

Effects of Spinal Fusion on Adjacent Segments Over Time

Physical Therapy in Canton for Upper Back and Neck

Have you had a spinal fusion surgery or have been recommended to have one? This article discusses the wear and tear that occurs around the fusion site.

Time marches on and sooner or later you realize it is marching across your face. That's a popular quote made by Dolly Parton in the 1989 movie Steel Magnolias. And as we all know, the passage of time affects many other parts of the body. In this study, surgeons take a look at the effect of time on spinal segments above and below an area that was fused 10 years ago. The patients all had a procedure known as an anterior cervical decompression and fusion (ACDF). Fusion at one level stops motion but may increase the load on the next (adjacent) segment. This study attempts to find out how often this happens and how bad is it?

Using magnetic resonance imaging (MRIs), researchers compared two groups of adults over a period of 10 years. The first group had cervical (neck) spinal disorders that led to the ACDF procedure at one or two levels. Some had bone spurs; others had discs that were protruding. In all cases, there was pressure on the spinal cord and/or spinal nerve roots causing significant neurologic symptoms.

Conservative (nonoperative) care did not help, so surgery was done to remove bone, disc material, and any other soft tissue or bone blocking the nerve tissue. That's the first surgical (decompression) step. The next part of the surgery used bone graft to fuse two or more vertebrae together. Fusion is necessary to stop the pain and help stabilize the affected segments.

The second (control) group was made up of healthy adults who had no symptoms of neck pain or neck problems. The groups were matched by age (ranging from 17 to 68) and sex (equal numbers of men and women). By including a group of normal, healthy adults, it was possible to observe the physiologic effects of aging without fusion. The idea of making comparisons with this group is that it helps answer the question of whether disc degeneration at adjacent levels is related to the increase in stress caused by the ACDF -- or if changes observed in the discs is just a result of time and the effects of aging. Or maybe it's both! Let's see what they found out.

MRIs were reviewed by two experienced neuroradiologists who knew nothing about the patients or control subjects. They paid specific attention to signal intensity of the disc, presence of any disc protrusion, narrowing of the disc spaces, and any signs of foraminal stenosis. The foramen is the opening in the bone through which the spinal nerve roots pass as they travel from the spinal cord down to the arms (or legs in the lower extremities). Stenosis means narrowing. So foraminal stenosis refers to a narrowing of the openings for the spinal nerve roots. Pressure on the nerves at this point is what causes neck pain, headaches, numbness and other symptoms suffered by these patients.

Analysis of results showed a definite increase in the incidence of adjacent segmental disc degeneration in the ACDF group compared with the control group. The upper segment adjacent to the fusion was affected more often than the lower adjacent segment. Some areas of the neck seemed more likely to present with problems. For example, narrowing of the disc space was more common at C3-C4 and C6-C7 in the ACDF group. Protrusion of the disc occurred at all levels in the ACDF group with the exception of the C5-C6

segment.

The control group did show evidence of aging over time affecting the spine. Posterior disc protrusion was seen most often (72 per cent), followed by decrease in MRI signal intensity (59.7 per cent), disc space narrowing (30 per cent), and foraminal stenosis (nine per cent). In both the ACDF patient group and the control group, positive MRI findings indicating degeneration were not always accompanied by symptoms of any kind. When symptoms did occur, patients in the ACDF group were much more likely to be the ones affected.

The authors concluded that disc degeneration progresses faster and more often in patients who have had the ACDF surgical procedure when compared to normal, healthy adults who are only subjected to the affects of aging over time. The results may seem obvious but this is the first proof that ACDF speeds up adjacent degeneration when added to the normal effects of physiologic aging.

The exact reasons for this remain to be discovered. It's possible there are environmental and genetic factors that cause the initial advanced disc degeneration in some, but not all, adults. The authors intend to keep studying this problem in hopes of finding out why some people develop disc degeneration while others don't. They will also extend the follow-up with these patients beyond the first 10 years to get a look at what happens much later in time. This study gave a hint that perhaps some spinal levels are at greater risk than others for disc damage, degeneration, and progression of disease. They plan to take a closer look at that as well.

Reference: Morio Matsumoto, MD, et al. Anterior Cervical Decompression and Fusion Accelerates Adjacent Segment Degeneration. In The Journal of Bone and Joint Surgery. January 2010. Vol. 35. No. 1. Pp. 36-43.