International Surgery Journal
Singh M et al. Int Surg J. 2021 Apr;8(4):1160-1164
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: https://dx.doi.org/10.18203/2349-2902.isj20211290

Original Research Article

Intraoperative strategies to overcome difficulties in laparoscopic cholecystectomy for chronic calculous cholecystitis

Mohinder Singh, Dipesh Goel*

Department of General Surgery, Gian Sagar Medical College and Hospital, Ram Nagar, Jhansla, Patiala, Punjab, India

Received: 02 March 2021
Revised: 11 March 2021
Accepted: 15 March 2021

***Correspondence:**
Dr. Dipesh Goel,
E-mail: dipeshsurindergoel@yahoo.com

ABSTRACT

Background: Surgery in chronic cholecystitis is very challenging because of inability to hold the gall bladder, dense adhesions, frozen Calot's triangle and difficulty in applying clips. Precise and meticulous dissection is required to establish critical view of safety. There is no consensus among surgeons about appropriate intraoperative steps in difficult gall bladder (GB) surgery. The authors aim to present various intraoperative difficulties and strategies to overcome them.
Methods: A prospective study of 81 patients of chronic cholecystitis was done in our institution. They were divided in two groups. Group A in which surgery could be done easily. Group B in which surgery was difficult and different intraoperative strategies were applied to overcome them.
Results: Total 42 patients were included in group A and 39 patients in group B. Various difficulties encountered while performing laparoscopic cholecystectomy in group B were adhesions (53.8 %), inability to grasp the fundus of GB (15.3%), frozen Calot's triangle (15.3%), inability to grasp the Hartmann's pouch (12.8%) and cystic duct edema (2.5%).
Conclusions: Intraoperative technique of identification of Rouviere′s sulcus first, followed by high peritoneal incision on the GB body. Subsequently blunt dissection of Calot's triangle using gauze piece and hydro dissection by suction irrigation canula ventral to the sulcus. It created a retro gall bladder tunnel safely. It established the critical view of safety in all our cases.

Keywords: Laparoscopic cholecystectomy, Cholecystitis, Bile duct injury, Critical view of safety

INTRODUCTION

Laparoscopic cholecystectomy is the most widely accepted treatment for calculous cholecystitis.[1] It is the commonest elective operation performed in our institution. In our study all of the patients were from rural areas with restricted health facilities. Because of this, diagnosis of gall stones and surgery was delayed. As a result, when they finally came for operation, the gall bladder wall was contracted, fibrosed and thick resulting in near obliteration of the Calot's triangle. During the operation, we found difficulty in holding the gall bladder, dense adhesions, frozen Calot's triangle and difficulty in clip application on cystic duct stump. Anatomic variations of biliary tree and vasculature made the surgery more demanding as there were high chances of bile duct injury (BDI). The risk of BDI may be as high as 3.5 times more than that for easy cholecystectomy.[2] Enteric fistula and a major vascular event were the other complications. Sometimes there was no progress made in adhesiolysis and dissection of Calot's triangle with usual standard methods of laparoscopic cholecystectomy. Even the experienced surgeon found it challenging to perform safe surgery. Thus, conversion to open or subtotal cholecystectomy was often done. In literature, the incidence of difficult Calot's triangle dissection is 15

percent.[3] Because of high volume of patients presenting with chronic cholecystitis in our institute, we needed to adopt techniques which made surgery safe. Hence, various intraoperative steps to perform safe laparoscopic cholecystectomy in patients of chronic cholecystitis were reviewed.

The objectives of our study were to document various difficulties during laparoscopic cholecystectomy in chronic calculous cholecystitis and discuss various intraoperative strategies to establish the critical view of safety (CVS).

METHODS

A prospective study was conducted in our institution from August 2019 to December 2020.

Inclusion criteria

Inclusion criteria were patients with history and previous hospital records suggestive of acute episode of calculous cholecystitis, gall stone pancreatitis, and choledocholithiasis with cholelithiasis were included in our study.

Exclusion criteria

Exclusion criteria were patients with morbid obesity, coagulation disorders and liver cirrhosis were excluded from study.

Sample size

A total of 81 patients were included in the study. They were assigned into two groups. Group A included patient in whom laparoscopic cholecystectomy had been completed easily. Group B included patients in whom there were difficulties in laparoscopic cholecystectomy and various intraoperative strategies were applied.

Statistical analysis

Data was presented by mean and standard deviation. T test was used to compare two means. The probability of less than 0.05 was used as cut off point for all significant tests. Frequency table of intraoperative difficulty was prepared. Strategies to overcome difficulties were discussed.

All patients underwent clinical assessment. Their age, sex, duration of symptoms and number of previous attacks of calculus cholecystitis for which hospitalization is required were noted. USG was done in all cases. Particular note was made of parameters such as positive WES (wall echo shadow) sign, thick gall bladder walls near the neck and dilated CBD. LFTs of the patients were also studied. Patients with dilated CBD or deranged LFT (liver function test) were advised MRCP. An ERCP guided sphincterotomy with CBD stenting was also done in patients with choledocholithiasis followed by laparoscopic cholecystectomy. Plan was made to tackle various difficulties during operation. Options to overcome difficulty in grasping fundus of gall bladder included aspiration of gall bladder contents with endo needle, use of tooth forceps or incising fundus to grasp GB. Adhesions were tackled by gentle and meticulous adhesiolysis. Difficulty in grasping the Hartmann's pouch was addressed by milking the stone up or delivery of the stone intraperitoneally after incising gall bladder. Difficulty in demonstration of critical view of safety was tackled by localization of Rouviere′s sulcus, followed by high peritoneal incision high on body of GB. Then pushing the inferior leaflet of peritoneum dorsally with wet gauze and hydro dissection with irrigation suction cannula. Subsequently creating plane between gall bladder and liver bed. Ensuing dissection from liver bed to junction of cystic duct and neck of GB. Finally, dissection to define cystic duct and artery. It established critical view of safety. Lastly, difficulty faced was placing tight fitting clip on edematous cystic duct. It was overcome by extracorporeal knot with vicryl or mass ligation of cystic duct and artery.

RESULTS

A total of 124 cases of laparoscopic cholecystectomy cases were performed in the given period. 81 (65.3%) cases were of chronic cholecystitis which constitute our study group. Rest 43 were excluded. 42 were included in group A. 39 (48.1%) cases were included in group B. There were 38 female and 4 male patients in group A. 32 female and 7 male patients in group B.

Table 1: Pathology of chronic cholecystitis in group A vs group B.

Pathology	Group A (no. of cases)	Group B (no. of cases)
Calculous cholecystitis	41	30
Gall stone pancreatitis	0	6
Cholelithiasis with Choledocholithiasis	1	3

Increased bilirubin was seen in only one patient from group A. He was suffering from cholelithiasis with choledocholithiasis. Increased bilirubin was observed in 3 patients from group B. All of them were diagnosed as cholelithiasis with choledocholithiasis.

Increased alkaline phosphatase was seen in only one patient from group A. He was suffering from cholelithiasis with choledocholithiasis. Increased alkaline phosphatase were seen in 9 patients from group B. 3 patients suffered from cholelithiasis with choledocholithiasis and 6 suffered from gall stone pancreatitis.

Ultrasonography findings in group A showed mean gall bladder wall thickness of 3.2 mm. Dilated CBD (>7 mm) in one patient of cholelithiasis with choledocholithiasis. Wall echo shadow (WES) sign was not observed. In group B mean gall bladder wall thickness was 5.8 mm. Dilated CBD was seen in 3 patients of cholelithiasis with choledocholithiasis. WES sign was observed in 6 patients of calculous cholecystitis.

Table 2: Comparison of mean and standard deviation of parameters in group A vs group B.

	Group A	Group B	T test	P value
Age	32.6±7.6 years	56.8±9.9 years	12.39	0.0001
Duration of symptoms	2.2±0.95 years	7±3 years	9.85	0.0001
No. of attacks	1.08±0.68	4.2±1.04	16.09	0.0001
GB wall thickness	3.2±0.43	5.8±0.76	19.12	0.0001
Surgery time	72±5.7 mins	110±5.2 mins	31.2	0.0001
Post op stay	2±0.5 days	2±0.6 days	0.00	1.0000
Bile duct injury	0.024±0.15	0	0.99	0.3310

Table 3: Intraoperative difficulties in group B with various causes.

Intraoperative difficulty	No. of patients	Causes
Grasping fundus of gall bladder	6	Empyema/Mucocele
Adhesions	21	Previous inflammation
Grasping Hartmann's pouch	5	Impacted stone at GB neck
To establish critical view of safety	6	Frozen Calot's triangle
In applying clip to cystic duct	1	Edematous cystic duct

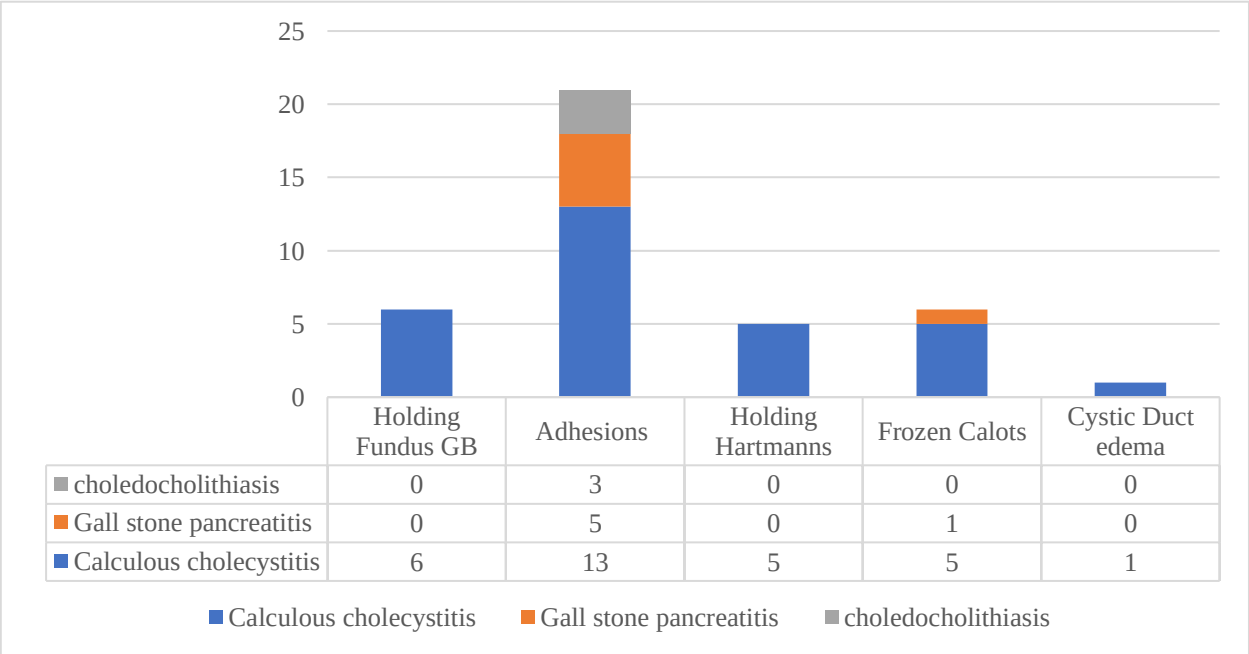

Figure 1: Difficulties faced in group B with different etiologies.

None of the patients in group A and B were converted to open. No subtotal cholecystectomy was performed in either group.

DISCUSSION

Difficult laparoscopic cholecystectomy is not defined. It is because of subjectivity. Studies have used preoperative scoring parameters to define a difficult operation.[4-6] However, we have not used them in our study. It is because we have large plethora of chronic cholecystitis patients. And we wanted to develop our own scoring system based on large sample size.

In our series 81 patients are designated as "anticipated difficult laparoscopic cholecystectomy" for chronic cholecystitis. In nearly half (39/81, 48.1%) of the anticipated difficult surgeries, difficulties were faced. These were overcome by applying various intraoperative strategies. It signifies that half of the perceived difficult

surgery can be accomplished using careful, slow and meticulous dissection.

In our study there was increase of difficulty in operation with increasing age. The incidence of difficult laparoscopic cholecystectomy in chronic cholecystitis increases after 40 years of age, reaching peak in 6th decade of life. Following which there is fall in incidence in 7th decade. Difficult laparoscopic surgery is more common in males 7/11 (63% male vs 45.7% female), which is comparable as with other studies.[7]

In our study there was increase in difficulty with prolonged duration of symptoms and number of previous attacks of calculous cholecystitis. It leads to ongoing inflammation and fibrosis of gall bladder wall, thus making surgery very challenging. Similar findings are seen in study by Agarwal et al.[8]

In our series recurrent calculus cholecystitis was recognized as the most common pathology giving rise to chronic cholecystitis. Similar findings were observed in literature.[9] Other causes were gall stone pancreatitis and choledocholithiasis. Increase in bilirubin levels, alkaline phosphatase and dilated CBD on USG is consistent finding in cholelithiasis with choledocholithiasis. Laparoscopic cholecystectomy in a choledocholithiasis post ERCP intervention was easy if performed within 72 hours as compared to interval cholecystectomy as was in our series.[10]

Positive wall echo shadow (WES) sign on ultrasound was a good indicator of a difficult laparoscopic cholecystectomy.[11] In our series 6 patients had positive WES sign. All of them were difficult operation. In our study gall bladder wall thickness over 5 mm was associated with difficult operation. Nidoni et al described difficult gall bladder surgery when the wall thickness is over 3 mm.[12]

In our study the intraoperative technique prevented the bile duct injury. Even the frozen Calot's had been managed without complications. We first localized the Rouviere′s sulcus and the dissection began ventral to it. A high peritoneal incision was taken on gall bladder, extending the incision medially and laterally on the gall bladder. Pushing the inferior peritoneal leaflet dorsally a retro GB tunnel was created.

This was accomplished with use of gauze and hydro dissection with blunt tip of irrigation suction cannula. Thus, establishing the critical view of safety. Our technique minimized complications and reduced conversions. The most important landmark was identification of Rouviere′s sulcus. keeping in mind that if the dissection remained ventral to it, there will be no bile duct injury.[13] Adhesions were the commonest intraoperative difficulty (21/39). Frozen Calot's and difficulty in holding fundus of gall bladder was the next common difficulty. Difficulty in holding Hartmann's and cystic duct edema were the least common. Adhesions were the most common difficulty observed by Bhat et al.[14]

In our study there was significant increase in intraoperative time with difficult cases (110±5.2 min) vs easy cases (72±5.7 min). Neither of the patients were converted to open. There was no bile duct injury (BDI) in group B. In the literature, the incidence of BDI in difficult cholecystectomy is 1.3 percent.[15] No subtotal cholecystectomy or conversion to open was performed either. In literature, Sewefy et al mentions operative time to be (114±10 minute), which was comparable with our study.[4] In a study by Atta the operative time taken by experienced surgeon for laparoscopic cholecystectomy is 30-70 minutes. The gall bladder wall thickness of≥4mm was taken as difficult operation.[16] Whereas in our study operative time was more as the GB wall thickness of 5.8±0.76 mm was considered difficult operation.

There was no significant increase in post-operative hospital stay in a difficult laparoscopic cholecystectomy (group B, 2±0.6 days) when compared with easy cholecystectomy (group A 2±0.5 days). This was possibly because none of the patients developed post-operative complications. In literature the length postoperative stay was similar unless complicated.[17,18]

Limitations

In our study we have not used any scoring system to assess preoperative difficulty. It is because we wanted to focus our discussion to document various intraoperative difficulties and strategies to overcome them. And we wish to develop our own scoring system based on large sample size in further studies.

CONCLUSION

Adhesions were the commonest difficulty which was overcome by precise, gentle and meticulous adhesiolysis. Establishment of CVS in frozen Calot's triangle was the most challenging intraoperative difficulty. It was overcome by identification of Rouviere′s sulcus and keeping dissection ventrally. It was the first most important step in ensuring safe surgery for difficult cases of chronic cholecystitis. Craniolateral fundal and caudolateral Hartmann's traction of GB opens the Calot's triangle. By taking high peritoneal incision on body of GB then pushing the inferior leaflet of peritoneum dorsally with wet gauze and hydro dissection by blunt tip of irrigation suction cannula a retro GB tunnel was created. This established critical view of safety thus minimizing BDI and conversions. Though intraoperative time was more in difficult cases, but there were no conversions or BDI. The post-operative stay was not increased in difficult cases. The authors recommend this technique for chronic calculous cholecystitis to establish CVS.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Zhang WJ, Li JM, Wu GZ, Luo KL, Dong ZT. Risk factors affecting conversion in patients undergoing laparoscopic cholecystectomy. ANZ J Surg. 2008;78(11):973-6.
2. Georgiades CP, Mavromatis TN, Kourlaba GC, Kapiris SA, Bairamides EG, Spyrou AM, et al. Is inflammation a significant predictor of bile duct injury during laparoscopic cholecystectomy?. Surgic Endosc. 2008;22(9):1959-64.
3. Shinde J, Pandit S. Innovative Approach to a Frozen Calot's Triangle During Laparoscopic Cholecystectomy. Ind J Surg. 2015;77(6):554–7.
4. Sewefy AM, Hassanen AM, Atyia AM. Retro infundibular laparoscopic cholecystectomy versus standard Laparoscopic Cholecystectomy in difficult cases. Int J Surg. 2017;43:75-80.
5. Neri V, Ambrosi A, Di Lauro G, Fersini A, Valentino TP. Difficult cholecystectomies: validity of the laparoscopic approach. J Soc Laparoendosc Surg. 2003;7(4):329.
6. Gupta N, Ranjan G, Arora MP. Validation of scoring system to predict difficult laparoscopic cholecystectomy, Int J. Surg. 2013;11(9):1002-6.
7. Akcakaya A, Okan I, Bas G, Sahin G, Sahin M. Does the difficulty of laparoscopic cholecystectomy differ between genders?. Ind J Surg. 2015;77(2):452-6.
8. Agarwal D, Arora D, Avasthi A, Kothari A, Dangayach KK. Study of 292 patients for prediction of difficult laparoscopic cholecystectomy using detailed history, clinical and radiological parameters. Int Surg J 2016;3:349-53.
9. Jones MW, Gnanapandithan K, Panneerselvam D, et al. Chronic Cholecystitis. In: StatPearls. Treasure Island (FL): Available at: https://www.ncbi.nlm.nih.gov/books/NBK470236/. Accessed on 08 February 2021.
10. Lo CM, Liu CL, Fan ST, Lai EC, Wong J. Prospective randomized study of early versus delayed laparoscopic cholecystectomy for acute cholecystitis. Anna Surg. 1998;227(4):461.
11. Arora BK, Arora R, Arora A. Laparoscopic cholecystectomy in wall echo complex gall stone disease: a study. Int Surg J. 2017;4(4):1309-12.
12. Nidoni R, Udachan TV, Sasnur P, Baloorkar R, Sindgikar V, Narasangi B. Predicting Difficult Laparoscopic Cholecystectomy Based on Clinic radiological Assessment Clin Diagn Res. 2015;9(12):PC09–12.
13. Singh M, Prasad N. The anatomy of Rouviere's sulcus as seen during laparoscopic cholecystectomy: A proposed classification. J Minim Access Surg. 2017;13(2):89.
14. Bat O. The analysis of 146 patients with difficult laparoscopic cholecystectomy. Int J Clinic Experiment Medic. 2015;8(9):16127.
15. Targarona EM, Marco C, Balague C, Rodriguez J, Cugat E, Hoyuela C, et al. How, when, and why bile duct injury occurs. Surgic Endosc. 1998;12(4):322-6.
16. Atta HM, Mohamed AA, Sewefy AM, Abdel-Fatah AF, Mohammed MM, Atiya AM. Difficult laparoscopic cholecystectomy and trainees: predictors and results in an academic teaching hospital. Gastroenterol Res Pract. 2017;5;2017.
17. Jae Woo Park, Munjin Kim, Sang Kuon Lee, Appropriate Hospital Discharge Timing after Laparoscopic Cholecystectomy: Comparison of Postoperative Day 1 vs. Day 2 Discharge Protocol. J Minim Invasive Surg 2019;22(2):69-74
18. Henneman D, Da Costa DW, Vrouenraets BC, van Wagensveld BA, Lagarde SM. Laparoscopic partial cholecystectomy for the difficult gallbladder: a systematic review. Surgic Endosc. 2013;27(2):351-8.

Cite this article as: Singh M, Goel D. Intraoperative strategies to overcome difficulties in laparoscopic cholecystectomy for chronic calculous cholecystitis. Int Surg J 2021;8:1160-4.