

Fullendo-KLIF for the Anatomical Nomenclature of the Full-Endoscope Guided Lumbar Interbody Fusion through the Kambin Triangle: PELIF, PETLIF, FELIF, FE-TLIF or KLIF?

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History of the full-endoscopic (Fullendo) surgery

Full-endoscopic lumbar spine surgery was initially developed using transforaminal (TF) approach. This approach is passing through the so called Kambin triangle (Figure 1).

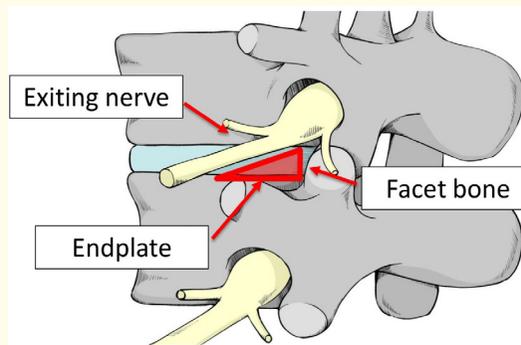


Figure 1: Kambin Triangle.

The triangle is composed by lateral boarder of the facet bone, exiting nerve root and endplate [1,2]. With great care not to damage the exiting nerve, a cannula can be inserted into the disc through the Kambin triangle. This is the unique concept of this approach as comparing to the traditional posterior interlaminar approach.

Several frontiers had been attempted to use an endoscope with a cannula and finally, Dr. Yeung successfully established the current single-portal endoscopic surgery [3,4]. This fullendo procedure can be done with only 8 mm skin incision, and damage to the back muscles during the surgery would be minimum. Thus, it is understood the least invasive spine surgery, so far. The transforaminal approach has been developing year by year. Initially, the transforaminal fullendo surgery was limited only to the discectomy for the herniated nucleus pulposus [5,6]. Recently, owing to the evolution of the surgical drill, bony decompression became possible with this procedure. Thus, the surgical indication of the TF-fullendo surgery spread to the decompression of the spinal canal stenosis.

There are three types of the spinal canal stenosis. First, foraminal stenosis was surgically treated by the TF-fullendo technique [7,8]. This surgery was named as transfoaminal full-endoscopic lumbar foraminotomy (TELF). The TELF was reported to be especially useful for the failed back syndrome [9]. Next, the lateral recess decompression was treated by the total SAP (superior articular process) resection, and it was named endoscopic ventral facetectomy [10]. The fullendo surgery has been still developing and the final type of the stenosis, i.e. central stenosis will be treated in the near future.

Fullendo lumbar interbody fusion

Recently, various full-endoscopic lumbar interbody fusion technique has been reported. The basic concept in these technique should be always same. The cannula, instrument, and cage can be inserted through the Kambin triangle safely, although the name of the techniques are different. For example, Nakamura, *et al.* in 2017 [11] reported the technique and called it as PELIF (percutaneous endoscopic lumbar interbody fusion). Also, in 2018 Wu, *et al.* used PELIF for their technique [12]. Nagahama, *et al.* in 2018 [13] reported their concept with introducing their original ovary shaped cannula, and they named the technique as PETLIF (percutaneous endoscopic transforaminal lumbar interbody fusion). In some country the percutaneous endoscopic surgery is called as full-endoscopic surgery. Now the consensus is reached to use full-endoscopic surgery. Youn, *et al.* in 2018 [14] used the term as FELIF (full-endoscopic lumbar interbody fusion) and FE-TLIF (full-endoscopic transforaminal lumbar interbody fusion) by Kamson, *et al.* in 2019 [15]. Once again, despite the various name of the full-endoscope guided lumbar interbody fusion; i.e. PELIF, PETLIF, FELIF and FE-TLIF, the basic concept is to insert the cage through the Kambin triangle using the full-endoscopy.

Proposal of fullendo KLIF (trans-Kambin triangle lumbar interbody fusion)

There are various lumbar interbody fusion (LIF) technique in the literature. The name of the surgery would be based on the anatomical location of the cage insertion. For example, during PLIF (posterior LIF) surgery, cages are inserted posterior to the disc, on the other hand for ALIF (anterior LIF), cage insertion is from the anterior to the disc. Likewise, TLIF (Transforaminal LIF), DLIF (direct lateral LIF), XLIF (extreme lateral LIF), OLIF (oblique lateral LIF) would be named after the anatomical location of the cage insertion. While the endoscopic LIF such as PELIF, PETLIF, FELIF and FE-TLIF, the name is based on the endoscopic technique not on the anatomical location. The anatomical location of the endoscopic LIF techniques should be through the Kambin triangle (Figure 2).

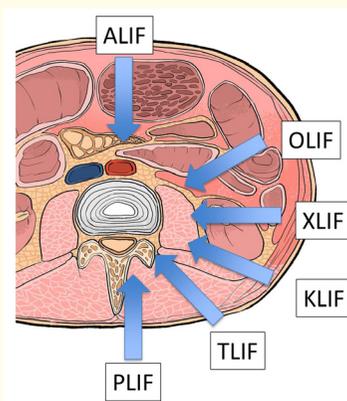


Figure 2: Anatomical insertion point of KLIF.

Kambin triangle is anatomically just outside of the intervertebral foramen, and the cage is inserted directly through the Kambin triangle not through the foramen. Thus, we would like to propose the name of the full-endoscopic LIF should be trans-Kambin triangle LIF (KLIF).

Conclusion

There are variety names of the full-endoscope guided trans-Kambin triangle lumbar interbody fusion technique in the literature such as PELIF, PETLIF, FELIF and FE-TLIF. However, these names are not based on the anatomical location of the insertion point of the cage. Thus, we wish to propose that fullendo KLIF (trans-Kambin triangle LIF).

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