

Learning Objectives

By the conclusion of this session, participants should be able to understand flaws a simplified set of 15 factors contributing to patient frailty.

Introduction

To improve preoperative risk stratification for surgical cervical deformity (CD) patients, a CD frailty index (CD-FI) incorporating 40 factors was recently developed. To increase clinical utility, a simpler CD-FI (mCD-FI) is necessary.

Methods

CD patients >18yr with preop CD-FI component factors. Bivariate correlation assessed relationships between component deficits of the CD-FI and overall CD-FI score. Deficits contributing to CD-FI score were included in multiple stepwise regression models. Deficits from model with largest R² were dichotomized, and mean score of all deficits calculated, resulting in mCD-FI score from 0-1. Patients were stratified by published cutoffs: not frail (NF, <0.3), frail (0.3-0.5), severely frail (SF, >0.5; *Searle et al. 2008*). Means comparison tests established correlations between frailty category and clinical outcomes.

Results

Included: 121 CD patients (61±11yrs, 60%F). Table 1 presents the final multiple stepwise regression model identified the following factors as responsible for 86% of the variation in CD-FI score: lung disease (β=0.033), BMI <18.5 or >30 (β=0.015), diabetes (β=0.040), depression (β=0.020), liver disease (β=-1.101), rheumatoid arthritis (β=0.058), venous disease (β=0.099), unsteady gait (β=0.022), bladder incontinence (β=0.031), bowel incontinence (β=0.044), leg weakness (β=0.040), >3 comorbidities (β=0.151), anxiety (β=0.098), difficulty sleeping >6 hrs (β=0.056), and inability to walk (β=0.043). From these deficits, the overall population's mCD-FI was calculated: 0.31±0.14. Patient breakdown by mCD-FI category: NF: 47.9%, Frail: 46.3%, SF: 5.8%. As compared to NF and frail patients, SF patients had the longest inpatient hospital stays (2.5 and 1.7 times longer, respectively, P=0.042), greater baseline neck pain (NRS Neck 1.3 and 1.1 times higher, P=0.033), inferior NDI scores (1.6 and 1.2 times greater, P<0.001) and inferior EQ-5D outcomes (1.2 and 1.1 times lower, P<0.001). Compared to NF, frail patients had higher odds of superficial infection (OR:1.1[1.001-1.2]), and SF patients had increased odds of mortality (OR:10.4[1.2-90.6]).

Health Deficit	Standardized Coefficient (β)	Standard deviation (SD)	P
Lung disease	0.033	0.013	0.010
BMI <18.5 kg/m ² or >30 kg/m ²	0.015	0.008	0.054
Diabetes	0.04	0.011	<0.001
Depression	0.02	0.009	0.024
Liver disease	-0.101	0.057	0.077
Rheumatoid arthritis	0.058	0.015	<0.001
Venous disease	0.099	0.068	0.149
Unsteady gait	0.022	0.007	0.004
Bladder incontinence	0.031	0.012	0.010
Leg weakness	0.04	0.008	<0.001
≥4 Comorbidities	0.151	0.039	<0.001
Anxiety (EQ-5D-3L)	0.098	0.008	<0.001
Bowel incontinence	0.044	0.008	<0.001
Difficulty sleeping >6 hours (SWAL-QOL 9B)	0.056	0.008	<0.001
Inability to walk (EQ-5D-3L)	0.043	0.01	<0.001
R ² =0.860			

Table 1. Final multiple stepwise regression model predicting overall patient cervical deformity frailty index (CD-FI) score. Health deficits identified in this model were used to calculate the modified cervical deformity index score (mCD-FI).

Figure 1.

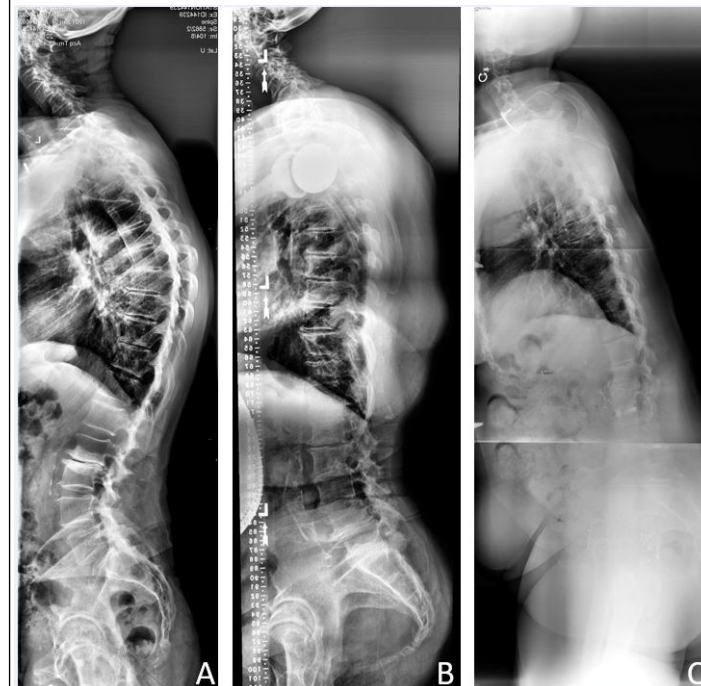


Figure 1. Preoperative lateral radiograph case examples for Not Frail (A), Frail (B), and Severely Frail (C) surgical cervical deformity patients. The mCD-FI scores were 0.20, 0.40, and 0.53, for the Not Frail, Frail, and Severely Frail patients, respectively.

Conclusions

This modified CD frailty index shows greater levels of patient frailty correlating with increased LOS, neck pain, and inferior clinical outcomes. The few number of deficits needed to calculate the present frailty score gives this modified CD frailty index increased clinical utility.

References

Searle SD, Mitnitski A, Gahbauer EA, Gill TM, Rockwood K. A standard procedure for creating a frailty index. *BMC Geriatr.* 2008;8:24. doi:10.1186/1471-2318-8-24