

Assessment of Factors Predicting the Conversion of Laparoscopic Cholecystectomy: A Retrospective Study

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Abstract

Aim: To assess the pre-operative and intra-operative factors which can predict the conversion of laparoscopic cholecystectomy.

Study design: A retrospective study

Place and Duration: This study was conducted at Abbasi Shaheed Hospital Karachi Pakistan from June 2020 to June 2021

Methodology: A total of 526 patients have been admitted and underwent laparoscopy during the time period of study. Their records were observed retrospectively. Out of the total, 14 patients had a conversion and were considered as group 1 whereas the other 14 patients were selected randomly and called group 2. Different predictive factors were assessed in the study.

Results: Out of the 526 patients, 14 (2.6%) had undergone conversion, however, no difference was observed between the two groups other than the values of alkaline phosphatase was statistically significant. The most common intraoperative determinative factor for conversion during surgery was the delineation of Carot's triangle.

Conclusion: The laboratory and ultrasound findings before surgery in both groups were not statistically significantly different other than the levels of alkaline phosphatase which is why it can be concluded that it is quite difficult to have the predictive factors of conversion before

surgery. However, during surgery, the most common factor is difficulty in delineating the Carot's triangle.

Keywords: laparoscopic cholecystectomy, Carot's triangle. Surgery, alkaline phosphatase

Introduction

In 1987, the process of laparoscopic cholecystectomy was introduced by Philip Mouret and is recognized as the gold standard technique of gallbladder disease treatments.^{1,10} However, still there are certain reasons due to which surgeons recommend open cholecystectomy to some patients and convert them, among which the most common reason is if Calot's triangle is not identified correctly because of the inflammation in the surrounding of the gall bladder.^{2,12} The current study was conducted to analyze the factors which can determine the chances of conversion before and during the surgery for cholecystectomy.

Methodology

During the study period, a total of 526 participants underwent laparoscopic surgery at our hospital. Permission was taken from the ethical review committee of the institute. All the preoperative data and demographics of the patients were observed which included gender, age, LFTs, and conversion reason which was written in the notes made before surgery. There was one patient who had undergone planned open cholecystectomy was excluded from the study whereas 14 patients who had successful laparoscopy were randomly selected and compared with the group who were converted. For all surgeries, the four-trocar technique was used in which a 10 mm port was inserted which was followed by two ports of 5 mm in the sub-umbilical region. For dissection, Maryland forceps or a hook were used, and artery and cystic duct were divided after clipping them separately. The liver bed and gallbladder were separated by monopolar electrocautery and were extracted via an epigastric port. For conversion, an upper midline incision or Kocher's incision was made once the surgeons had taken the decision of conversion. Data were computed in SPSS version 23

Results

A total of 526 patients had undergone laparoscopic cholecystectomy of which 14 patients belonged to group 1 i.e. 2.6% patients had experienced conversion. Among the other 512, who had successfully completed their laparoscopy, 14 patients were randomly selected in group 2 for comparison purposes. In group 1, 4 patients had acute cholecystitis while the remaining had chronic calculous cholecystitis. The mean age of converted patients was 62.43 years in a range of 43-81 years, whereas in group 2 it was 47.8 with a range of 11-79 years with a male to female ratio 3:4 and 1:1 in groups 1 and 2 respectively. The results of LFTs of both groups are presented in Table 1. In Table number 1, it can be observed that results in most patients were normal in both groups, however, total bilirubin levels were raised in 3 participants in groups 1 and in 2 participants in groups 2. Alkaline phosphatase was found to be raised in 2 patients and in 1 patient in groups 1 and 2 respectively. Table 2 exhibits the ultrasound findings in both groups.

The findings of ultrasound exhibited that there was dilated common bile duct 2 patients, pericholecystic fluid was present in 1 patient, and wall thickness was also increased. Multiple calculi were present in the majority of group 1 patients whereas, in group 2, pericholecystic fluid was present in 4 patients, 4 patients had their common bile duct dilated and 5 patients had increased wall thickness. Patients of group 2 had multiple gallstones present. The inability of structural anatomy identification at Calot's triangle due to inflammation is the most common cause of conversion as suggested in Table number 3.

Table 1. LFT results in both groups

Group 1			Group 2		
Direct bilirubin	Indirect bilirubin	Alkaline phosphatase	Direct bilirubin	Indirect bilirubin	Alkaline phosphatase
			0.5	0.1	130
			0.4	0.1	72
			0.9	0.3	154
0.8	0.1	59	0.2	0.1	198
			1.9	0.2	118
0.2	0.1	191	0.3	0.1	112
1.6	0.6	270	1	0.2	84
0.8	0.5	263	0.8	0.2	70
0.4	0.1	93	0.7	0.2	83
			3.3	2.6	236
0.7	0.1	63	1.2	0.3	85
1.7	0.5	75	0.4	0.1	77
4.7	3.2	138	0.8	0.3	113
1.2	0.2	83	1.0	0.9	109
NS	NS	P<0.001	NS	NS	

Table 2. Ultrasound findings of both groups

US findings (Group 1)				US findings (Group 2)			
CBD (mm)	Number of calculi	Pericholecystic collection	Wall thickness	CBD (mm)	Number of calculi	Pericholecystic collection	Wall thickness
N	Multiple	N	N	N	Multiple	None	N
				N	Multiple	None	N
N	Sludge	Present	Inc	N	Multiple	None	N
11.9	Multiple	None	N	N	Multiple	None	N

				N	Multiple	Present	Inc
8-9	Multiple	None	Inc	N	Multiple	None	N
N	Multiple	None	N	N	Multiple	None	Inc
N	Multiple	None	N	7	Single	None	N
N		None	N	N	Multiple	Minimal	Inc
N	Multiple	None	N	6-7	Multiple	None	N
				8-9	Sludge	Minimal	N
				N	Multiple	None	Inc
				N	Multiple	Present	Inc
N	Multiple	None	N	8-9	Multiple	None	N

Table 3. Reasons of conversion in study participants

Conversion reasons	Total cases number
Gangrenous, friable gallbladder	1
Dilated common bile duct	1
Dense adhesions, difficulty in the dissection of Calot's triangle	10
Gallbladder embedded in the liver	1
Common bile duct adherent to gallbladder	1

Discussion

For the treatment of diseases of gallstones, the gold standard technique is laparoscopic cholecystectomy.³ Multiple studies have been conducted to date which has exhibited the advantages of laparoscopic cholecystectomy have included earlier oral intake, resuming the normal activities earlier, short stays at the hospital, improved cosmesis, and decreased pain after surgery over open cholecystectomy.⁴ A surgeon must understand the conversion of laparotomy is not a complication or failure but it is to make patients feel safe and should be able to convey it to patients before the surgery.⁵ There are different factors that are responsible for conversions such as age, obesity, gender, body mass index, symptom duration, total leucocyte count, LFT, history of biliary diseases such as jaundice, acute cholecystitis, etc.⁶ In this study, some of these factors were assessed, and it was determined that the major reason for conversion was the difficulty that occurred at the time of dissecting Calot's triangle, a complication, or due to the failure of some instrument.¹¹ If surgeons can accurately predict the conversion chances before surgery, it would

be beneficial both for patients and surgeons and by this patients can be warned prior to the surgery and surgeons can prepare themselves for a difficult and long procedure ahead.¹³ Previous studies have exhibited that converting from laparoscopic procedure to open cholecystectomy has resulted in a significant change in patient outcomes due to the high ratio of complications after surgery and a longer stay at the hospital.^{14,15} The rate of conversion in the current study was 2.6% i.e. 14 out 526 patients which were in concordance with other studies where the rate varies from 2-15%.^{7, 8, 9}

No significant difference is present in the distribution of age and gender in either group. When liver function tests of both groups were compared, no statistically significant difference was observed between the total and direct bilirubin, however, between the values of alkaline phosphatase, the difference was statistically significant. Ultrasound findings were also well matched and no significant differences were present in both groups in the current study. However, lacunae were present in the completeness of reports of ultrasound. It was also observed that the most common reason for conversion during surgery was the difficulty faced during delineating the anatomy of Calot's triangle. No cases of conversion because of complications were reported. During the study, there was no difficulty observed in creating the pneumoperitoneum situations nor the difficulty in extracting gallbladder or instrumental failure had arisen. No deaths were reported during the surgery. This study can serve as a stepping stone with the help of which, similar studies can be conducted to assess the predictive factors for conversion.

Conclusion

The laboratory and ultrasound findings before surgery in both groups were not statistically significantly different other than the levels of alkaline phosphatase which is why it can be concluded that it is quite difficult to have the predictive factors of conversion before surgery. However, during surgery, the most common factor is difficulty in delineating Carot's triangle.

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