Neurospine 2024;21(3):865-867.
https://doi.org/10.14245/ns.2448882.441

Neurospine
pISSN 2586-6583 eISSN 2586-6591

Commentary

Distal Junctional Kyphosis and Failure in Adult Deformity Surgery Down to L5: Commentary on "Distal Junctional Failure After Fusion Stopping at L5 in Patients With Adult Spinal Deformity: Incidence, Risk Factors, and Radiographic Criteria"

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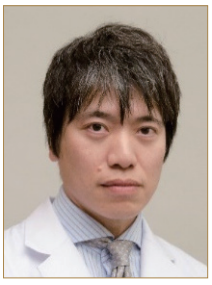

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See the article "Distal Junctional Failure After Fusion Stopping at L5 in Patients With Adult Spinal Deformity: Incidence, Risk Factors, and Radiographic Criteria" via https://doi.org/10.14245/ns.2448122.061.

Pelvic realignment surgery for global sagittal malalignment has become accepted well. While this intervention is advantageous to strong correction of spinopelvic parameters, the classification and management of proximal junctional kyphosis (PJK) and failure (PJF) have also been rapidly developed because of their notably high incidence.[1] Then, PJK and PJF as well as lumbar stiffness disability and persistent sacroiliac joint syndrome have raised further debate on spinopelvic surgery.[2] A study has shown no marked differences in patient-reported outcomes of the activities of daily living between long fusions to L5 versus to S1.[3] Nevertheless, it is problematic that additional major complications occur at a high rate in pelvic fixation—PJK, PJF, and implant-related complications such as screw malposition and anchoring loss, cage dislocation and subsidence, and rod breakage. As a result, floating fusion surgery has recently gained increasing attention.[4] The establishment of indication for floating fusion is highly demanded, as a treatment strategy in patients with less-severe adult spinal deformity (ASD) still accepting no inclusion of the L5–S1 segment for instrumentation.

An article of retrospective cohort study by Do et al.,[5] published in the September 2024 issue of the *Neurospine*, describes the classification and management of distal junctional kyphosis (DJK) and failure (DJF) in patients with ASD who underwent long fusion surgery down to L5. There is no argument about a high rate of DJK and DJF in ASD cases with long fusion stopping at L5; in particular, the definition of DJF as a condition requiring revision surgery is clinically useful.[6] In ASD requiring fusion through the pelvis, the frequency of PJF that can result in revision surgery is not necessarily high.[7-9] Meanwhile, DJK and DJF are often symptomatic, in which the revision rate seems to be high.[4,6] Prior retrospective cohort studies identified no differences in the revision rate between fusion groups to L5 and to the sacrum,[7,10-12] which should however be associated with the kind of pelvic anchors as well as the selection bias of patient age and follow-up period. On the other hand, in the

study by Do et al.,[5] at least no cases of PJF in patients undergoing fusion surgery stopping at L5 is noteworthy. In general, preoperative mismatch between the pelvic incidence (PI) minus the lumbar lordosis (LL) is a common factor for poor outcomes of pelvic fixation in patients with ASD.[13] Hence, the study of Do et al.[5] cohort with long spinal fusion terminated at L5, as retrospectively collected, might include cases not fully suited to select floating fusion down to L5, e.g., preferable to pelvic fusion and applicable to fusion down to L4. In fact, although the preoperative pelvic tilt (PT) was not identified by the multivariate analysis, a significant difference was observed between the DJF and non-DJF groups in the univariate analysis. We believe that corrective spinal surgery down to the sacrum is required to modify spinopelvic parameters in cases preoperatively with a high PT and/or those with a high PI. The indication for floating fusion surgery needs to be further developed in the future.

The study by Do et al.[5] found as well that postoperative changes in the distal junctional angle could predict DJF, which is convincing. However, there was a significant difference in the preoperative disc angle at L5–S1 between the standing and supine positions. This should be recognized more important clinically, since surgeons must determine the application of floating fusion only based on preoperative factors. A minimum 5-year follow-up study demonstrated requirements of additional fusion to the pelvis in 50% of patients undergoing long fusion stopping at L5.[6] In the study of Do et al.,[5] the revision rate thus appears to be low. Patient selection bias cannot be excluded as the retrospective study design, whereas the augmentation for the lowest instrumented vertebra (LIV), e.g., infra-laminar hooks, which was applied in 80% of cases, would be effective. Deep understanding of the pathogenesis, preoperative risk factors, and surgical factors of DJF is essential for spine surgeons involved in ASD treatment. When DJK is classified in detail, like PJK, the failure at the LIV is likely to be a surgical factor. We can control other surgical factors, such as the LIV augmentation and LL distribution except at L5–S1,[14] which have been reported as Roussouly sagittal profile.[15] It is of particular interest to know whether these parameters are useful to mitigate the risk of DJF and manage DJF-related complications. Further investigation is warranted to reveal more effective preventive and treatment strategies for DJK and DJF.

• **Conflict of Interest:** The authors have nothing to disclose.

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