



CONVERSION OF LAPAROSCOPIC TO OPEN CHOLECYSTECTOMY: A DIFFICULT PROPOSITION TO PREDICT PREOPERATIVELY.

General Surgery

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ABSTRACT

Laparoscopic cholecystectomy has been the gold standard in the management of Cholelithiasis since decades. However there are few cases which obviate the necessity for conversion to open procedure and prediction of these cases preoperatively has been a challenge to the surgical fraternity since years. Predicting the possibility of conversion to open procedure preoperatively with risk factors would result in optimum management of the patient.

AIM: To evaluate the preoperative risk factors implicated in conversion of laparoscopic to open cholecystectomy.

METHODS: A total of 788 patients admitted to our tertiary care hospital during January 2013 to August 2017, were divided into open cholecystectomy (OC) and laparoscopic cholecystectomy group (LC) and treated with intent to cure. Data was collected retrospectively regarding age, gender, admission (Elective/Emergency), indications for Surgery (Acute/Chronic Cholecystitis/GB Polyp), co-morbid illness, previous surgery, preoperative ERCP and deranged LFT and statistically analysed.

RESULTS: 749 patients underwent LC and 39 patients were converted into open cholecystectomy. There was no significant difference in distribution of age, gender, preoperative LFT values, preoperative ERCP, co-morbid illness and previous surgery in either of the groups. However, males aged >60 years (60%) were found to carry significant risk of conversion to open procedure. 30% patients (p <0.001) with acute cholecystitis underwent conversion. Conversion rate of 4.9% (n=39) was noted in this study. The common cause for conversion was difficult calot's triangle dissection which was seen in 64.1% (n=25) patients.

CONCLUSION: Emergency laparoscopic cholecystectomy for acute cholecystitis and elderly males aged >60 yrs are independent predictive preoperative risk factors for conversion of laparoscopic to open cholecystectomy. Preoperative ERCP, previous surgery, co-morbid illness and deranged LFT do not conclusively aid in prediction of conversion to open cholecystectomy.

KEYWORDS

Laparoscopic Cholecystectomy, open cholecystectomy, conversion, cholecystitis, cholelithiasis, gall stones.

INTRODUCTION

Laparoscopic cholecystectomy has been the gold standard in the management of Cholelithiasis since decades [1-3]. Laparoscopic intervention has been indicated in almost all of the conditions for symptomatic cholelithiasis as it has enormous advantages like less postoperative pain, early recovery, short hospital stay and so on [4-6]. However there are few cases which need conversion to open procedure and prediction of these cases preoperatively has been a challenge to the surgical fraternity since years in order to avoid exposure of the patient to disadvantages of open procedure. Though there are a few studies trying to highlight the risk factors for conversion to open procedure, but have hardly been able to pinpoint to one particular risk factor or condition which effectively predicts the conversion of laparoscopic procedure. Here is a retrospective study which has been carried out to find out the preoperative risk factors which may lead to conversion of laparoscopic procedure.

MATERIALS AND METHODS

This retrospective analysis includes 788 patients who underwent or were planned for laparoscopic cholecystectomy during January 2013 to August 2017 for various gall stone illnesses in a single institute. Patients were divided into two groups i.e., laparoscopic group (LC) and converted open group (OC). Records of all patients were collected regarding CBC, LFT, Ultrasonography of abdomen, ECG, Chest radiograph and bleeding parameters. The outcome parameters for preoperative risk factors for conversion to open procedure were compared in terms of age, gender, admission (Elective/Emergency), indications for Surgery (Acute/Chronic Cholecystitis/GB Polyp), presence of co-morbid illness, previous surgery, preoperative ERCP, Ultrasonography of the abdomen and deranged LFT.

Patients with acute cholecystitis were planned for laparoscopic cholecystectomy on emergency basis if it was <48hrs since onset of symptoms. If it was beyond 48 hours patient was planned for interval cholecystectomy after 4 weeks as an institutional protocol and was considered as chronic cholecystitis. Those patients who underwent

preoperative ERCP either for choledocholithiasis/gall stone pancreatitis were operated 4 weeks after the procedure. Patients who were taken up for planned elective/emergency open cholecystectomy have not been included in this study.

TECHNIQUE:

Laparoscopic cholecystectomy was performed using the conventional 4 port technique, patient under general anesthesia, 10 mm sub-umbilical port was placed using open hasson's technique followed by 10 mm epigastric port and two 5mm ports were placed in the right hypochondrium and lumbar regions. A functional port was added whenever necessary to abate dissection. The laparoscopic cholecystectomy was proceeded conventionally using antegrade technique with the dissection of the calot's triangle followed by clipping of cystic artery and duct separately and extraction of the gall bladder from the liver bed using diathermy.

Statistical analysis:

Data was collected retrospectively and was assimilated in a database (Microsoft Excel). Statistical evaluation using SPSS software, version 18 (IBM, USA) with percentage, mean, standard deviation, range and P value was derived to establish the results. P value of <0.05 was considered statistically significant.

RESULTS

A total of 796 patients were admitted to the hospital with gall bladder complaints, of which 788 were planned for Laparoscopic Cholecystectomy during Jan 2013 to Aug 2017 and were included in this study. 8 patients excluded from study were 1 patient had an MI along with cholecystitis, 1 patient had an EF of 30% and was not fit for general anaesthesia, 4 patients underwent emergency open cholecystectomy in view of septicemia and 2 patients were diagnosed to have gall bladder malignancy during the preoperative workup. The indications (diagnosed using ultrasonography of the abdomen) for Laparoscopic Cholecystectomy

Table 1: Comparison of preoperative risk factors in both groups

Parameters	LC (n=749)	OC (n=39)	P value
Mean Age (years)	47.15±13.92	51.05±13.84	0.100
Gender (M,F)	M=257, F=492	M=23, F=16	0.120
Previous surgery	96 (12.8%)	4 (10.1%)	0.213
Co-morbid illness	94 (12.5%)	7 (17.9%)	0.078
Deranged LFT	14 (1.9%)	2 (5.1%)	0.178
Preoperative ERCP	6 (0.8%)	2 (5.1%)	0.053
Ultrasonography abdomen (indication for surgery)	43 (5.7%)	12 (30.7%)	<0.001*
• Acute cholecystitis	699 (93.3%)	27 (69.2%)	0.228
• Chronic cholecystitis	7 (0.9%)	0	0.145
• Gall bladder polyp			
Emergency cholecystectomy	30 (4%)	12 (30.7%)	<0.001*

*P value <0.05 is considered statistically significant.

included chronic cholecystitis with symptomatic gallstones seen in 726 patients, acute cholecystitis seen in 55 patients and gall bladder polyps seen in 7 patients.

These patients were considered into 2 groups i.e., laparoscopic cholecystectomy group (LC) and converted open group (OC) comprising of 749 and 39 in each group respectively. Total of 280 males and 508 females were included in the study of which LC had 34.4% males and 65.6% females and OC had 41 % females and 59% males. Mean age of LC was 47.15±13.92 years (range 15–75), while that of converted open patients was 51.05±13.84 (range 18–68). Total of 722 were diagnosed to have chronic calculus cholecystitis, 55 were diagnosed with acute cholecystitis and 11 with gall bladder carcinoma on histopathological examination. Of the 788 patients, 42 were admitted on emergency basis and rest 746 were operated on an elective basis. LC had 12.5% patients who had a co morbid illness whereas OC had 23.3%.

Both the groups were compared with previous abdominal surgery; LC had 12.8% patients and 8% patients in OC with p value of 0.213 making it statistically insignificant. Similarly deranged LFT was analysed in both the groups, LC and OC groups had 1.9% and 2.5 % respectively. Preoperative ERCP was compared, LC had 0.8% and OC had 2.5% patients.

Of the 788 patients, 39 patients underwent conversion to open procedure. Intra-operatively, 4 patients were found to have gall bladder carcinoma, 5 patients had pyocoele with omental adhesions, 2 patients had bleeding (1 from Cystic Artery and 1 from portal vein injury), 1 patient was found to have CBD injury and 26 patients had dense adhesions which were difficult for dissection and had to be converted. No mortality was noted in this study.

DISCUSSION

This retrospective study was done in a tertiary care centre for the management of symptomatic gall bladder diseases. Preoperative risk factors like age, gender, type of admission, preoperative ERCP and deranged LFT which could possibly lead to conversion of laparoscopic cholecystectomy to open procedure were carefully evaluated and compared between both groups.

Table 2: Spectrum of diagnoses in the study

Diagnosis	LC (n=749)	OC (n=39)
Chronic cholecystitis	692 (93.3%)	23 (58.9%)
Acute cholecystitis	43 (5.7%)	7 (17.9%)
Gall bladder carcinoma	7 (0.9%)	4 (5%)
Pyocoele of GB	0(0%)	5(6.3%)
Gall bladder polyp	7 (0.9%)	0

Table 3: Pattern of conversion in this study

Reasons for conversion	n
• Difficult Calot's triangle dissection	25
• Gall bladder carcinoma	4
• Pyocoele with omental adhesions	5
• Mirizzi's syndrome	2
• Bleeding	2
• CBD injury	1

Mean age of laparoscopic group (LC) was 47.15 years, while that of converted open (OC) patients was 51.05 years. Age distribution in either group of the patients was not statistically significant and is comparable with other studies [7-9]. In contrast, Licciardello A et al and Rothman JP et al reported that age >65 years to be an independent risk factor for conversion to open cholecystectomy [10-11]. 64.5% patients were females constituting the bulk of the population undergoing Laparoscopic cholecystectomy which is in comparison with similar studies [9,12,13]. There was no significant difference in the gender distribution amongst both the groups as well. However on multivariate analysis, male patients (60%) (p <0.001) admitted on an emergency basis had significantly higher rates of conversion. Similarly deranged LFT, preoperative ERCP, co morbid illness and previous surgery were analysed and there was no significant difference in either of the groups. These results were comparable with other series in the literature [7,8,14,15].

42 out of 788(5.3%) patients underwent emergency laparoscopic cholecystectomy, these patients had significantly higher rates of conversion (30% of total conversions) with p value of <0.001. Other studies have also indicated that acute cholecystitis to be an independent risk factor for conversion to open cholecystectomy [7,10]. The reason cited for higher conversion rate is the difficulty in delineating the anatomical considerations and differentiating the outlines of structures because of local inflammation. Though the conversion rates are higher in acute cholecystitis, it should be noted that laparoscopic cholecystectomy is the preferred choice of management and a surgeon should never apprehend from offering a laparoscopic cholecystectomy with due risk explained to these patients [16,17].

Diagnosis of pyocoele preoperatively accurately is challenging and same has been noted by Bhattacharjee PK et al [8]. Similarly 5 patients in this series had pyocoele of gall bladder which was missed by ultrasonographic examination and was only evident intra-operatively.

Consenting plays an important role in all patients who are undergoing laparoscopic cholecystectomy [5,18]. Predicting the possibility of conversion to open procedure preoperatively with help of these predictive factors described above would help the surgeon in counselling the patient beforehand regarding the complexity of the procedure and risk and complications associated with it. All these patients undergoing should be counselled and consented about this possibility of conversion.

Rate of conversion was 4.9% (39 of 788) in this series, which is comparable with other similar studies, which ranges between 2-15% [5, 19, 20]. Commonly the reason for conversion is due to patient related (difficult Calot's dissection) or a procedure related complication (bleeding/CBD injury) [21–23]. Various reasons for conversion have been quoted in the literature; however a few intraoperative complications and findings were noted in this study. 25 patients had dense adhesions which were difficult for Calot's triangle dissection, 4 patients were found to have gall bladder carcinoma, 5 patients had pyocoele with omental adhesions and 2 patients had mirizzi's syndrome. Intraoperative complications which led to conversion were 2 patients had bleeding (1 from Cystic Artery and 1 from portal vein injury), 1 patient was found to have CBD injury. Atmaram DC et al [9] have quoted similar reasons for conversion. Though laparoscopy is the standard of care, it would be wise enough to imply that the conversion of laparoscopic to open cholecystectomy is not a failure on the part of the surgeon. But it is an extra step taken towards the overall safety of the patient after careful risk benefit analysis. However level of expertise of the surgeon do play a part in this decision making.

CONCLUSION

Based on the results of this study, acute cholecystitis patients undergoing emergency laparoscopic cholecystectomy and elderly males aged >60 yrs are independent predictive preoperative risk factors for conversion of laparoscopic to open cholecystectomy. Preoperative ERCP, previous surgery, co-morbid illness and deranged LFT do not conclusively aid in prediction of conversion to open cholecystectomy. Difficult Calot's dissection is the commonest reason for conversion to open procedure. Proper counselling and consenting

is an important aspect in informing these patients about their increased risk of conversion.

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REFERENCES:

- Soper NJ, Stockmann PT, Dunnegan DL, Ashley SW. Laparoscopic cholecystectomy. The new 'gold standard'? *Arch Surg.* 1992;127:917-921
- Cuschieri A, Dubois F, Mouiel J, Mouret P, Becker H, Buess G, et al. The European experience with laparoscopic cholecystectomy. *Am J Surg.* 1991;161:385-387.
- Southern Surgeons Club. A prospective analysis of 1518 laparoscopic cholecystectomies. *N Engl J Med.* 1991;324:1073-1078
- Kane RL, Lurie N, Borbas C, Morris N, Flood S, McLaughlin B et al 1995 The outcomes of elective laparoscopic and open cholecystectomies. *J Am Coll Surg.* 1995;180:136-145
- Livingston EH, Rege RV. A nationwide study of conversion from laparoscopic to open cholecystectomy. *Am J Surg.* 2004;188:205-211
- Williams LF Jr, Chapman WC, Bonau RA, McGee EC Jr, Boyd RW, Jacobs JK. Comparison of laparoscopic cholecystectomy with open cholecystectomy in a single center. *Am J Surg.* 1993;165:459-465
- Utsumi M, Aoki H, Kunitomo T, Mushiake Y, Yasuhara I, Taniguchi F, et al. Preoperative Risk Factors for Conversion of Laparoscopic Cholecystectomy to Open Cholecystectomy and the Usefulness of the 2013 Tokyo Guidelines. *Acta Med Okayama.* 2017 Oct;71(5):419-425.
- Bhattacharjee PK, Halder SK, Rai H, Ray RP. Laparoscopic Cholecystectomy: A Single Surgeon's Experience in some of the Teaching Hospitals of West Bengal. *Indian J Surg.* 2015 Dec;77(Suppl 2):618-23.
- Atmaram DC, Lakshman K. Predictive factors for conversion of laparoscopic cholecystectomy. *Indian J Surg.* 2011 Dec;73(6):423-426
- Licciardello A, Arena M, Nicosia A, Di Stefano B, Cali G, Arena G, Minutolo V. Preoperative risk factors for conversion from laparoscopic to open cholecystectomy. *Eur Rev Med Pharmacol Sci.* 2014 Dec;18(2 Suppl):60-8.
- Rothman JP, Burcharth J, Pommergaard HC, Viereck S, Rosenberg J. *Dig Surg.* 2016;33(5):414-23.
- Goonawardena J, Gunnarsson R, de Costa A. Predicting conversion from laparoscopic to open cholecystectomy presented as a probability nomogram based on preoperative patient risk factors. *Am J Surg.* 2015 Sep;210(3):492-500.
- Stanisic V, Andjelkovic I, Vlaovic D, Babic I, Kocev N, Nikolic B et al. (2013) Feasibility of applying data mining techniques for predicting technical difficulties during laparoscopic cholecystectomy based on routine patient work-up in a small community hospital. *Hepatogastroenterology* 60:1561-68.
- Ishizaki Y, Miwa K, Yoshimoto J, Sugo H, Kawasaki S. Conversion of elective laparoscopic to open cholecystectomy between 1993 and 2004. *Br J Surg.* 2006 Aug;93(8):987-91.
- Sippey M, Grzybowski M, Manwaring ML, Kasten KR, Chapman WH, Pofahl WE, et al. Acute cholecystitis: risk factors for conversion to open procedure. *J Surg Res.* 2015 Dec;199(2):357-61.
- Lo CM, Fan ST, Liu CL, Lai EC, Wong J. Early decision for conversion of laparoscopic to open cholecystectomy for treatment of acute cholecystitis. *Am J Surg.* 1997 Jun;173(6):513-7
- Kologlu M, Tutuncu T, Yuksek YN, Gozalan U, Daglar G, Kama NA. Using a risk score for conversion from laparoscopic to open cholecystectomy in resident training. *Surgery.* 2004 Mar;135(3):282-7.
- Le VH, Smith DE, Johnson BL. Conversion of laparoscopic to open cholecystectomy in the current era of laparoscopic surgery. *Am Surg* 2012; 78:1392-1395.
- Kama NA, Kologlu M, Doganay M, Reis E, Atli M, Dolapei M. A risk score for conversion from laparoscopic to open cholecystectomy. *Am J Surg.* 2001; 181:520-525.
- Rosen M, Brody F, Ponsky J. Predictive factors for conversion of laparoscopic cholecystectomy. *Am J Surg.* 2002; 184:254-258.
- Krahenbuhl L, Scwabas G, Wente MN, Schafer M, Schlumpf R, Buchler MW. Incidence, risk factors, and prevention of biliary tract injuries during laparoscopic cholecystectomy in Switzerland. *World J Surg.* 2001; 25:1325-1330.
- Merriam LT, Kanaan SA, Dawes LG, Angelos P, Prystowsky JB, Rege RV et al. Gangrenous cholecystitis: analysis of risk factors and experience with laparoscopic cholecystectomy. *Surgery* 1999; 126:680-686.
- Kumar A, Thombare MM, Sikora SS, Saxena R, Kapoor VK, Kaushik SP. Morbidity and mortality of laparoscopic cholecystectomy in an institutional setup. *J Laparoendosc Surg.* 1996; 6:393-397.