The Evolving Surgical Management of Moderate to Severe Cholecystitis

Kenneth Luberice, MD; Phillip Jenkins, BS; Edward J. Prange, MD; Brian Dalton, MD; Ruchir Puri, MD

University of Florida College of Medicine Jacksonville, FL, 32209

UFHealth
UNIVERSITY OF FLORIDA HEALTH

INTRODUCTION

Laparoscopic cholecystectomy is the gold standard treatment modality for symptomatic gallbladder disease. In patients with more challenging presentations, the placement of a percutaneous cholecystostomy tube or a partial cholecystectomy are reasonable damage control options to minimize bile duct injuries. This study was undertaken to examine our single institutional results with partial cholecystectomy and to compare our outcomes to those of patients undergoing laparoscopic 'converted to open' cholecystectomy and patients cholecystectomy following previous percutaneous cholecystostomy.

METHODS

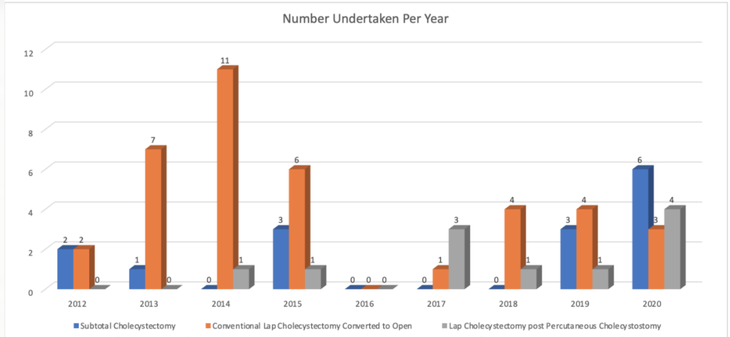
From December 2012-to-December 2020, 2,538 patients underwent cholecystectomy and 71 patients underwent percutaneous cholecystostomy. With IRB approval, demographic data and perioperative outcomes were analyzed and compared between patients undergoing subtotal cholecystectomies, cholecystectomy status post percutaneous cholecystostomy drainage procedure, and laparoscopic cholecystectomy that were converted to 'open'. Statistical analysis was undertaken utilizing GraphPad Prism 9™ software. Nominal data were analyzed using Chi-Square Analysis. Interval data were analyzed utilizing non-parametric testing of means through Mann-Whitney U-Test. For illustrative purposes, data are presented as median (mean ± SD).

RESULTS

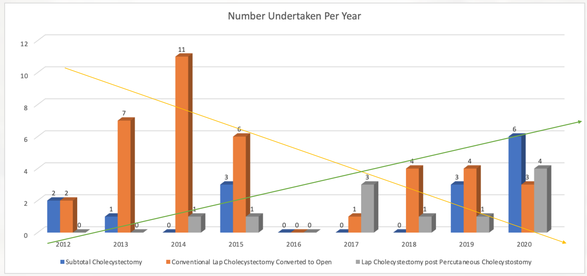
Of all patients undergoing cholecystectomy from 2012 - 2020, 35 (1.4%) underwent 'conversion to open', 18 (<1%) underwent subtotal cholecystectomy. Of the 71-patient that underwent percutaneous cholecystostomy, 11 (16%) underwent subsequent cholecystectomy.

Relative to patients undergoing cholecystostomy placement, patients who underwent subtotal cholecystectomy and 'conversion to open' were significantly younger and had a lower ASA class, p=0.005, p=0.007, respectively. There was no difference in operative duration or use of intraoperative cholangiogram (IOC), between all three groups (Table

	Subtotal Cholecystectomy	Conventional Lap Cholecystectomy Converted to Open	Lap Cholecystectomy post Percutaneous Cholecystostomy	Across all 3 groups
	18	*35*	*11*	*Total / p-Value*
Demographics				
Age (years)	56(55 ± 17.9)	66(61 ± 15.6)	75(75 ± 14.3)	***0.005***
Gender (Men/Woman)	56%M / 44% W	49%M / 51%W	45%M / 55% W	*NS*
BMI (kg/m2)	33(32 ± 0.73)	31(31 ± 8.3)	29(29 ± 7.9)	*0.04*
Previous Intra-abdominal Surgery	33%	60%	64%	*NS*
Preoperative Total Bilirubin	0.7 (1.4 ± 0.54)	0.75 (1.8 ± 3.5)	0.4(0.8 ± 0.93)	*NS*
Preoperative WBC	10.9 (13.7 ± 1.54)	9 (10 ± 6.3)	6.2(7.2 ± 3.09)	***0.04***
ASA Classification	*2(2 ± 0.63)*	*3 (3 ± 0.73)*	3(3 ± 0.53)	***0.007***
Intraoperative Course				
Years of Experience	1 – 5 (33%) 5 – 6 (44 %) >10 (23%)	1 – 5 (40%) 5 – 6 (10 %) >10 (50%)	1 – 5 (46%) 5 – 6 (27 %) >10 (27%)	0.03
Operative Duration (mins)	147 (152 ± 4.0)	179(220 ± 199.8)	91(134 ± 81.3)	NS
Estimated Blood Loss (mL)	100 (262 ± 114.6)	**300(361 ± 341.1)**	40(118 ± 229.9)	0.07
Intra-Operative Cholangiogram	22%	14%	18%	NS
Conversions to open	50%	*100%*	18%	**<0.0001**
Intra-Operative Complications	44%	**83%**	45%	**0.006**
Drain Placement	61%	*29%*	27%	**0.05**
Postoperative Course				
Length of Stay (days) [operation - discharge]	*6(7 ± 4.6)*	*5(7 ± 5.4)*	2(4 ± 5.2)	*NS*
Total Length of Stay (days) [admission - discharge]	10(11 ± 7.4)	*9(10 ± 8.5)*	4(8 ± 7.2)	*NS*
ICU Length of Stay (day)	0(1 ± 0.58)	0 (1 ± 3.4)	0(1 ± 1.5)	*NS*
Discharge with Drain	39%	17%	0%	*NS*
Postoperative Complications	27%	17%	9%	*NS*
In-hospital Mortality	0%	3%	0%	*NS*
Readmission within 90 Days	7%	9%	0%	*NS*
30 Day Mortality	0%	3%	0%	*NS*



Demographic and perioperative outcomes of patients undergoing cholecystectomy



Trend showing decrease conversions to open and increase subtotal cholecystectomy

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Relative to patients undergoing cholecystostomy placement, patients who underwent subtotal cholecystectomy and 'conversion to open' were significantly younger and had a lower ASA class, p=0.005, p=0.007, respectively. There was no difference in operative duration or use of intraoperative cholangiogram (IOC), between all three groups (Table). Converted to Open cholecystectomy had a significantly higher rate of intraoperative complication rate 83%, p = 0.006. Median Estimated blood loss (EBL) was 300ml in patients that were 'converted to open' vs. 100ml and 40ml in patients undergoing subtotal and cholecystostomy tube placement, p = 0.07.

MIS Surgeons undertake more subtotal laparoscopic cholecystectomy than ACS surgeons 56% vs. 44%; ACS surgeons convert to open more often than MIS surgeons 77% vs. 33 %, p = 0.02. Majority of Subtotal cholecystectomy are being undertaken by Surgeons less than 10 years from training, p = 0.03. Over time, there has been an increased number of subtotal cholecystectomies and a decrease in the number of 'laparoscopic converted to open' (Table).

CONCLUSION

The management of patients with severe cholecystitis continues to evolve. Within the last decade, there has been a trend of increased utilization of subtotal cholecystectomy and decrease in laparoscopic cholecystectomies being 'converting to open'. Our data suggest that laparoscopic subtotal cholecystectomy is a safe and feasible option for the management of a difficult gallbladder. The application of partial cholecystectomy technique is associated with significantly less intraoperative complications and trends toward a decrease in EBL, readmission rate.

When comparing all three approaches to the management of a difficult gallbladder, conversion to open does not offer any extra value. Furthermore, it seems to be the more favorable approach to the management of a difficult gallbladder by surgeons less than 10 years removed from training. As the shift in the management of patients with moderate to severe cholecystitis continues to evolve, patient selection remains of paramount importance and despite their differences, all three approaches may help minimize bile duct injuries.