

**Management of Degenerative Lumbar Spine
Disorders by Transforaminal Lumbar Interbody
Fusion (TLIF)
Thesis**

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**in
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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

﴿قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ
الْعَلِيمُ الْحَكِيمُ﴾

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Abstract

Study Design: This study retrospectively examines outcomes of transforaminal lumbar interbody fusion (TLIF) technique in the management of degenerative diseases of lumbar spine.

Objectives of the study: To assess the clinical and radiographic outcome of TLIF, to describe the technique and indications in the treatment of degenerative disease of the lumbar spine, and to demonstrate the safety, surgical efficacy, and advantages of the transforaminal approach for lumbar interbody fusion.

Methods: We retrospectively reviewed thirty three patients treated with TLIF for degenerative diseases of the lumbar spine who were followed up for a minimum of 1.5 years (mean: 18 months; range: 12–24 months). Twelve patients had degenerative disc disease, 15 had isthmic or degenerative spondylolisthesis, 2 had canal stenosis with instability and 4 had failed previous back surgery.

Results: Low back pain completely resolved in 22 patients, moderate relief from pain was achieved in 9 patients, and the pain was unchanged in 2 patients. Thirty patients (90%) had solid radiographic fusions at latest follow-up, and confirmed pseudoarthrosis rate of 1 of 33 (3%). Complications included intraoperative dural tear in two patients and postoperative wound infection in two. Two patients suffered a transient extensor paresis. One case showed cage loosening and mild retropulsion.

Conclusions: Transforaminal lumbar interbody fusion is a safe and effective method for achieving circumferential spinal fusion via a single-stage procedure. This procedure is particularly useful in restoring disc space height and lumbar lordosis. Interbody cages in spondylolisthesis are useful to increase neuroforaminal height, to facilitate reduction, and to improve the chances of achieving a successful 360° fusion.

Key Words: Degenerative disease of the spine —Posterior lumbar interbody fusion—Transforaminal approach.

Aim of the work

The objective of the study was to assess the clinical and radiographic outcome of TLIF and to demonstrate the safety, surgical efficacy, and advantages of the transforaminal approach for lumbar interbody fusion; describing the technique and indications in the treatment of degenerative disease of the lumbar spine.

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List of abbreviations

1	ALIF	Anterior lumbar interbody fusion
2	PLIF	Posterior lumbar interbody fusion
3	TLIF	Transforaminal lumbar interbody fusion
4	CT	Computer tomography
5	MRI	Magnetic resonance imaging
6	CEP	Cartilage end plate
7	IVD	Intervertebral disc
8	AF	Annulus fibrosus
9	NP	Nucleus pulposus
10	IVF	Intervertebral foramen
11	CSF	Cerebrospinal fluid
12	DDD	Degenerative disc disease
13	LSS	Lumbosacral spine
14	BMPs	Bone morphogenic proteins
15	LDP	Lumbar disc prolapse
16	FSU	Functional spinal unit
17	IAR	Instantaneous axis of rotation
18	TIFCs	Threaded interbody fusion cages
19	Peek	Polyetheretherketone
20	CFRP	Carbon fibre reinforced Peek
21	ESR	Erythrocyte sedimentation rate
22	ADLs	Activities of daily living
23	ODI	Oswestry disability index score
24	Lt	Left
25	Rt	Right
26	M	Male
27	F	Female
28	P value	Probability value

Introduction

Spine fusion may be defined as the elimination of movement across an intervertebral motion segment by bony union. It is one of the most commonly performed procedures in spine surgery. The concept of spine fusion surgery was first reported on **1911** by **Albee** and by **Hibbs**.

The goal of lumbar fusion is to create solid bone between two or more vertebrae to stop movement between them thus reducing pain from motion and mechanical instability.

In **1953 Cloward** first described his posterior lumbar interbody fusion technique (PLIF) as a surgical treatment option for lumbar disc disease. The unilateral transforaminal approach for segmental lumbar interbody fusion was first described in the **1985** by **Blume** to address some of the complications associated with instrumented (bilateral) PLIF.

In the **1990s TLIF** procedure was modified and popularized by **Harms, et al., 1997**: The TLIF procedure is an interbody combined with a unilateral posterior (facet and/or interlaminar) arthrodesis performed with or without a bilateral posterolateral arthrodesis that is stabilized with pedicle screw instrumentation. This procedure is performed via a single midline posterior surgical approach. Access to the intervertebral disc is gained by a unilateral resection of the lamina, pars interarticularis, and zygapophysial (facet) joint at the level or levels to be fused. An aggressive discectomy and interbody arthrodesis can thus be performed unilaterally with relatively minimal medial retraction (compared with the PLIF procedure) of the traversing nerve root and thecal sac, and with essentially no

retraction of the exiting nerve root. A number of materials have been used in the TLIF procedure for structural interbody support, including autograft and allograft bone, metal, composites, and, recently, nonresorbable and resorbable polymers.

Recently, **TLIF** procedure was defined as an interbody combined with unilateral posterior (facet and/or interlaminar) fusion performed with or without a bilateral posterolateral fusion that is stabilized with pedicular screw instrumentation. TLIF provides fusion of the anterior and posterior column, the anterior column stabilized by interbody spacer and bone graft; the posterior column stabilized by pedicle screws and bone graft on lamina and facet joint. TLIF procedure preserves the anterior and posterior ligamentous complex to maintain a tension band for compression on the graft. This approach greatly reduces the amount of surgical muscle dissection and minimizes nerve root manipulation required to access the vertebrae, discs and nerves thus less traumatic to the spine and safer for the neural elements (**Jeffery, 2004**).

Pertinent Anatomy of the Lumbar Spine

The lumbar vertebrae are the largest segments of the movable part of the vertebral column, and can be distinguished by the absence of a foramen in the transverse process, and by the absence of facets on the sides of the body. The body is large, wider from side to side than from before backward, and a little thicker in front than behind. It is flattened or slightly concave above and below, concave behind, and deeply constricted in front and at the sides. The pedicles are very strong, directed backward from the upper part of the body; consequently, the inferior vertebral notches are of considerable depth (Fig1.1) (Marvin, 2003).

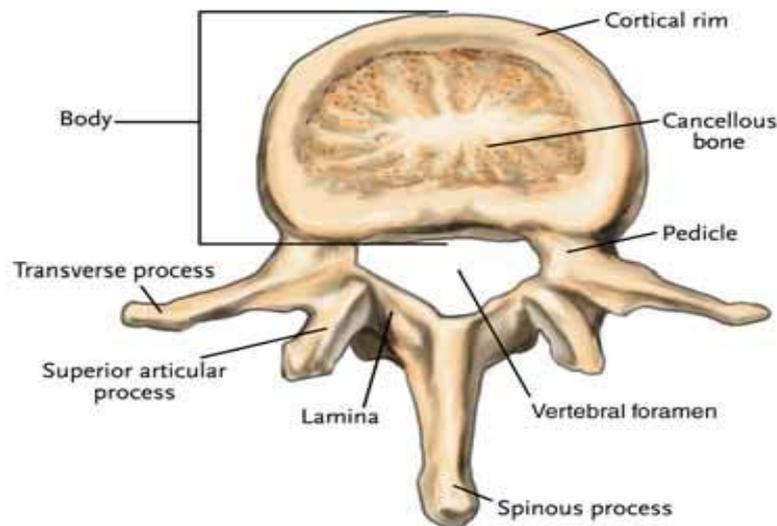


Fig1.1: Typical Lumbar Spine (Gray's Anatomy, 2001).

The laminae are broad, short, and strong; the vertebral foramen is triangular, larger than in the thoracic, but smaller than in the cervical region. The superior and inferior articular processes are well defined, projecting respectively upward and downward from the junctions of pedicles and laminae. The facets on the superior processes are concave, and look backward and medialward; those on the inferior are convex, and are directed forward and lateralward. The former are wider apart than the latter, since in the articulated column