

Post-operative ICU admission and SOFA Score Assessment after Elective Surgery: A Comparative Case Study of Laparoscopic and Robot-assisted Low Anterior Resection

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INTRODUCTION

The Sequential Organ Failure Assessment (SOFA) score is a scoring system to assess the level of organ dysfunction/failure. The SOFA score and Intensive Care Unit (ICU) admission after surgery can be used as a predictor of post-operative outcomes.

AIM

We conducted a study comparing the differences of ICU admission, medical cost of ICU patients and SOFA score by surgical modality to investigate the impact of surgical modality on ICU usages.

METHOD

- A nationwide Japanese claim database (Medial Data Vision Data) which represents approx. 23% of acute general hospitals in Japan was used.
- We identify adult patients who underwent Low Anterior Resection (LAR) between April 2018 and June 2022 in the hospitals with over 500 beds.
- The ICU patients were identified using claim codes (A3011, A3012) and divided into Laparoscopic (LAP) and Robot assisted surgery (RAS) groups.
- Propensity Score Matching (PSM) was used to balance the covariates of studied population. We included age, sex, BMI, CCI, cancer stage and the year of surgery into matching.

RESULTS

- A total of 6,671 low anterior resection patients were identified (LAP: 4,692, RAS: 1,979). The ICU admission rate was 10% (471/4,692) in LAP and 13.5% (268/1,979) in RAS ($p = .000$).
- After removing the population with missing values in any of studied outcomes, 412 LAP and 255 RAS cases were left of which 510 patients were paired (LAP: 255, RAS: 255) for matching.
- In the matched analyses, the ICU Length of Stay (LOS) stay was 2.42 ± 1.57 in LAP and 2.06 ± 0.79 in RAS ($p = 0.001$) respectively. The SOFA score was 10.22 ± 9.17 in LAP and 3.68 ± 3.62 in RAS ($p < 0.001$) on the ICU admission date, and 10.25 ± 15.21 in LAP and 2.49 ± 5.53 in RAS ($p < 0.001$) on the discharge date. The average hospitalization cost of ICU admitted patients was USD 23,389 (SD: 11,997) for LAP and USD 20,543 (SD: 9,015) for RAS ($p = 0.003$).

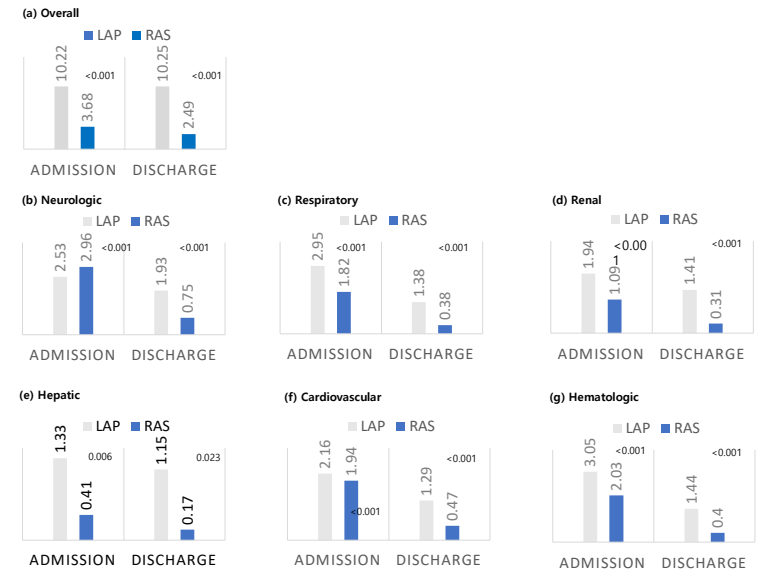
Table1. Patients baseline characteristics

		LAP	RAS	p-value	LAP	RAS	p-value
N		412	255		255	255	
Sex(%)	Female	152(36.9)	83(32.5)	0.290	86(33.7)	83(32.5)	0.851
	Male	260(63.1)	172(67.5)		169(66.3)	172(67.5)	
Age	<45	10(2.4)	5(2.0)	0.375	2(0.8)	5(2.0)	0.566
	45-55	43(10.4)	28(11.0)		27(10.6)	28(11.0)	
	55-65	75(18.2)	62(24.3)		52(20.4)	62(24.3)	
	65-75	15(37.9)	92(36.1)		96(37.6)	92(36.1)	
	>75	128(31.1)	68(26.7)		78(30.6)	68(26.7)	
CCI	1	291(70.6)	179(70.2)	0.173	178(69.8)	179(70.2)	0.943
	2	44(10.7)	18(7.1)		20(7.8)	18(7.1)	
	3	77(18.7)	58(22.7)		57(22.4)	58(22.7)	
BMI	Underweight	45(10.9)	25(9.8)	0.932	24(9.4)	25(9.8)	0.994
	Normal	255(61.9)	164(64.3)		165(64.7)	164(64.3)	
	Overweight	93(22.6)	55(21.6)		56(22.0)	55(21.6)	
	Obesity	19(4.6)	11(4.3)		10(3.9)	11(4.3)	
Cancer stage	Tis, T0, Tx	52(12.6)	57(22.4)	0.001	44(17.3)	57(22.4)	0.451
	T1	58(14.1)	48(18.8)		45(17.6)	48(18.8)	
	T2	72(17.5)	27(10.6)		30(11.8)	27(10.6)	
	T3	187(45.4)	104(40.8)		121(47.5)	104(40.8)	
	T4	43(10.4)	19(7.5)		15(5.9)	19(7.5)	
Surgery year	2018	75(18.2)	9(3.5)	<0.001	7(2.7)	9(3.5)	0.830
	2019	76(18.4)	47(18.4)		45(17.6)	47(18.4)	
	2020	78(18.9)	71(27.8)		63(24.7)	71(27.8)	
	2021	120(29.1)	81(31.8)		92(36.1)	81(31.8)	
	2022	63(15.3)	47(18.4)		48(18.8)	47(18.4)	

Table2. ICU stays and cost

	LAP	RAS	p-value	LAP	RAS	p-value
Length of stay in ICU (days)	2.34(1.37)	2.06(0.79)	0.003	2.42(1.57)	2.06(0.79)	0.001
Hospitalization cost (USD)	22,563(11,226)	20,543(9,015)	0.015	23,389(11,997)	20,543(9,015)	0.003

Graph 1. SOFA score on admission/discharge date



CONCLUSION

- The ICU admission rate was higher in RAS than LAP, but a significantly lower SOFA score on both admission and discharge date as well as shorter LOS were observed in RAS. Total medical cost was also lower in RAS than LAP.
- Due to inherent limitation of claims, we were not able to identify if more routine ICU admission is preferred after RAS than LAP. To avoid a bias caused by hospital practice and routine admission, a prospective study that applies a same criteria to determine the needs of ICU admission is required.