

Paraspinal Fat Infiltration in Patients Undergoing Anterior Cervical Discectomy and Fusion: The Relationship with Frailty and Postoperative Outcomes

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Introduction

The objective of this study was to assess cervical paraspinal muscle fatty infiltration as a radiographic marker for physiologic frailty and its association with perioperative outcomes following anterior cervical discectomy and fusion (ACDF).

Materials and Methods

A retrospective review was conducted including patients above the age of 50 who underwent primary ACDF for degenerative pathologies at a single tertiary care institution between the years of 2021 and 2024. Preoperative T2-weighted axial magnetic resonance imaging at the C5-C6 level was used to quantify fatty infiltration of the paraspinal muscles as described by the Goutallier classification. Patients' frailty was denoted using the Modified Frailty Index-5. Associations among patient demographics, comorbidities, Goutallier classification, MFI-5 scores, and postoperative outcomes were evaluated using Chi-squared analysis, Fisher's exact test, Kruskal-Wallis H test, and Spearman's rank correlation.

Results

A total of 547 patients with a mean MFI-5 score of 1.7 ± 1.0 were included. Higher Goutallier classification was significantly associated with lower BMI ($p = 0.020$), decreased rate of diabetes mellitus ($p = 0.013$), decreased rates of hypertension (0.026), and higher MFI-5 scores ($p = 0.049$). Stratification of MFI-5 scores demonstrated statistically significant differences in the distribution of Goutallier grading across frailty groups ($p = 0.020$), increased length of stay ($p = <0.001$), non-home discharge ($p = 0.013$), and increased 180-day complications ($p = 0.008$). Spearman correlation analysis found MFI-5 scores correlated with Goutallier classification ($p = 0.096$, $p = 0.025$), length of stay ($p = 0.193$, $p < 0.001$), non-home discharge ($p = 0.137$, $p = 0.001$), and complications ($p = 0.088$, $p = 0.039$).

Conclusion

Cervical paraspinal muscle fatty infiltration demonstrates a measurable association with physiologic frailty in patients undergoing ACDF. Integration of magnetic resonance imaging as a proxy for established frailty indices has potential to assist in preoperative assessment and surgical planning.