Early Proximal Junctional Failure in Patients with Preoperative Sagittal Imbalance

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Abstract

Study Type Retrospective review.

Introduction Sagittal imbalance has been associated with lower health-related quality of life outcomes, and restoration of imbalance is associated with improved outcomes.[1–3] The long constructs used in adult spinal deformity have potential consequences such as proximal junctional kyphosis (PJK). Clinically, the development of PJK may not be as important as failure of the construct or vertebrae at the proximal end. As PJK does not lead to worse clinical outcomes,[4,5] we define the term early proximal junctional failure (EPJF) as fracture, implant failure, or myelopathy due to stenosis at the upper instrumental vertebra (UIV) or UIV + 1 within 6 months of surgery.

Objective The purpose of this study is to report the incidence of EPJF in patients who are sagittally imbalanced preoperatively and to identify risk factors postoperatively that correlate with EPJF using commonly reported sagittal balance parameters.

Methods We reviewed 197 patients with preoperative sagittal imbalance by at least one of the following: sagittal vertical axis more than 5 cm, global sagittal alignment more than 45 degrees, pelvic incidence—lumbar lordosis more than 10 degrees, or spine–sacral angle less than 120 degrees. Radiographic measurements also included proximal junctional angle, thoracic kyphosis, lumbar lordosis, pelvic parameters, and sagittal balance parameters/formulas, as well as UIV angle, UIV spinosacral angle, and UIV plumb line to assess as potential risk factors. EPJF incidence was calculated postoperatively for each of the accepted sagittal balance parameters/formulas.

Results EPJF was observed in 49 of 197 patients (25%) with preoperative sagittal imbalance and was more common in fusions with UIV in the lower thoracic spine (TS) (35%) than in those with UIV in the upper TS (10%) or lumbar (25%) ($p = 0.007$). Of the 49 EPJF patients, 16 patients (33%) required revision surgery within the first year, for an overall early revision rate of 8%. The incidence of EPJF was no different in patients with or without postoperative sagittal balance. No parameter/formula was more sensitive than another in predicting EPJF.

Conclusions The incidence of EPJF (25%) is greater in this sagittally imbalanced group than previously reported for adult deformity patients, occurring most often when the UIV is in the lower TS. Sagittal balance correction was not correlated with change in incidence of EPJF. Despite the high incidence, the early revision rate within the first year is low.

Keywords
- adult spinal deformity
- proximal junctional failure
- spine surgery
- sagittal balance

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Disclosures
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