Transitioning from Laparoscopic to Robotic Techniques in Community Based Practice by a General Surgeon. Is It Safe? Our Outcomes and Learning Curve Experience.

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Background

Over the past few decades, the practice of a general surgeon has changed from open to minimally invasive procedures. Laparoscopic procedures constitute a significant proportion of general surgery practice with cholecystectomy being one of the most common procedures performed. Adopting laparoscopic techniques involved a steep learning curve. Similarly, robotic procedures are now gaining popularity with increasing penetrance into daily practice. The purpose of our study is to present a single surgeon's outcomes during the transition from laparoscopic (LC) to robotic cholecystectomy (RC) with our primary endpoint being operative safety.

Methods

- All patients who underwent cholecystectomy by a single surgeon at a community hospital between April and August of 2019 were identified and data was collected retrospectively.
- Information collected included age, sex, BMI, ASA score, pathology, length of stay (LOS), blood loss, readmission, reoperation, re-intervention, operative time, and wound class.
- Patients who underwent additional procedures at the time of cholecystectomy were excluded.
- Kruskal-Wallis test was used to compare laparoscopic versus robotic groups. Findings were considered significant for $p<0.05$.

Results

- The two study groups were of similar sample size (LC=34, RC=28) and all patient related variables including age, sex, BMI, ASA scores, wound class were similar between two groups (p-values 0.9, 0.8, 0.7, 0.4, 0.8 respectively).
- Both groups had a comparable number of elective versus non-elective cases (p=0.37).
- Histologic findings were either inflamed or non-inflamed based on pathology reports without significant difference between groups (p=0.77).
- Intraoperative blood loss was significantly higher in the laparoscopic group (LC:47.4mL, RC=13.9mL; p=0.0011).
- Operative time was significantly higher in robotic group (RC: 54±12.8 minutes; LC: 44±17.4 minutes; p=.0014. In the LC group, 3 patients required blood transfusions for symptomatic anemia postoperatively, 1 patient was taken back to OR for significant bleeding, and 1 patient required ERCP for choledocholithiasis.
- In the RC group, 1 patient was readmitted for postoperative ileus but no patients required postoperative transfusion or intervention. LOS was similar between approaches (p=0.51).

	Laparoscopic	Robotic	P-value
Variable			
Number of cases (N)	34	28	
Age (mean±SD) (years)	49.9±19.4	49.8±16.6	P=0.8652
Sex	10 (M), 24 (F)	9 (M) 19 (F)	P=0.8541
BMI (mean±SD)	31.5±6.9	30.4±6.4	P=0.7342
ASA score (Median)	2	2	P=0.396
Post op LOS (mean±SD) (days)	0.9±1.3	0.6±0.7	P=0.51
Blood loss (mean±SD)	47.4±90.6	13.9±15.8	P=0.0011
Cases	Elective - 21	Elective - 21	P=0.3729
	Non-Elective -13	Non-Elective - 7	
Operating time (mean±SD) (minutes)	44±17.4	54±12.8	P=0.0014
Wound class (Median)	3	2.5	P=0.843
Histology*	Inflamed - 27	Inflamed - 21	P=0.7664
	Non-inflamed - 7	Non-Inflamed - 7	
Readmissions	0	1 (ileus)	
Reoperation	1	0	
Required procedure	1 (ERCP)	0	

Conclusion

Our outcomes show a significant difference in operative times and intraoperative blood loss in similar population groups. Although LC was associated with shorter operative times, RC appears to be relatively safer in regard to lower estimated blood loss, fewer blood transfusions, reoperations, and postoperative interventions. Significantly longer operative times for RC are likely due to the learning curve of the surgeon and operating room staff. Technological advantages inherent to the robotic platform such as firefly immunofluorescence and 3D visualization may contribute to the improved clinical outcomes associated with RC.