive procedures that are associated with bleeding.

Open surgical procedures, which are associated with scar tissue development, include spinal fusion, laminectomy, and microdiscectomy. It is normal for some scar tissue to develop after a surgical procedure, although it is usually not associated with symptoms. In a relatively small percentage of cases scar will contribute to abnormal signs or symptoms. Scar tissue is often referred to as fibrosis. The term fibroproliferation refers to the progressive development of scar tissue.

Scar tissue can contribute to intractable pain via a number of different mechanisms. It can limit tissue movement and cause inflammation. Scar tissue (fibrosis) can adhere to spinal nerve roots. It can also create adhesive or restrictive bands between adjacent spinal structures. Scar tissue tends to be very vascular with a dense blood supply subsequently when it is physically stretched it tends to bleed easily. This type of recurrent injury sets the stage for additional scar formation (fibroproliferation). Epidural scar (fibrosis) can develop within 2-12 weeks of surgical intervention.

Clinically significant scar formation in the low back is usually characterized by gradual progression of low back pain and the development of slowly progressive pain extending into one or both legs. Individuals who have restrictive scar in the low back tend often experience increased pain during any movement or activity that stretches the involved tissues. Repeated injuries to a region with adhesive scar tissue can lead to recurrent small (micro) vessel bleeding and changes in the physical characteristics of scar.

### **Scar Tissue (Fibrosis and Chronic Pain)**

Chronic neck and back pain leads to abnormal neck and trunk muscle activity and limited range of motion. This pattern of abnormal movement sets the stage for abnormal connective tissue remodeling, persistent inflammation and contributes to sensitization of the nervous system thus lowering an individual's pain threshold. The increase in perceived pain further leads to limitation of movement setting the stage for a vicious cycle of compromise and abnormal tissue repair and remodeling. Research has shown that reduced tissue mobility (hypomobility) and an abnormal increase in tissue or joint mobility influences the remodeling of connective tissue. Both hypomobility and hypermobility can result in tissue atrophy or scar tissue (fibrosis) development. The presence of inflammation promotes fibrosis. Fibrosis leads to increased tissue stiffness which sets the stage for abnormal tugging and pulling type stresses during movement.

If connective tissue is laid down in a disorganized pattern it will contribute to compromise of blood and lymphatic flow which leads to inflammation. This process may also increase the distance between cells and their blood supply. Abnormal connective tissue remodeling plays an important role in the development of chronic back pain. This process can not be visualized using current diagnostic imaging technology like computerized tomography (CT) or magnetic resonance imaging (MRI).

A change in the connective tissue architecture alters both the chemical and physical relationships surrounding specialized nerve endings which carry the signal which trigger the perception of discomfort or pain. If the tissue changes cause increased sensitivity or more easily stimulated nerve endings it will take less of a stimulus to cause or magnify pain. As stated above the increase in pain will lead to conscious and unconscious limitation or alteration of movement of the involved area.

### **The Evaluation of Scar Tissue**

The diagnosis of scar tissue in the spine requires assessment with the use of one or more of the following, history, clinical examination, and specialized imaging procedures. Diagnostic imaging is the best way to confirm the presence of fibrosis. One of the most accurate methods of imaging scar requires the use of magnetic resonance imaging (MRI) with and without the use of a contrast agent. Epidurography can also be used to help identify the location of scar. Epiduroscopy can be used for direct visualization of peri-dural or epidural scar and its relationship to adjacent anatomical structures.