

**Title: Incidence and risk factors of proximal junction failure (PJF) after multi-level spinal fusion in an integrated network delivery care setting**

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**Introduction:**

Proximal junction failure (PJF) is a serious post-operative complication of multi-level spinal surgery. PJF can lead to additional complications such as pain and reoperations, making it a costly complication. Furthermore, there are few cohort studies that evaluate PJF in non-academic hospital settings. This study aims to describe the incidence and risk factors of PJF in an integrated delivery network (IDN) of community hospitals.

**Methods:**

Through data partnership with Mercy Technology Services, adult patients who underwent multi-level thoracic and/or lumbar spine fusion surgery were extracted from 2011-2018 Mercy electronic health records (EHR), which is one of the comprehensive real-world databases including preoperative and intraoperative information. Occurrence of PJF 24 months after fusion was collected from the EHR using natural language processing. Kaplan-Meier curves for overall cohort and by surgical anatomy, were generated. To evaluate risk factors for PJF, cox proportional hazard models were fitted with anatomy and patient characteristics as covariates.

**Results:**

Of the 585 patients included for analysis, 45 (7.7%) experienced PJF within 24-months of the index fusion surgery. The incidence of PJF for “thoracic or lumbar” group was 5.5% (23/414) versus 12.9% for thoracolumbar group (22/171). Compared to patients without PJF (n=540, 92.3%), after covariate adjustment, significant risk factors for PJF were fusion surgeries spanning the thoracolumbar spine (adjusted Hazard Ratio (aHR), 2.35,95% Confidence Interval (CI),1.30-4.25; p-0.005) and older age (aHR,1.02,95% CI,0.998-1.05; p-0.068). No significant association between higher BMI (aHR,0.999,95% CI,0.991-1.01, p-0.86), and osteoporosis (aHR,1.29,95% CI,0.60-2.76, p-0.51) were observed with PJF.

**Conclusion:**

The observed 24-month incidence of PJF in an IDN setting is 7.7%. Spinal fusion surgeries spanning both the thoracic and lumbar regions were significantly associated with a higher incidence of PJF. Further investigations with a larger cohort size are needed to appropriately identify potential risk factors for PJF.

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