

Frailty Scores as a Predictor of Post-Operative Complications in Head and Neck Cancer Patients

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Introduction

Frailty is defined as a clinical syndrome of decreased physiologic reserve resulting from cumulative biologic stressors and is associated with increased vulnerability to changes in health.¹ Previously, frailty has been shown to be an independent predictor of post-operative complications in head and neck cancer (HNCA) patients.^{2,3} However, this data often cannot be generalized more broadly due to focus on particular populations and surgical procedures. Additionally, a standardized frailty instrument has yet to be defined in this population.

Our study evaluates the relationship between preoperative frailty scores and postoperative complications in patients undergoing major surgeries for head and neck cancer.

Methods

This was a retrospective review of 275 surgical procedures performed on HNCA patients over the age of 18 years between May 2015 and May 2020. Data gathered included patient demographics, surgical details, and post-operative complications. Frailty was evaluated based on information available at the time of pre-operative clinic visit using the modified frailty index 5 (mFI-5), the modified frailty index 11 (mFI-11), and the adult comorbidity evaluation (ACE-27). Surgeries included neck dissections, glossectomies, total thyroidectomies, open maxillectomies, laryngectomies, and composite resections requiring free flap reconstruction.

Results

242 patient charts were reviewed for a total of 275 surgical procedures. 102 patients had at least one post-operative complication. mFI-11 score correlated with Clavien-Dindo class with a coefficient of .029 compared to no correlation seen with ACE-27 Grade and MFI-5 score. When measured by Odds Ratio (OR), ACE-27, mFI-5, and mFI-11 scores all predicted risk of post-operative complications. Increasing mFI-11 scores corresponded to incidence of any medical or surgical complication. Multivariate logistic regression found that mFI-11 score was a significant predictor of pneumonia (OR = 2.03; 95% CI, 1.44 - 2.92), myocardial infarction (OR = 1.86; 95% CI, 1.03 – 3.23), and death (OR = 3.45; 95% CI, 1.5 – 11.34).

Table 1: Correlation of Frailty and Clavien-Dindo Class

Variable	rho	Clavien Dindo Class P-Value
ACE-27 Grade	0.19	0.052
mFI-5 Score	0.15	0.139
mFI-11 Score	0.22	0.029

Table 1: Correlation between pre-operative comorbidity and frailty scores and Clavien-Dindo Class.

Table 2: Outcomes after major HNCA surgeries stratified by mFI-11 score

Parameter	Total N	mFI-11 Score						P-Value
		0 N (%)	1 N (%)	2 N (%)	3 N (%)	4 N (%)	≥ 5 N (%)	
Any Complication	102	28 (27.5)	28 (27.5)	32 (31.4)	8 (7.8)	3 (2.9)	3 (2.9)	<0.001
Pneumonia	18	1 (5.6)	4 (22.2)	7 (38.9)	4 (22.2)	1 (5.6)	1 (5.6)	<0.001
Any Complication excluding dysphagia*	89	23 (25.8)	25 (28.1)	29 (32.6)	7 (7.9)	2 (2.2)	3 (3.3)	<0.001

Table 3: Odds Ratio for Frailty Score and Outcomes

Outcomes	Unadjusted Odds Ratio (95% CI)		
	ACE-27 Grade	MFI-5 Score	MFI-11 Score
Any Complication	2.7 (1.98,3.75)	1.86 (1.37,2.56)	1.69 (1.34,2.16)
Dysphagia	2.76 (1.89,4.16)	1.88 (1.28,2.8)	1.66 (1.27,2.19)
Any Complication Excluding Dysphagia	2.62 (1.93,3.65)	1.81 (1.33,2.5)	1.65 (1.3,2.11)

Table 3: Odds Ratio for each frailty score and outcomes. All were statistically significant using a 95% CI with a P-value < 0.05.

* Included complications were death, hematoma/seroma, wound dehiscence, wound site infection, fistula formation, need for take back to the operating room, free flap failure, deep vein thrombosis, pulmonary embolism, myocardial infarction, sepsis, and urinary tract infection

Table 2: Increasing mFI-scores were significantly associated with risk of any medical or surgical complication, pneumonia, and non g-tube complications. P-values correspond to Fisher exact test.

Discussion

Increasing preoperative Modified Frailty Index in 275 patients with head and neck cancer undergoing major surgeries predicted post-operative medical and surgical complications.

More important than age, frailty assessment preoperatively is a key predictive indicator for post operative outcomes and can be used to risk stratify and counsel patients considering major head and neck oncologic surgery.

Further research is needed to assess the validity of frailty screening tools prospectively.

Conclusion

Incorporating frailty and comorbidity assessments in patients considering undergoing surgery for head and neck cancer will be instrumental in optimizing treatment plans and postoperative outcomes.

References

- Clegg A, Young J. The frailty syndrome. *Clin Med (Lond)*. 2011;11(1):72-75. doi:10.7861/clinmedicine.11-1-72
- Abt NB, Richmon JD, Koch WM, Eisele DW, Agrawal N. Assessment of the Predictive Value of the Modified Frailty Index for Clavien-Dindo Grade IV Critical Care Complications in Major Head and Neck Cancer Operations. *JAMA Otolaryngol Head Neck Surg*. 2016;142(7):658–664. doi:10.1001/jamaoto.2016.0707
- Pitts KD, Arteaga AA, Stevens BP, et al. Frailty as a Predictor of Postoperative Outcomes among Patients with Head and Neck Cancer. *Otolaryngology–Head and Neck Surgery*. 2019;160(4):664-671. doi:10.1177/0194599818825466