

Posterior lumbar interbody fusion (PLIF)

Bilateral [lumbar laminectomy](#) and aggressive [lumbar discectomy](#) followed by the placement of [bone grafts](#) into the decorticated [disc](#) space. It has been advocated to reduce the movement in an abnormal [motion segment](#).

The PLIF procedure was first described in 1944 by Briggs and Milligan ¹⁾ who used laminectomy bone chips in the disc space as interbody graft. In 1946, Jaslow ²⁾ modified the technique by positioning an excised portion of the spinous process within the intervertebral space. It was not until 1953 when Cloward ³⁾ described his technique, which used impacted blocks of iliac crest autograft that the popularity of PLIF surgery increased. Although technically more difficult than posterolateral fusion techniques (i.e., intertransverse fusion in which bone graft spans between the transverse processes), the PLIF procedure was found to have the advantage of substantially increased fusion rates, often in excess of 85%. Despite the increased fusion rate, this technique was fraught with complications related to blood loss, dural/neural injury, graft extrusion, and arachnoiditis ⁴⁾.

Due to the lack of appropriate implants, the initial fusions were performed via decortication of the dorsal and lateral structures of the spine, followed by placement of an autograft. Despite acceptable fusion results, better primary stability and higher fusion rates were desired. In addition, it became known that the primary load-bearing of the spine is located ventrally in the area of the corpus of the vertebrae. These considerations led to the development of the Posterior [lumbar interbody fusion](#) (PLIF) technique that was introduced by [Cloward](#) in 1953 and gained significantly in popularity. After removal of the intervertebral disc, he positioned iliac crest bone blocks between the vertebral bodies. Based on this technique and these considerations, intervertebral implants were developed in the 1970s.

Posterior [lumbar interbody fusion](#) (PLIF), as described by [Cloward](#), with laminectomy of the entire separate neural arch in [spondylolisthesis](#), is a difficult operation, but with good results by nerve roots decompression. [Fusion](#) is stable and does not accelerate degenerative lesion of the upper disc ⁵⁾.

Since 1980s numerous operations have replaced posterior lumbar interbody fusion (PLIF) with human bone. These often involve expensive implants and complex procedures. Escalating expenditures in lumbar fusion surgery warrant re-evaluation of classical PLIF with allogeneic ilium and without instrumentation

Between 1981-2006 321 patients ages 12-80, underwent 339 one- or two-level allo-PLIFs for degenerative instability and were followed 1-28 years. Fusion status was determined by radiographs and as available, by CT scans. Clinical outcome was assessed by the Economic/Functional Outcome Scale.

RESULTS: 308 of the 321 patients were followed postoperatively (average 6.7 years, range 1-28); 297 (96%) fused. Fusion rates were lower for patients with substance abuse (89%, p=0.007). Clinical outcomes in 87% of patients were excellent (52%) or good (35%). Economic/Functional Outcome Scale scores following initial allo-PLIF on average increased 5.2 points. Successful fusion correlated with nearly a 2-point gain in outcome score (p=0.001). A positive association between a patient characteristic and outcome was observed only with age 65 and greater; whereas negative associations in clinical outcomes were observed with mental illness, substance abuse, heavy stress to low back, or industrial injuries. Total complication rate was 7%.

With three decades of follow-up we found successful clinical outcomes are highly correlated with solid

fusion using only allogeneic iliac bone ⁶⁾.

In the [Percutaneous posterior lumbar interbody fusion](#) (PPLIF) group, as compared with [posterior lumbar interbody fusion](#) (PLF) group, mean operating time was shorter, blood loss was negligible, and mean hospital time was halved. By the last follow-up visit (greater than or equal to 2 years), pain and disability in PLF group had diminished by 31.9% and 20.1%, respectively. The corresponding figures in PPLIF group were 55.4% and 42.7%, respectively.

In the context of postdiscectomy low back pain, PPLIF has proven, thus far, to be a safe procedure with improved clinical results ⁷⁾.

Contraindications

Relatively contraindicated with well preserved disc-space height.

Outcome

Many ~ 1 year later show recollapse of the disc space , which raises the question as to whether the PLIF has any benefit over simple [lumbar discectomy](#).

Stand alone PLIF may be associated with progressive spondylolisthesis at that level and are usually supplemented with pedicle screw/rod.

see [TLIF](#).

Complications

Nerve injury

Retropulsion of bone graft

Posterior lumbar interbody fusion with instrumented posterolateral fusion in adult spondylolisthesis

Case series

A total of 36 cases were operated. The patients included were 14 men and 22 women, with an average age of 57.17 ± 27.32 years. The technique consists of PLIF+IPLF, using local bone for the fusion. The clinical results were evaluated with the Visual Analogical Scale (VAS) and the Kirkaldy-Willis criteria. The radiological evaluation followed the Bratingan (PLIF) and Lenke (IPLF) methodology. A total of 42 variables were statistically analysed by means of SPSS18. We used the Paired Student's

T-test, logistic regression and Pearson's Chi-square-test.

The spondylolisthesis was isthmic in 15 cases and degenerative in 21 cases. The postoperative evaluations had excellent or good results in 94.5% (n = 34), with a statistically significant improvement in the back pain and sciatica (p < 0.01). The rate of [circumferential fusion](#) reached was approximately 92%. We had 13.88% of transitory morbidity and 0% of mortality associated with our technique. A greater age, degree of listhesis or length of illness before the intervention, weakly correlated with worse clinical results (p < -0.2). In our series, the logistical regression showed that the clinical characteristics of the patient, radiological characteristics of the lesion and our surgical technique were not associated with greater postoperative complications.

Although a higher level of training is necessary, we believe that the described technique is a very effective decision in cases of spondylolisthesis, isthmic or degenerative, refractory to conservative treatment, for the obtaining the best clinical results and rates of fusion, with similar risks to those of the other published techniques. Our statistical analysis could contribute to improve outcomes after surgery ⁸⁾.

1)

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