VALIDATION OF THE JAPANESE DIFFICULTY SCORE FOR LAPAROSCOPIC HEPATECTOMY IN ROBOTIC LIVER RESECTION

Ansley B Ricker, Benjamin Motz, Michael Watson, Erin Baker, David A. Iannitti, Dionisios Vrochides, John Martinie

BACKGROUND

- Laparoscopic hepatectomy is associated with a steep learning curve, leading to the development of robotic approaches to reduce technical limitations of these complex procedures.
- The Japanese Laparoscopic Difficulty Scoring (LDS) was developed to standardize the stratification of laparoscopic hepatectomy into low, intermediate, and high complexity procedures.

Difficulty of laparoscopic liver resection

10-level index	1	2	3	4	5	6	7	8	9	10
Three-level index	Low			Intermediate			High			
Definition	• For surgeons starting laparoscopic liver resection • For surgeons with experience of <10 cases of laparoscopic liver resection			• For surgeons who can consistently perform laparoscopic liver resection in "low difficulty" cases • For surgeons with experience of ≥10 and <50 cases of laparoscopic liver resection			• For surgeons who can consistently perform laparoscopic liver resection in "intermediate difficulty" cases • For surgeons with experience of ≥50 cases of laparoscopic liver resection			
Landmark Operation	Simple and small partial hepatectomy in segment 3			Left lateral sectionectomy			Simple hemihepatectomy Technical limitation in current laparoscopic surgery			

- The LDS has been shown to correlate with perioperative outcomes in laparoscopic resections but has not been validated for robotic resections.
- This study assesses whether this correlation also applies to the robotic approach.

RESULTS

- 882 hepatectomies were performed during the study period. 413 underwent minimally invasive hepatectomy. 276 underwent laparoscopic resection, and 137 of those underwent robotic resection.

	Low (N=25)	Intermediate (N=58)	High (N=54)	p value
OR time (min)				< 0.0001
Median (Q1,Q3)	174 (143, 197)	157.5 (128.25, 196)	239 (182, 288.5)	
Mean (SD)	183.9 (77.9)	173.0 (68.0)	245.8 (84.9)	
EBL (mL)				< 0.0001
Median (Q1,Q3)	100 (60, 200)	150 (85, 250)	475 (200, 800)	
Mean (SD)	158.2 (140.1)	270.3 (358.8)	641.9 (682.6)	
Transfusion				0.0011
No	23 (92.0%)	52 (89.7%)	35 (64.8%)	
Yes	2 (8.0%)	6 (10.3%)	19 (35.2%)	

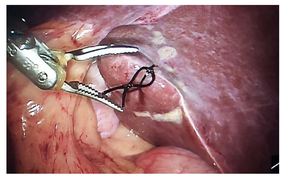
- Postoperatively, "High" difficulty was associated with higher rates of post-hepatectomy liver failure (p = 0.018) and increased length of stay (p = 0.0005).

Length of Stay (days)	Low LDS (n=25)	Intermediate LDS (n=58)	High LDS (n=54)
Median (Q1,Q3)	2 (2, 3)	3 (2, 4)	4 (3, 6)
Mean (SD)	2.6 (1.3)	3.5 (2.2)	5.50 (4.89)
30-day Readmission			
Yes	3 (12.0%)	2 (3.4%)	7 (13.0%)
No	22 (88.0%)	56 (96.6%)	47 (87.0%)

METHODS

- After IRB approval, a retrospectively maintained registry of hepatectomies performed at a single high-volume tertiary care center was queried for all minimally invasive resections performed between 2008 and 2019.
- Patients were grouped based on LDS: "low" (<4), "intermediate" (4-6), and "high" (7+) difficulty.
- Statistical comparisons were made using ANOVA or Chi square test.





CONCLUSIONS

- Operative complexity is driven by greater extent of resection, manifested by increased operative time, EBL, and blood transfusion, and leads to increased PHLF and LOS.
- LDS successfully predicts the complexity of robotic liver resection as it has previously done for laparoscopic hepatectomies and can be used as a tool to guide beginner robotic surgeons.`