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BVENT

COMPARATIVE STUDY BETWEEN PEDICULAR SCREWS, INTERBODY FUSION CAGES AND COMBINED PROCEDURES IN MANAGEMENT OF SPONDYLOLISTHESIS

A Thesis submitted for partial fulfillment of

M.D. Degree in Neurosurgery

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**Comparative study between transpedicular screw fixation
with lateral fusion, posterior lumbar interbody cage fusion
and combined procedures
in management of spondylolithesis.**

Thesis Protocol

Submitted for partial Fulfillment of M.D. (Neurosurgery)

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Introduction:

Spondylolisthesis is derived from Greek roots "spondy" meaning spine and "Olisthesis" to slip or slide down (Amundson : 1992).

Spondylolisthesis is a chronic instability of the spine which occurs as: axial, rotational, translational, retrolisthesis or. Post-surgical instability (Farfan, 1983).

Conservative treatment with immobilization by corset, brace, or plaster Jacket can reduce symptoms (Turner & Bianco, 1971).

The goals of surgery are relief of pain, improvement, or resolution of neurologic deficit, and improvement of quality of life (Herkowitz, 1995).

Surgical treatment of spondylolisthesis was devised to arrest progressive subluxation and relieve back pain. Posterior spinal fusion was introduced independently by Hibbs, (1911) and Albee in (1911). Subsequently their surgical techniques were modified and the role for spinal fusion was expanded to encompass a variety of spine disorders (Temple et al., 1994).

Surgical treatments advocated for spondylolisthesis include repair of the defect for spondylolysis, root decompression, for radiculopathy, in situ fusion, and reduction (Amundson et al., 1992).

Opinions vary as to the proper operation in spondylolisthesis. Fixation of the unstable spine by posterior fusion is the treatment that most surgeons prefer. A successful fusion usually relieves symptoms enough to allow the patient to work. Posterior rather than anterior fusion is preferred because its techniques is more flexible when preparing a suitable bed for a difficult fusion, it permits exploration of the defects, nerve roots, and intervertebral discs, it provides room for a larger mass of solid bone, and it is a safer operation (Wood, 1992).

The primary goals of spinal instrumentation as an aid to fusion are to realign vertebrae, maintain alignment and promote the development of a solid bony fusion (Ashman, 1993).

There are many methods for internal fixation of the spine. The earliest reports of attempted internal fixation for the spine were by Harra in 1889 and Lange in 1910. Pedicular screw fixation can be used for lumbosacral fusion without anxiety concerning nonunion (Roy- Camille, 1986).

Several internal fixation systems available are attached through pedicles. All of these systems depend on the ability of screw to obtain and maintain purchase in the vertebral body through the pedicle until solid fusion occurs (Zindrick et al., 1986).

The main advantage of the pedicular screws and rods that it offers high stability to the fused segment similar to intact spine (Wittenberg et al., 1995). It accelerates the rate of fusion, easy insertion and had the ability to correct the deformities in addition to less complication than other methods.

Prior methods of intervertebral body fusion include the early use of bone dowels (Cloward, 1953; Witterberger, 1957; Crook, 1982 and Otero Vich, 1985) and cylindrical fusion cages (Longfellow, 1951; Bagby, 1988) to achieve interbody stabilization. Limitations of these methods led to the later development of threaded interbody fusion cages (Michelson, 1988; Ray, 1988).

The posterior lumbar interbody fusion (PLIF), as first described in many variations, involves the bilateral insertion of bone grafts. The grafts are usually obtained from the iliac crest, with associated donor site morbidity and postoperative discomfort. Subsequently, metallic interbody fusion cages were developed as graft substitutes that, along with eliminating the associated donor site pain, have proven to provide an acute postoperative stability and reduction of motion not provided by bone grafts alone. This added stability may promote a successful fusion in an environment where the patient has quickly returned to all or portions of his or her daily activities, as has been demonstrated in animal studies (Andrew et al., 1997).

Stabilization after decompression of spondylolytic spondylolisthesis is difficult because of a lack of fusional bone bases, gap between the transverse process bases, and incompetent anterior disc support. Posterior lumbar interbody fusion offers anterior support, reduction, and a broad fusion base. The addition of posterior lumbar interbody fusion to posterolateral fusion after a complete decompression and pedicle screw fixation is a recommended procedure for the treatment of spondylolytic spondylolisthesis with spinal stenosis (Suk Se-II et al., 1997).

Interbody cages in the lumbar spine have met with mixed success in clinical studies. This has led many investigators to supplement cages with posterior instrumentation. They review the mechanics of interbody cage fixation in the lumbar spine with respect to three-dimensional stabilization and the strength of the cage-vertebra interface. The effect of supplementary posterior fixation is reviewed. These studies involved the application of different loads to the spine and the measurement of vertebral motion in flexion-extension, axial rotation, and lateral bending. There are no published studies, which detected any differences between different cage designs. However, it does seem that cages inserted from an anterior direction provide better stabilization to the spine than those inserted from a posterior direction. In general, anterior cages stabilize better than posterior cages in axial rotation and lateral bending. Cages from both directions stabilized well in flexion, but not in extension. Supplementary posterior fixation with pedicle or translamina screws substantially improves the stabilization in all directions (Oxland TR and Lund T, 2000).

