

Increased Preoperative Frailty is Associated with Worse Perioperative Outcomes After Robotic-Assisted Pulmonary Lobectomy

Atif M. Islam BS¹, Brandon J. Dyer BS¹, Austin C. Erickson BS¹, Andrew Bedard BS¹, Joseph R. Garrett MPH ARNP-C², Carla C. Moodie PA-C², Diana De La Cruz PA-C², Lindsay P. Power PA-C², Jenna R. Tew PA-C², Jobelle J.A.R. Baldonado MD^{1,2}, Samuel T Freyaldenhoven MD^{1,2}, Jacques P. Fontaine MD^{1,2}, and Eric M. Toloza, MD PhD^{1,2}

¹University of South Florida Health Morsani College of Medicine, Tampa, FL, USA; ²Moffitt Cancer Center, Tampa, FL, USA

Introduction

- Individual clinical factors, such as malnutrition and inflammatory markers, predict survival in cancer patients but often fail to capture overall patient vulnerability and prognosis.
- The Deficit Accumulation Survival Index (DASI) has been validated to offer a holistic picture of frailty. This study evaluated whether increased preoperative DASI scores were associated with common intraoperative and perioperative outcomes following Robotic-Assisted Pulmonary Lobectomy (RAPL).

Study Design

- Retrospective Cross-Sectional

Methodology

- We retrospectively reviewed 830 consecutive patients who underwent RAPL from September 2010 to January 2025 by a single surgeon.
- Frailty was quantified using the Deficit Accumulation Survival Index (DASI), which is derived from 24 routinely available clinical parameters spanning functional status, nutritional markers, and inflammatory lab values (Table 1). Each variable was assigned in a binary fashion using previously validated cutoffs to indicate the presence or absence of a deficit.
- For each patient, DASI scores were calculated at two individual time points, Preoperative and Discharge. Preoperative was defined as the most recent data prior to the surgical procedure, while Discharge values were defined as the final recorded measurements before hospital discharge
- Skin-to-skin surgical time, estimated blood loss (EBL), chest tube duration, and hospital length of stay (LOS) were the primary perioperative outcomes.
- Descriptive statistics, Spearman correlations, and Mann-Whitney U tests were used to analyze associations between DASI scores and perioperative outcomes.

Table 1: DASI Score Variables, with Hospital LOS included only in Discharge DASI.

DASI Variables
Marital Status (Single/Divorced/Widowed = 1, Married = 0)
Language (Not English = 1; English = 0)
BMI, kg/m2 (<19 = 1, >19 = 0)
ECOG Status (2,3,4 = 1, 0,1 = 0)
Fall Risk (High = 1, Moderate/Low = 0)
Number of Medications (>5 = 1, <5 = 0)
Healthcare Utilization in Prior 6 months (>2 visits = 1, <2 visits = 0)
WBC, k/uL (>11 = 1, <11 = 0)
Neutrophils, k/uL (<1.8 = 1, >1.8 = 0)
Lymphocytes, k/uL (<1.1 = 1, >1.1 = 0)
NLR Index (>5 = 1; <5 = 0)
Hgb, g/dL (<12 = 1, >12 = 0)
Platelet Count, k/uL (>450 or <150 = 1, 150-450 = 0)
PLR Index (>250 = 1, <250 = 0)
SII Score (>1600 = 1, <1600 = 0)
Sodium, mmol/L (<135 = 1, >135 = 0)
Creatinine, mg/dL (>1.3 = 1, <1.3 = 0)
Calcium Corrected, mg/dL (>11 = 1, <11 = 0)
Albumin, g/dL (<3.5 = 1, >3.5 = 0)
PNI Score (<45 = 1, >45 = 0)
Path Tumor Size (>3cm = 1, <3cm = 0)
Path Nodal Metastasis (N1,N2 = 1; N0 = 0)
Path Distant Metastasis (M1 = 1, M0 = 0)

Table 3: Perioperative Outcomes and Associations With Preoperative DASI

Outcome	Median (IQR)	Spearman's ρ	p-value
Skin-to-skin time (min)	173 (146–213.5)	0.242	<0.001
Estimated blood loss (mL)	100 (50–200)	0.211	<0.001
Chest tube duration (days)	3 (2–6)	0.269	<0.001
Length of stay (days)	4 (3–6)	0.300	<0.001

Table 2: Patient Demographics and Baseline Characteristics

Characteristic	Value
Total patients, n	830
Age, years, median (IQR)	69.8 (62.8–75.5)
Female sex, n (%)	463, (55.8%)
Body Mass Index, kg/m², median (IQR)	27.7 (24.0–31.0)
Smoking history, pack-years, median (IQR)	27.0 (4.2–50.0)
Preoperative DASI, median (IQR)	4 (3–5)
Discharge DASI, median (IQR)	5 (4–7)

Table 4: DASI Scores by Discharge Disposition

Variable	Favorable Discharge (n=668)	Unfavorable Discharge (n=130)	p-value (Cliff's δ)
Preoperative DASI, median	4	5	<0.001 (–0.366)
Discharge DASI, median	5	6	<0.001 (–0.260)

Results

- A total of 830 consecutive RAPL patients were included in the analysis.
- Median age was 69.8 years [IQR: 62.8-75.5], median BMI was 27.7 [24.0-31.0], and a median smoking history of 27.0 pack-years [4.2-50]. Women comprised 55.8% of the cohort.
- Median cohort Preoperative DASI score was 4 (IQR, 3–5), while the median Discharge DASI score increased to 5 (IQR, 4–7).
- Median perioperative outcomes for the cohort included a skin-to-skin time of 173 minutes (IQR, 146–213.5), EBL of 100 milliliters (mL) (IQR, 50–200), chest tube duration of 3 days (IQR, 2–6), and a hospital LOS of 4 days (IQR, 3.00–6.00).
- Higher Preoperative DASI scores were positively correlated with increased skin-to-skin surgical time (Spearman's ρ: 0.242, p<0.001), EBL (ρ: 0.211, p<0.001), chest tube duration (ρ: 0.269, p<0.001), and hospital LOS (ρ: 0.300, p<0.001).
- Discharge disposition data were available for 798 patients, with 668 (83.7%) having favorable discharge dispositions.
- Patients with favorable discharge dispositions had significantly lower median Preoperative (4 vs. 5, p<0.001, Cliff's δ: -0.366) and Discharge (5 vs. 6, p<0.001, δ: -0.260) DASI scores.

Conclusion

- Increases in preoperative frailty, as measured by the DASI score, were significantly associated with increased skin-to-skin surgical time, EBL, chest tube duration, and LOS.
- Our findings suggest that the DASI score could be employed as a preoperative risk stratification tool to enable identification of patients at a higher risk for increased resource utilization following RAPL.

Questions?

Email: atifislam@usf.edu