

Editorial

A Perspective on Lateral Lumbar Interbody Fusion (LLIF)

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Abbreviations

PLIF: Posterior Lumbar Interbody Fusion; TLIF: Transforaminal Lumbar Interbody Fusion; LIF: Lumbar Interbody Fusion; PS: Pedicle Screw; LLIF: Lateral Lumbar Interbody Fusion; XLIF: extreme Lateral Interbody Fusion; OLIF: Oblique Lumbar Interbody Fusion

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Successful LIF depends on i) enough lumbar intervertebral releasing and curettage, ii) grafting massive bone into the released intervertebral space and iii) reconstruction of the anterior and middle column support. PLIF (TLIF) is compatible with the criteria of successful LIF mentioned above. In the current tendencies of spinal fusion surgery, it is no doubt that PLIF (TLIF) is accepted as a golden LIF procedure for treatment of degenerative disorders. Furthermore, PLIF (TLIF) with PS provides a great advantage in performing 3-dimensional correction and solid stabilization of affected segments immediately after surgery through a posterior approach alone. In the latest decade, minimally invasive PLIF(TLIF)with PS have also been introduced and are gaining popularity as new alternatives to the conventional PLIF (TLIF) procedures. Nonetheless, several disadvantages of PLIF (TLIF) with PS remain unsolved. The risks of perioperative complications, including surgical bleeding from the epidural space, which often becomes uncontrollable, surgical damage to the paravertebral muscles, and an overall high technical demand could not be completely eliminated even in its current status. Furthermore, it also has a high risk of neurological complication because the affected lumbar canal is not wide enough to permit safe passage of materials into the interbody space by the posterior approach [1]. Contrary to PLIF (TLIF), a new surgical technique retroperitoneally approaching the lumbar intervertebral space from the lateral site of the lumbar spine (transpsaos approach) has been proposed and utilized to perform LLIF (XLIF, OLIF). The significant advantage of LLIF is that it could enable spinal surgeons to carry out intervertebral releasing, correction of the affected segment, and indirect decompression of the spinal canal without exploring the neural tissue and dissecting the paravertebral muscles. Therefore, in comparison to PLIF (TLIF), much less surgical bleeding and less neural complications are expected as a result. From my perspective,

LLIF is very indicative to the mild or moderate stenotic segment with local instability and/or the non-rigid kyphoscoliotic segment. Mini-open LLIF with percutaneous PS has a potential to be a golden standard minimally invasive spinal surgery in the near future [2-4]. But mini-open LLIF could not be revealed in cases with rigid ossifying segments, anatomical valiance of the high pelvic crest, and unpredictable bifurcation of the major vessels. Furthermore, indication of mini-open LLIF below L3/4 segment is still controversial because of several risks in technical difficulties, such as damage to the lumbar nerve plexus in the psoas muscles, the ureter and a possibility of major vessel injury. Another concern is that the bone grafted area around the interbody spacer, which presents enough in conventional PLIF (TLIF), cannot be gained in mini-open LLIF procedure, therefore, the bone fusion rate might be worse in mini-open LLIF. The long-term results of bone fusion rate in mini-open LLIF have not been reported. In PLIF (TLIF) with PS, it is possible to carry out bone graft using the resected local bone [5]. In contrary to this merit, harvesting of graft bone from the ilium is crucial in mini-open LLIF procedure currently. Does morbidity at bone graft donor sites often develop repeatedly in mini-open LLIF [6] ? Mini-open LLIF with percutaneous PS has been rapidly gaining popularity amongst spinal specialist worldwide, but it seems to be a largely industry-driven technique-based procedure as well. An industry “push” could not be completely neglected in mini-open LLIF popularity. The comparative effectiveness and safety of LLIF versus PLIF (TLIF) has not been proven, including cost-effectiveness and its indications [7]. In addition, although more than 2700 LLIF procedures could be performed annually before occupational limits were exceeded, prolonged exposure to “low-level” radiation as an occupational risk in mini-open LLIF remains a concern for medical personnel as much as minimally invasive PLIF(TLIF) with percutaneous PS [8]. Numerous clinical researches and studies are expected to establish the standard inclusive criteria and safer techniques of mini-open LLIF without the industry “push”.

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