Fi-Lab Beyond Medicine: Using Routine Blood Tests to Predict Surgical Risk in Elderly Colorectal Cancer Patients

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Introduction

The Frailty Index Lab (FI-Lab) score has potential as a predictive tool for assessing post-operative outcomes, including mortality, in colorectal cancer surgery[1]. By quantifying frailty based on accumulated deficits, the FI-Lab score may help identify patients at higher risk of adverse surgical outcomes. Its ability to standardize frailty assessment makes it a valuable candidate for evaluating post-operative mortality in colorectal cancer surgery, where patient-specific risk stratification is critical. Currently, there are very few studies that have looked at applying frailty scores to colorectal elective surgical patients.

Aims

Frailty is becoming increasingly difficult to quantify in surgical patients, and the Fi-Lab helps us determine a frailty score, to help risk stratification, which is particularly important in patients requiring surgical procedures[2]. This study investigates the association between pre-operative frailty and post-operative clinical outcomes in octogenarian patients undergoing colorectal cancer resection, using the Frailty Index Lab Score (FI-Lab).

Methods

Retrospective

The study uses retrospective data on patients undergoing colorectal cancer resection at a tertiary care centre from 2011 to 2017.
N = 337.

Fi-Lab score

The Fi-Lab score is obtained by summing the variable-deficit scores and dividing by the number of variables, a score ranging from 0 to 1; a higher score indicates greater frailty

Outcome Measures

Primary outcome: 1-year mortality, 2-year mortality, 5-year mortality
Secondary outcomes: Length of stay, association with ASA/m-Fi/Age

Results

Total of **337** patients between the ages of 80-93 years. 185 females (55%) and 152 males (45%).

Fi-Lab **was significantly higher in patients who died vs. survivors** at 1 year and at 2 years

Stepwise increase in mortality by Fi-Lab risk categories observed across all time points, and **statistically significant** at **1 and 5 years**

Patients classified **as high frailty** by Fi-Lab are **significantly greater risk of death** at 1 and 5 years

Primary Outcomes:

Table 1 Average FI Lab Deficit Ratio against mortality

	Outcome	FI-Lab Deficit Ratio Mean	p-value*
1-year mortality	Survival	0.233	0.007
	Mortality	0.319	
2-year mortality	Survival	0.232	0.020
	Mortality	0.285	
5-year mortality	Survival	0.231	0.091
	Mortality	0.259	

Patients within the high frailty groups had significantly higher mortality rates ($p < 0.05$) than those in the moderate to low frailty groups, only at 1- and 2-year mortality but not at 5-year mortality

A stepwise increase in mortality was across all time points, statistically significant at 1 and 5 years

Table 2 Mortality rate according to frailty group

	Frailty Group	Survival	Mortality	p-value*
1-year mortality	Low	147	8	0.003
	Moderate	124	11	
	High	37	10	
2-year mortality	Low	133	22	0.076
	Moderate	115	20	
	High	37	13	
5-year mortality	Low	102	53	0.044
	Moderate	93	42	
	High	23	24	

Table 3 Adjusted Odds Ratio of mortality according to frailty group

	Frailty Group	Odds Ratio	95% CI	p-value*
1-year mortality	Low	1.00	N/A	N/A
	Moderate	1.56	0.59 – 4.29	0.400
	High	4.62	1.63 – 13.5	0.004
2-year mortality	Low	1.00	N/A	N/A
	Moderate	1.02	0.50 – 2.05	>0.09
	High	2.34	1.01 – 5.29	0.043
5-year mortality	Low	1.00	N/A	N/A
	Moderate	0.98	0.57 – 1.67	>0.9
	High	2.08	1.02 – 4.28	0.044

Figure 1. Fi-Lab Risk Categories:

High >0.40
Moderate 0.21– 0.40
Low <0.20

Patients in high-risk Fi-Lab group had significantly increased odds of mortality vs. those in low-risk group.

Secondary Outcomes:

- The Fi-Lab deficit ratio was compared against secondary outcomes: Length of stay, association with ASA, complication rates.
- There was no statistical significance in these secondary outcomes.

Limitations

- Lowest variable in Fi-Lab was 6, we aimed to collect >10 but struggled due to lack of values available
- Over 80% of patients had >10 variables in the Fi-Lab score
- Limited to a specific cohort (Over 80s and only colorectal cancer patients)

Conclusion

The FI-Lab Score is a practical, objective tool that strongly correlates with post-operative mortality in octogenarians undergoing colorectal cancer surgery. Specifically, patients classified as high frailty by FI-Lab are at significantly greater risk of death at 1, 2, and 5 years. These findings support the integration of FI-Lab into pre-operative risk assessments to better guide clinical decision-making and personalize perioperative care strategies for older adults.

References:
[1] Howlett, S.E., Rockwood, M.R., Mitnitski, A. *et al.* Standard laboratory tests to identify older adults at increased risk of death. *BMC Med* **12**, 171 (2014). https://doi.org/10.1186/s12916-014-0171-9
[2] Xue QL. The frailty syndrome: definition and natural history. Clin Geriatr Med. 2011 Feb;27(1):1-15. doi: 10.1016/j.cger.2010.08.009. PMID: 21093718; PMCID: PMC3028599