



What to consider in degenerative spondylolisthesis: posterolateral fusion or transforaminal interbody fusion

Hitesh N. Modi, Shakti A. Goel

Department of Spine Surgery, Zydus Hospitals and Healthcare Research Private Limited, Ahmedabad, India

Correspondence to: Hitesh N. Modi, MS, PhD. Department of Spine Surgery, Zydus Hospitals and Healthcare Research Private Limited, Ahmedabad, India. Email: modispine@yahoo.co.in.

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Degenerative spondylolisthesis (DS) usually happens at lower lumbar levels (more commonly at L4–5) with the degree of slip is Meyerding classification type 1 or 2. Rarely DS has Meyerding type 3 or more slip. DS is usually a combination of facet hypertrophy and thickening of ligamentum flavum that leads to spinal stenosis. Therefore, majority of DS patients usually presents to a surgeon with symptoms of spinal stenosis. In that sense, the treatment for DS is hotly debated in literature. Different articles clearly mention superiority of decompression and fixation (DF) over decompression alone (D) in such cases (1). Decompression alone can improve clinical symptoms of patients with DS; however, symptoms can recur in few years requiring another surgery. Therefore, according to the current consensus, DF is often indicated while treating DS with lumbar stenosis (2-4).

When it comes to the DF and what is to be done is still unclear. There are two main ways for DF: pedicle screw fixation and posterolateral fusion (PLF) and pedicle screw fixation and posterior/transforaminal lumbar interbody fusion (PLIF/TLIF). Literatures do not prove superiority of PLF over TLIF or vice a versa in cases of DS. In an article by Kepler *et al.* reported a significant decrease in the number of patients undergoing isolated decompression in patients with DS between 1999 and 2011, and an increase in the number of patients undergoing decompression with an interbody fusion (5). Reviewing the published articles, one thing is understood that there are very few high-level prospective randomized studies demonstrating better results with TLIF when compared with PLF in patients

of DS. They give the credit of improved results to a solid bone fusion associated with TLIF, which is often used as an oversimplified rationale to support the increased cost and complications in relation with TLIF (6).

In a recent study published by Schroeder *et al.*, worldwide survey opinion was taken for cases of single level DS in a questionnaire from 223 surgeons. The survey included orthopedic and neurosurgeons both from US and non-US countries. Spine surgeons believe that the treatment for DS depends upon various factors when deciding decompression alone versus decompression and instrumentations such as demographics, pathology, associated instability, presence of low back pain and patients' age etc. They also have pointed out socioeconomic impact as TLIF drastically increases the cost of surgery when compared with PLF. Thus, the general consensus is to tailor the treatment according to patient (7).

If we compare the neurological complications between PLF versus TLIF, it has been noted higher neurological complications in TLIF group in form of CSF leak, nerve damage or root sleeve injuries. Additionally, TLIF has increased overall cost of the surgery as well when compared with PLF (8,9). On the other hand, a recent meta-analysis published by McAnany *et al.* showed no significant difference in developing postoperative complications between PLF and TLIF where there pooled data had 383 and 268 patients had PLF and TLIF, respectively. However, they do support the previous findings of increasing overall cost in TLIF group. Additionally, hospital stay was significantly shorter in PLF group when compared with TLIF group (10).

Surgical cost is definitely an important issue for the country with lower socio-economic condition as well as developing nations where the patients bear majority of their health-care expenditure. On the other hand, however, they equally need clinically and functionally same result. In a single center comparative analyses of DS at L4–5 between 68 PLF patients versus 111 TLIF patients done by Gottschalk *et al.* demonstrated a significantly lower surgical cost in PLF group by 577–5,276 USD when it was compared with the TLIF. Additionally, they also demonstrated significantly higher blood loss, drain output and longer surgical time in TLIF group. Radiological fusion rate was 95% in both groups at 2-year follow-up, which did not show any difference. On clinical evaluation by ODI, VAS and SF-36 scales, both groups had similar outcome at any point of time during postoperative follow-up. Both groups had clinically significant improvement in all parameters, which did not exhibit statistically significant difference in both groups. In conclusion they revealed although the total hospital cost was higher in TLIF group than PLF group, it was mainly due to longer hospital stay in TLIF group. Additionally, regarding fusion rates, this case series mentioned that 360-degree fusion or TLIF gives additional advantage in cases of isthmic spondylolisthesis; however, it did not express any advantage in cases of DS. In fact, authors wrote that PLF cohort required revisions due to higher non-unions while TLIF cohort required underwent revisions due to adjacent segment disease (11).

In conclusion, we can say that when it comes to consider PLF or TLIF in particularly for DS, PLF has some definitive advantages such as, less blood loss, short hospital stay and less cost to surgery; on the other hand, TLIF has better fusion rate. However, if results are evaluated clinically, TLIF is not superior to the PLF procedure in terms of clinical results and complication rates. Randomized controlled trial which is considered as class 1 and 2 evidence for any scientific guidance, Challier *et al.* have tried to answer these questions in their report (12). It is a welcome step towards developing guideline in recommending treatment consideration of DS although number of patients allotted to each group was less. However, they have not considered sagittal balance while considering the treatment which should a research topic in cases of DS. It may be possible that depending upon preoperative sagittal balance or pelvic profile, which creates a specific situation where TLIF may be indicated. However, based on the current literature available, PLF should be considered while treating DS and TLIF should be reserved in specific conditions

such as high pelvic incidence, high-grade spondylolisthesis, multilevel DS or associated spinal degenerative deformities.

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