

## Spinal Fusion: Techniques Results and Limitations

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Spinal fusion or vertebral arthrodesis has first been used around 1910 to treat deformity cases and spinal tuberculosis. Its aim was to abolish movement through bony healing of several spinal segments. Spinal fusion is used nowadays not only to treat infections and deformities but also trauma and degenerative conditions. One of the most common uses is in degenerative disc disease whereby fusion is used in order to stop painful or abnormal movement. Although initially fusion was performed posteriorly, later posterolateral, anterior and combined fusions have been performed. In order to achieve the best possible fusion mass surgeons have tried to obtain fusion simultaneously at the front and back of the spine. One such technique is the so called PLIF technique (posterior lumbar interbody fusion) where bone graft is inserted through the spinal canal into the intervertebral disc following retraction of its contents. A variation of this technique is the TLIF type of fusion (transforaminal lumbar interbody fusion) consisting of introducing the intervertebral graft through the foramen avoiding thus violating the spinal canal. Anterior fusion techniques in the lumbar spine involve approaching the front of the spine either in a transperitoneal or a retroperitoneal route. The advent of rigid fixation mainly using pedicle screws has improved fusion rates although this resulted in increased cost and morbidity. Anterior grafting techniques have evolved towards the use of hollow cages made out of carbon fiber, PEEK or titanium. Fusion cannot be achieved without the use of either bone graft or bone substitutes (save exceptional cases). More recently bone morphogenetic proteins have been commercialized and their clinical use is expanding. The aim of BMPs and other bone substitutes is to avoid donor site morbidity linked with autograft harvesting. Complications of spinal fusion mainly include infection, nerve root injury related to misplaced pedicle screws and pseudarthrosis. The latter can be quite difficult to diagnose. Several papers in the past have pointed out the poor relation between imaging studies

and clinical results. Long term complications include adjacent segment disease in which the level between the fused and unfused spine shows signs of degeneration instability or spinal canal stenosis.

Although spinal fusion in deformity and trauma cases has undoubtedly clear clinical benefits, this procedure is considered controversial in treating degenerative disc disease. Until 1999 there was little scientific evidence on the effectiveness of fusion in treating degenerative lumbar spondylosis (3). A good quality prospective trial published in 2001 showed evidence that fusion was superior to conservative treatment (2). A more recent study though showed no clinical difference between fusion and conservative management comprising exercises and cognitive intervention (1). Even though fusion might still have its place for deformity, trauma, infections and some tumors its use in degenerative disc disease might be overtaken in the future by newer more physiological solutions.

### References

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