Prediction of Difficult Laparoscopic Cholecystectomy on the Basis of Gallbladder Wall Thickness

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Abstract

Objective: To identify if gallbladder wall thickness is associated with technical difficulty during laparoscopic surgery and whether conversion to open cholecystectomy is more frequent in such patients.

Methods: This prospective, non-randomized and descriptive study was conducted in Department of Surgery,Unit IV of Civil Hospital Karachi from December, 2010 to November 2012. Sixty four patients who underwent laparoscopic cholecystectomy were included. A fresh ultrasound was performed one day prior to surgery and gall bladder wall thickness of ≥ 3mm was taken as predictor for difficult surgery. Various intraoperative parameters were recorded including total time taken, time taken to clear calots triangle and conversion to open cholecystectomy.

Results: Out of 64 patients, 4(6.3%) were males and 60 (93.8%) were females. Age ranged from 22-65 years with a mean of 40.45 ± 12.43 years. Gall bladder wall thickness ranged from 1-4.2 mm with a mean of 1.78 ± 0.80 mm. Difficult laparoscopic cholecystectomy was encountered in 13(20.3%). In patients with difficult laparoscopic cholecystectomy the mean gallbladder wall thickness was 2.40 ± 0.87 mm (p=0.001). The mean age of patients with difficult surgery was 40.54 ± 13.80 years. Mean operating time in patients with difficult laparoscopic cholecystectomy was 90.77±30.81 minutes as compared to 57.02 ± 20.63 minutes in normal laparoscopic cholecystectomy (p<0.001)

Conclusion: This study identifies and corroborates with the international literature that gallbladder wall thickness of 3mm is associated with difficult cholecystectomy and higher rate of conversion to open cholecystectomy.

Keywords: Gallbladder wall thickness, laparoscopic cholecystectomy. (AASH & KMDC 18(1):1;2013)

Introduction

Gallstones are the leading cause of admissions in a surgical unit. The prevalence in America and Europe is higher than in Asian population[1,2]. Laparoscopic cholecystectomy is considered to be the procedure of choice in patients with symptomatic gallstones. It is associated with better cosmetic results, shorter hospital stay, early mobilization, decreased postoperative pain and decreased wound complications. The conversion rates from laparoscopic to open cholecystectomy ranges widely from 1-13%[3,4]. There are many factors related to conversion including history of long standing disease, previous episodes of cholecystitis, pancreatitis etc. Identifying these factors not only is time saving but also decreases complications of the procedure, increases preparedness of the surgeon and proper counseling of the patient beforehand.

Gallbladder wall thickness on ultrasound and its relationship with difficult cholecystectomy has been documented in various publications[5,6]. Gallbladder wall thickness of ≥ 3 mm suggests acute cholecystitis[5].

The aim of our study was to identify if gallbladder wall thickness is associated with technical difficulty in laparoscopy and whether conversion to open cholecystectomy is more frequent in such patients.

Patients and Methods

The prospective, non-randomized and descriptive study was conducted in Department of Surgery, Unit IV of Civil Hospital Karachi and included 64 patients who underwent laparoscopic cholecystectomy from December, 2010 to November 2012. All pa-

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tients had symptomatic gallstones. Patients with altered liver function tests, dilated ducts, suspicion of gallbladder mass or common bile duct mass and history of pancreatitis were excluded. Hepatitis and diabetes was not an exclusion criterion. These patients were medically fit before surgery was undertaken.

A fresh ultrasound was performed one day prior to surgery by a single expert ultrasonologist. Gall bladder wall thickness of ≥ 3 mm was taken as predictor for difficult surgery. Patients with Choledocholithiasis underwent endoscopic retrograde cholangiopancreaticography (ERCP) and removal of stones, followed by laparoscopic cholecystectomy.

Laparoscopic cholecystectomy was done by various surgeons ranging from consultants to senior residents with an experience of having operated upon at least 50 such cases. Various intraoperative parameters were recorded including total time of operation which was taken as starting from pneumoperitoneum to the extraction of the gallbladder, bleeding, gallbladder perforation, stone spillage and time taken to clear calots triangle. If calots were difficult and took more than 20 minutes to clear the anatomy, laparoscopic procedure was abandoned and converted to open cholecystectomy.

Data was entered into Statistical Package for Social Sciences (SPSS) version 15. Descriptive data was taken out for the continuous variables while frequencies were determined for others. Qualitative data was analyzed and compared by cross tabulation and chi-square was determined. Independent sample t-test was applied for quantitative data and P values determined. $p < 0.05$ was taken as significant. For comparing quantitative data, paired sample t-test was applied.

Results

Out of 64 patients, 4(6.3%) were males and 60 (93.8%) were females. M:F ratio was 1:15. Age ranged from 22-65 years with a mean of 40.45 ± 12.43 years. Gall bladder wall thickness ranged from 1-4.2 mm with a mean of 1.78 ± 0.80 mm. Difficult laparoscopic cholecystectomy was encountered in 13(20.3%) and out of these 3(4.7%) were converted to open surgery. In patients with difficult laparoscopic cholecystectomy the mean gallbladder wall thickness was 2.40 ± 0.87 mm as compared to 1.62 ± 0.70 mm in normal laparoscopic cholecystectomy (p=0.001) (Table 1). There were 9(14%) with wall thickness ≥ 3mm and out of these 5(55.55%) had difficult surgery and one patient was converted to open surgery (p=0.013). Four of these five patients had difficult calots and one had empyema leading to difficulty in surgery.

The mean age of patients with difficult surgery was 40.54 ± 13.80 years as compared to 40.43 ± 12.21 years in those who had normal laparoscopic cholecystectomy. Age was categorized into groups and its association with gallbladder wall thickness is shown in (Table 2). Mean operating time in patients with difficult laparoscopic cholecystectomy was 90.77 ± 30.81 minutes as compared to 57.02 ± 20.63 minutes in normal laparoscopic cholecystectomy ($p<0.001$).

Discussion

Gallbladder wall thickness is regarded as a sensitive predictor for difficult surgery. In healthy patients the gall bladder wall thickness is < 2mm[7]. A wall thickness of ≥ 3mm indicates acute cholecystitis and is associated with difficult procedure and increased operating time[7,8]. In the present study, five out of the nine(55%) patients with wall thickness of 3 mm had encountered difficulty during the procedure as compared to eight out of fifty five patients(14.54) with normal wall thickness (p=0.013). The most common reason for technical difficulty was inflammation at calots triangle in four of the five patients with wall thickness of ≥ 3mm. In these patients the time taken to clear the cystic duct and artery was more than 20 minutes due to dense inflammatory adhesions.

Conversion to open cholecystectomyis reported in 2-15% of patients undergoing laparoscopic cholecystectomy[9,10,11]. In this study we had 3 patients (4.7%) had to be converted to open cholecystectomy. The mean gallbladder wall thickness in con-

Table1. Data characteristics of patients undergoing Laparoscopic Cholecystectomy (n=64)

	Normal Cholecystectomy (n = 51)	Difficult Cholecystectomy (n = 13)	p - value
Age (yrs.) Mean ± SD	40.43 ± 12.21	40.54 ± 13.80	p=0.1 95%CI 7.67-7.89
Sex (M:F)	2:49	2:11	p=0.181
Gallbladder wall thickness (mm) Mean ±SD	1.62 ± 0.70	2.40 ± 0.86	p=0.001* 95%CI 0.31-1.23
Conversion to open		3	
Operating time (mins.) Mean ± SD	57.02 ± 20.63	90.77 ± 30.81	p<0.001* 95%CI 19.49-48

*P<0.05 was considered significant

Table 2. Association and significance of different variables with gallbladder wall thickness (n=64)

	Normal Cholecystectomy	Difficult Cholecystectomy	p - value
	1.62 ± 0.70	2.40 ± 0.86	p=0.001* 95%CI 0.31-1.23
Males	1.85 ± 0.92	1.65 ± 0.64	p=0.82
Females	1.62 ± 0.71	2.54±0.85	p<0.001* 95%CI 0.43-1.41
Age groups yrs			
21-30	1.63 ± 0.83 n=14	2.12 ± 0.79 n=4	p=0.31
31-40	1.41 ± 0.39 n=14	2.50 ± 1.13 n=3	p=0.007* 95%CI 0.35-1.84
41-50	1.86 ± 0.78 n=13	3.17 ± 0.76 n=3	P=0.02* 95%CI 0.23-2.38
51-60	1.73 ± 0.88 n=7	1.3 n=1	P=0.66
61-70	1.37 ± 0.29 n=3	2.20 ± 0.14 n=2	p=0.03* 95%CI 0.11-1.56
Conversion	No 1.74 ± 0.76	Yes 2.77 ± 1.12	p=0.03* 95%CI 0.12-1.94

*P<0.05 was considered significant

verted patients was 2.7 ± 1.12 mm(p=0.03). All 3 patients were females.

In this study male to female ratio of difficult cholecystectomy was 2:11. Out of 4 male patients (50%) had encountered difficulty during the procedure as compared to females (18.3%). Several studies have found higher conversion rates in male patients[5,12,13]. The reason for higher conversion is not known but it has been observed that male patients have more intense inflammation and fibrosis that results in difficult surgery[10,14]. In this study there was statistically significant difference in gallbladder wall thickness when comparing females who underwent normal cholecystectomy versus difficult cholecystectomy (p<0.001). No such association was found in the male population.

It has been observed in various studies that increasing age of the patient is associated with higher conversion rates[12,15]. There was not much difference in this study between the mean age of the patients with difficult surgery compared to normal. On the other hand statistically significant association was found between increasing age groups and gall bladder wall thickness (Table 2).

Conclusion

This study identifies and corroborates with the international literature that gallbladder wall thickness of ≥ 3 mm is associated with difficult cholecystectomy and higher rate of conversion. This would not only help to anticipate difficulty preopera-

tively but also help to assemble a more experienced team to deal with the situation. Further, more patients can be counseled before hand of the increased chances of conversion and complications.

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