International Surgery Journal
Nigam VK et al. Int Surg J. 2024 Sep;11(9):1515-1518
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: https://dx.doi.org/10.18203/2349-2902.isj20242452

Case Series

Subtotal cholecystectomy: a case series

Vinod Kumar Nigam*, Siddharth Nigam

Department of General and Laparoscopic Surgery, Max Hospital, Gurugram, Haryana, India

Received: 28 June 2024
Revised: 03 August 2024
Accepted: 08 August 2024

***Correspondence:**
Dr. Vinod Kumar Nigam,
E-mail: drnigamvk@gmail.com

ABSTRACT

Subtotal cholecystectomy is a method of removing most of the gallbladder instead of whole of the gallbladder in case of a difficult gallbladder. The term "subtotal cholecystectomy" was introduced by Morse and Barb. Subtotal cholecystectomy is a bailout procedure undertaken in situations where the anatomical structures are not easy to identify making total cholecystectomy difficult and risky. We have done twelve cases from June 2019 to June 2024, while performing laparoscopic cholecystectomy as we could not continue, due to risk of injury and complications. Post-operatively there were some cases of mild bile leak, but no serious complications. All cases belong to Nassar scale grade 3 and 4. Here we are describing how and when subtotal cholecystectomy should be done.

Keywords: Bile leak, Cholecystectomy, Difficult gallbladder, Fenestrating, Nassar scale, Reconstituting, Subtotal cholecystectomy

INTRODUCTION

'When the anatomy is 'impossible' and the risk of common bile duct injury is high, it suffices to remove most of the gall bladder, leaving behind the most problematic part, namely a cuff of Hartman's pouch connected to the cystic duct and artery. This is achieved by opening the gall bladder in a 'safe' place above the pouch of Hartmann, emptying the stones and excising the upper part of the gall bladder. Usually, it is possible to see the opening of cystic duct from within. The remaining (small) part of the gallbladder is closed by sutures (or tied with a loop, if possible) and a drain is left since a transient bile leakage can develop (albeit rarely).[6] Subtotal excision is useful also when bleeding from the liver bed is expected, as in cirrhotic patients. Here the 'posterior' wall of the gallbladder is left in situ, excising the rest of the gallbladder and destroying the remaining mucosa with the electrocautery.[6]

'Difficult gallbladder' denotes the condition where removal of gallbladder safely without causing any iatrogenic injury to the biliary tract and surrounding important structures becomes difficult due to inflammation, dense adhesions, frozen Calot's tringle and biliary and vascular anamolies. In such cases, the structures of the Calot's triangle become very difficult to be identified anatomically. 'Difficult gallbladder' is a procedure with an increased surgical risk compared with standard cholecystectomies.[1,2]

Subtotal cholecystectomy is a bailout procedure undertaken when facing difficult laparoscopic cholecystectomy due to not achieving the critical view of safety, inadequate identification of the anatomical structures involved and / or risk of injury.[3] It was invented by Max Thorek of Chicago some 100 years ago, a technique which every surgeon has to master. Difficulty in cholecystectomy can be predicted in a preoperative manner by using clinical, radiology and laboratory findings. However, it becomes apparent only intraoperatively.[4] Such cases are difficult not only laparoscopically but also by open surgery. Subtotal cholecystectomy is a procedure that has only become more relevant with passage of time, with higher performance

rates now more than ever.[5] As laparoscopic cholecystectomy is more commonly performed, open cholecystectomy has reduced in number in today's minimal invasive surgery era. Asher Hirshberg, summarized subtotal cholecystectomy aptly, 'It is better to remove 95% of the gallbladder (i.e. subtotal cholecystectomy) than 101% (i.e. together with a piece of the bile duct)'.[6]

When doing laparoscopic cholecystectomy, a difficult gallbladder is to be diagnosed quickly and to be either converted to laparoscopic subtotal cholecystectomy or open subtotal cholecystectomy without wasting time and causing bile duct or vascular injury, it is a very important learning curve for young enthusiastic surgeons. Difficult gallbladder usually is encountered in acute on chronic cholecystitis with cholelithiasis, empyema, gangrene, cirrhotic liver with higher grades (3 or 4) of Nassar's grading scale, perforation, and Mirizzi syndrome. Subtotal cholecystectomy is based on damage control, when the structures of the Calot's triangle cannot be identified and the critical view of the safety cannot be achieved.[7] This study though has a low number of cases, explains when and how to do STC.

Gallstone disease is a major health problem that affects 1-4% of the western world population every year.[8] Khuroo et al studied prevalence of biliary tract disease in India and found that, the prevalence of gall stones in adult population was 6.12% (men 3.07% and women 9.6%).[9] Mhamunkar et al reported that, prevalence of cholelithiasis in India is more in females. The prevalence was more common in North Indians than South Indians followed by Maharashtra particularly from coastal regions.[10,11] Subtotal cholecystectomy (laparoscopic or open) is considered as a bail out procedure to remove gall bladder in difficult situations. World Journal of Emergency Surgery guidelines for acute calculous cholecystitis recommends performing subtotal cholecystectomy in situations where it's difficult to identify the anatomical structures needed or if there is a high risk of iatrogenic lesion.[12] The Nassar operative difficulty scale is a simple 4-point scale published in 1995 and has been used in prospective single region series which included data from 4089 patients.[13] We have done all our cases of subtotal cholecystectomy belonging to Nassar scale grade 3 and 4.

CASE SERIES

We operated 12 cases of difficult gallbladder by subtotal cholecystectomy in a single hospital from June 2019 to June 2024. All cases were preoperatively diagnosed as acute cholecystitis or acute-on-chronic cholecystitis. All cases were started as laparoscopic cholecystectomy but due to difficulty in dissection at Calot's triangle and to prevent injury to important structures, we converted 11 out of 12 of these cases to open cholecystectomy as a bail out procedure, 1 case was done as laparoscopic subtotal cholecystectomy.

Routine pre op investigations including ultrasound whole abdomen were done in all cases, on day of surgery. Informed written consent was taken from each patient (laparoscopic / open cholecystectomy). 11 out of 12 cases were converted to open subtotal cholecystectomy from laparoscopic cholecystectomy. 1 case underwent laparoscopic subtotal cholecystectomy. All cases of cholecystitis were in grade III and IV of Nassar's grading scale.

In this study of 12 patients, cases were male (16.6%) and 10 were female (83.4%). Most of the patients belonged to 31-50 years groups. Maximum number of (7) cases belonged to acute on chronic calculous cholecystitis with dense adhesions (58.3%). Two cases of empyema gallbladder and 3 cases of gangrene of gallbladder were also encountered in our study (25%) (Table 1).

Table 1: Distribution of cases as per diagnosis (n=12).

Type of gallbladder diseases	Number of patients	Percentage
Acute on chronic calculous cholecystitis with dense adhesions	7	58.3
Empyema of gallbladder	2	16.7
Gangrene of gallbladder	3	25

Out of 12 patients of our study 7 patients (58.3%) belonged to Nassar scale grade 3 and 5 (41.7%) to grade 4 (Table 2). The cases which were converted to open subtotal cholecystectomy were intra-operatively diagnosed as cases of acute on chronic calculous cholecystitis with dense adhesions, empyema of gallbladder, frozen Calot's triangle and gangrene of gallbladder.

Table 2: Distribution of cases according to Nassar scale grading of difficulty (n=12).

Nassar scale	Number of patients	Percentage
Grade 1	0	0
Grade 2	0	0
Grade 3	7	58.3
Grade 4	5	41.7

We did fundus first method of dissection in all cases as the dissection at Calot's triangle was found difficult and dangerous. First we opened the gallbladder at the fundus, suctioned out the bile and removed the stones. Dissection started from fundus separating gallbladder to be till near Hartmann's pouch. All the visible bleeders at liver bed and leaking bile ducts (Ducts of Lushka) were cauterized. In cases where cirrhotic liver was also present we took extra precaution and started the dissection at junction of liver and gallbladder leaving a thin slice of gallbladder wall, not the full thickness, without opening the gallbladder. It is always a matter of experience to find this plane of dissection with minimal bleeding and without entering the lumen of gallbladder. All bleeders even small, must be

cauterized. Gallbladder was double ligated at near Hartmann's pouch and then excised (endoloops were used in case of laparoscopic subtotal cholecystectomy). In 11 cases we had to use gel sponges (absorbable hemostatic gelatin sponge) to control bleeding and avoid post-operative bleeding and haematoma formation. Bile cultures were sent where indicated. Drains were placed in all cases. All cases received post op antibiotics. In all cases of open subtotal cholecystectomy we closed the opening of remnant part of gallbladder (reconstituting subtotal cholecystectomy).

All cases did well post operatively and did not develop any major complications. Bile leak continued for 15 to 20 days in 3 cases and gradually subsided. Majority of the bile leaks resolved within 2 weeks. None of the patients required any interventions for stopping bile leak. 1 patient had a collection at gallbladder fossa which was managed conservatively (Table 3).

Table 3: Post-operative complications (n=12).

Post-operative complications	Number of patients	Percentage
Bile leak 0-5 days (through drain)	6	50
Bile leak 6-14 days	3	25
Bile leak 15-20 days	3	25
Collection at gallbladder fossa	1	8.3

DISCUSSION

11 out of 12 patients of this study were converted from laparoscopic cholecystectomy procedure to open subtotal cholecystectomy due to difficulty to proceed with laparoscopic dissection. One case was done as laparoscopic subtotal cholecystectomy.

We feel that frozen Calot's triangle is the main deterrent for proceeding further by laparoscopy and conversion to open, is a wise decision. There is no advantage in proceeding with difficult dissection endangering important structures to injury and then converting to open after causing injury. It is wise to convert as soon as you feel you can't proceed safely, even then we are not spared from bile duct injuries and this is the situation where the risk of subtotal cholecystectomy cannot be more appreciated.[14] In such difficult situations, subtotal cholecystectomy (STC) comes to rescue, where the diseased organ can be removed safely. In 1947, Morse and Barb introduced the term 'subtot6al cholecystectomy'. Madding and Farrow popularized the term in 1955-1959.[15] Madding coined the term in his series of three cases in 1955 and Bornman and Terblanche described the safety of the procedure, and four decades later since its first description, Michalowski et al described the steps of laparoscopic STC.[16,17] With the advent of laparoscopic surgery and laparoscopic cholecystectomy in the late 1980s, the gold standard for cholecystectomy has changed to a laparoscopic approach.[18] Today, 92% of all cholecystectomies are done laparoscopically, although open cholesystectomies remain more common in many less affluent settings.[19]

We had a case of short cystic duct with dense adhesions, to avoid injury to bile ducts and vessels we decided to convert to laparoscopic subtotal cholecystectomy. Madni et al, indicates that, one of the most dangerous situations is a short cystic duct with the accompanying short cystic artery. The common bile duct may be mistaken for the cystic duct and be at a risk of transection. A short cystic artery may lead to injury or transection of the right hepatic artery.[20] Cholecystectomy is one of the most common abdominal operations performed worldwide.[21,22] The operation can be technically difficult owing to dense adhesions in Calot's triangle. Conversion to open surgery or subtotal cholecystectomy has been described to deal with such situations.[23,24]

Strasberg et al divided subtotal cholesystectomies in fenestrating and reconstituting types based on if the remaining portion of the gallbladder was left open or closed.[25] We did reconstituting subtotal cholecystectomy in all our laparoscopic converted to open subtotal cholecystectomy cases.

CONCLUSION

Subtotal cholecystectomy is an important bailout procedure in difficult gallbladders. Every surgeon must be experienced in laparoscopic and open cholecystectomy. In difficult cases, one should have a low threshold for converting to laparoscopic / open subtotal cholecystectomy.

ACKNOWLEDGEMENTS

Authors would like to thank Mr. Vipin Sharma his help in preparation of the manuscript.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Salky BA, Edye MB. The difficult Cholecystectomy: problems related to concomitant diseases. Semin Laparosc Surg. 1998;5(2):107-14.
2. Laws HL. The difficult cholecystectomy problems during dissection and extraction Semin Laparosc Surg. 1998;5(2):81-91.
3. Strasberg SM. A three-step conceptual roadmap for avoiding bile and injury in laparoscopic cholecystectomy: an invited perspective review. J Hepatobiliary Pancreat Sci. 2019;26(4):123-7.
4. Srinivasa S, Hammill CW, Strasberg SM. How to do laparosopic subtotal fenestrated cholecystectomy. ANZ J. Surg. 2021;91(4):740-1.

5. Ramirez-Giraldo C, Torres-Gullar A, Van-Londono I. Sate of the art in subtotal cholecystectomy: An overview. Front Surg. 2023;21.
6. Schein M, Rogers PN, Assalia A, Lane R. Schein's Common Sense Emergency Abdominal surgery. Springer. 2010;3:192.
7. Henneman D, daCosta DW, Vrounracts BC, Van Wagensveld BA, Lagarde SM. Laparoscopic partial cholecystectomy for the difficult gallbladder: a systematic review. Surg Endosc. 2013;27(2):351-8.
8. Sanders G, Kingsnorth AN. Gallstones. BMJ. 2007;335(7614):295-9.
9. Khuroo MS, Mahajan R, Zargar SA, Javid G, Sapru S. Prevalence of biliary tract disease in India: a sonographic study in adult population in Kashmir. Gut. 1989;30(2):201-5.
10. Bansal A, Akhtar M, Bansal AK. A clinical study: prevalence and management of cholelithiasis. Int Surg J. 2014;1:134-9.
11. Mhamunkar SR, Bapat RD, Mahadik SP, Abhyankar BA. Epidemiological study of cholelithiasis. Int Surg J. 2014;1(3):138.
12. Pisano M, Allievi N, Gurusami K, Borzellino G, Cimbanassi S, Boerna D, et al. 2020 World society of emergency surgery updated guidelines for the diagnosis and treatment of acute calculous cholecystitis. World J Emerg Surg. 2020;15(1):1-26.
13. Griffiths EA, Hodson J, Vohra RS, Marriott P, The Choles Study Group, Ketheb T, et al. Utilisation of an operative difficulty grading scale for laparoscopic cholecystectomy. Surg Endosc. 2018;33(1):122.
14. Keus F, de Jong JA, Gooszen HG, van Laarhoven CJ. Laparoscopic versus open cholecystectomy for patients with symptomatic cholecystectomy to cholelithiasis. Cochrane Database Syst Rev. 2006;(4):CD00623.
15. Lunevicins R. Review of the literature on Partial Resection of the Gallbladder, 1998-2022: The outline of the Conception of Subtotal Cholecystectomy and a Suggestion to use the Term Subtotal Open-Tract Cholecystectomy and Subtotal Closed – Tract Cholecystectomy. J Clin Med. 2023;12(3):1230.
16. Bornmann PC, Torblanche J. Subtotal cholecystectomy: for the difficult gallbladder in portal hypertension and cholecystitis. Surgery. 1985;98:1-6.
17. Michalowski K, Bornmann PC, Krige JE, Gallagher PJ, Terblandu J. Laparoscopic subtotal cholecystectomy in patients with chomplicated acute cholecystitis or birosis. Br J Surg. 1998;85:904-6.
18. Gallstones and laparoscopic cholecystectomy. NIH Consensus Statement. 1992;10(3):1-28.
19. Silverstein A, Costas-Chavarze A, Gakewaya MR, Lule J, Mulchopadhyay S, Meara JG, et al. Laparosopic Versus Open Cholecystectomy: A Cost-Effectiveness Analysis at Rawanda Military Hospital. World J Surg. 2017;41(5):1225-33.
20. Maclani TD, Nakonezny PA, Imran JB, Taveras L, Cunningham HB, Vela R, et al. A comparison of cholecystitis garding scales. J. Trauma Acute Care Surg. 2019;86(3):471-8.
21. Flum DR, Cheadle A, Prela C, Dellinger EP, Chan L. Bile duct injury during cholecystectomy and survival in medicare beneficiaries. JAMA. 2003;290(16):2168-73.
22. Azzawi MA, Abouelazayem M, Parmar C, Singhal R, Amr B, Martinino A, et al. A systematic review on laparoscopic subtotal cholecystectomy for difficult gallbladder: a life saving bail out or an incomplete operation? Ann R Coll Surg Engl. 2024;106(3):205-12.
23. Firgger R. Challenging situation in cholecystectomy and strategies to overcome them. Eur Surg. 2021;53:106-33.
24. Eikermann M, Siegel R, Broeders I, Dziri C, Fingerhut A, Gutt C, et al; European Association for Endoscopic Surgery. Prevention and treatment of bile duct injuries during laparoscopic cholecystectomy: the clinical practice guidelines of the European Association for Endoscopic Surgery (EAES). Surg Endosc. 2012;26(11):3003-39.
25. Strasberg SM, Pucci MJ, David DJ, Brunt LM. Subtotal cholecystectomy fenestrating reconstituting subtypes and the prevention of bile duct injury: definition of the optimal procedure in difficult operative conditions. J Am Coll Surg. 2016;222(1):89-96.

Cite this article as: Nigam VK, Nigam S. Subtotal cholecystectomy: a case series. Int Surg J 2024;11:1515-8.