



# Laparoscopic Subtotal Cholecystectomy Could Be an Alternative to Conversion

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## ÖZET

*Laparoskopik subtotal kolesistektomi açığa dönüře alternatif olabilir*

**Amaç:** Laparoskopik subtotal kolesistektomi safra kesesinin anatomisi total kolesistektomiye izin vermiyorsa açık kolesistektomiye alternatif olabilir. Bu çalışmanın amacı, zor kolesistektomi deneyimlerimizi paylaşmaktır.

**Gereç ve Yöntem:** Ocak 2008-Temmuz 2015 tarihleri arasında Bakırkoy Dr. Sadi Konuk Eğitim ve Arařtırma hastanesinde kolesitektomi yapılan 2250 hastanın verileri retrospektif olarak incelendi. Subtotal kolesistektomi yapılan veya kolesistektomi sırasında açığa geçilen toplam 113 hasta çalışmaya dahil edildi. Çalışmaya dahil edilen hastaların hepsi acil olarak ameliyata alınan hastalardı. Hastaların demografik özellikleri, hastanede ve yoğun bakımda kalıř süreleri ve komplikasyonlar deęerlendirildi.

**Bulgular:** Laparoskopik subtotal kolesistektomi 48 (%42.47) ve konversiyon koleksistektomi 65 (%57.52) uygulanan hastalar istatistiksel olarak karřılařtırıldı. İleri komplikasyonlarda ve minor komplikasyonlarda laparoskopik subtotal kolesistektomi ile konversiyon kolesistektomi grupları arasında anlamlı bir fark tespit edilmedi ( $p>0.05$ ). Hastanede kalıř süreleri ve yoğun bakım ünitesinde kalıř süreleri laparoskopik subtotal koleistektomi grubunda anlamlı olarak daha kısa saptandı (sırasıyla  $p=0.001$ ,  $p<0.01$  ve  $p=0.001$ ,  $p<0.01$ ).

**Sonuç:** Laparoskopik subtotal kolesistektominin komplikasyonları nedeniyle total kolesistektomi yapılmalıdır, ancak mümkün deęilse laparoskopik subtotal kolesistektomi güvenli ve etkili bir alternatiftir.

**Anahtar kelimeler:** Laparoskopik subtotal kolesistektomi, konversiyon kolesistektomi, komplikasyon

## ABSTRACT

*Laparoscopic subtotal cholecystectomy could be an alternative to conversion*

**Objective:** Laparoscopic subtotal cholecystectomy could be an alternative to open cholecystectomy if the anatomy of the gallbladder is not suitable for total cholecystectomy. The purpose of this study was to share our experience in difficult cholecystectomies.

**Material and Methods:** The records of 2250 patients, who underwent cholecystectomy in the General Surgery Department of Bakırkoy Dr. Sadi Konuk Training and Research Hospital, Istanbul, Turkey, between January 2008 and July 2015, were evaluated retrospectively. One hundred and thirteen patients, who underwent emergency laparoscopic subtotal cholecystectomy or conversion cholecystectomy, were included in our study. Demographic characteristics of the patients, length of hospital and intensive care unit stays and complications were assessed.

**Results:** Patients who underwent laparoscopic subtotal cholecystectomy 48 (42.47%) and conversion cholecystectomy 65 (57.52%) were statistically compared. No statistically significant difference was determined between the laparoscopic subtotal cholecystectomy and conversion cholecystectomy groups regarding major and minor complications ( $p>0.05$ ). There was statistically significant difference in terms of length of hospital and intensive care unit stay ( $p=0.001$ ,  $p<0.01$  and  $p=0.001$ ,  $p<0.01$ , respectively).

**Conclusion:** Total cholecystectomy should be pursued due to the complications of laparoscopic subtotal cholecystectomy, but if it is not possible, laparoscopic subtotal cholecystectomy is a safe and effective alternative.

**Key words:** Laparoscopic subtotal cholecystectomy, conversion cholecystectomy, complication

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## INTRODUCTION

The incidence of gall bladder related symptoms and complications in patients with gallstones is reported 1-2% per year (1). The standard treatment option for symptomatic patients is laparoscopic cholecystectomy (LC). In some patients with acute cholecystitis, Calot's triangle dissection cannot be performed safely. In these patients, dense fibrosis, severe inflammation, and abnormal anatomy may cause complications while dissection of Calot's triangle. The severe complication rate of LC is 2.6% and possible complications include bleeding, biliary leakage, apex or bile duct injury (2). Conversion cholecystectomy (CC) or laparoscopic subtotal cholecystectomy (LSC) can be performed as alternatives in situations of challenging dissection.

According to the Society of American Gastrointestinal and Endoscopic Surgeons' (SAGES) data, the CC rate was about 2-5% even in specialized centers (3,4). Although CC is accepted generally as a safe procedure with lesser mortality and morbidity rates, it has risks for potential complications. Although the complication rates were formerly reported as 6-21% in open cholecystectomy, currently complication rates are reduced (5).

When subtotal cholecystectomy (SC) and open total cholecystectomy (OTC) were compared, the average rates of complications in SC were less (6,7). There was no statistically significant difference between closing or not closing the cystic stump and excision of the back wall (8). However, there is no clear information about the relationship of LSC and CC in the literature. The benefit of LSC over CC has not been described in the current literature. The aim of this study was to compare the results of LSC and OTC in complicated cases of acute cholecystitis. Our hypothesis was that LSC was an alternative to CC, which is considered as an unsafe procedure.

## MATERIAL AND METHODS

The records of 2250 patients, who underwent cholecystectomy in the General Surgery Department of Bakirkoy Dr. Sadi Konuk Training and Research Hospital, Istanbul, Turkey, between January 2008 and July 2015, were evaluated retrospectively. One hundred and thirteen patients, who underwent emergency laparoscopic subtotal cholecystectomy or conversion

cholecystectomy, were included in our study. Demographic characteristics of the patients, length of hospital and intensive care unit stays, presence or absence of percutaneous transhepatic gallbladder drainage, American Society of Anesthesiologists (ASA) scores and complications in accordance with the Clavien-Dindo classification were assessed. Hospital ethics committee approval was obtained to conduct this study.

### Surgical technique for LSC

After establishing pneumoperitoneum, we first tried performing a standard laparoscopic approach. If major difficulty was encountered during gallbladder dissection from hepatic bed, surgeons incised the gallbladder wall and left the posterior wall in place. Then, the remnant mucosa was cauterized. If significant difficulty was faced during the Calot's triangle dissection and further dissection would expose the patient to increased risk of common bile duct injury or hemorrhage, the cystic duct was not isolated. An intraoperative cholangiography (IOC) was performed via punctuating the gallbladder, followed by cannulation of the cystic duct from the inside of the gallbladder, through an incision at the gallbladder neck wall. Then, the anterior wall was gradually excised and the wall of the gallbladder neck was closed with polyglactin 3-0, endoclips or Endo GIA.

### Statistical analysis

The Number Cruncher Statistical System (NCSS 2007, Kaysville, Utah, USA) was used for the statistical analysis. Besides descriptive statistical methods (average, standard deviation, median, frequency and mean), comparisons were made between the groups of parameters with normal distribution using Student's t-test; the Mann-Whitney U test was used for comparisons of abnormally distributed data. Pearson's Chi-square test and Fisher's exact test were used in the comparison of qualitative data. Results and 95% confidence intervals were evaluated and significance as accepted as  $p < 0.05$ .

## RESULTS

A total of 113 patients were included in the study. Patients who underwent LSC ( $n=48$ , 42.47%) and CC

**Table 1:** Demographic findings

	LSC (n=48)	CC (n=65)	p
Age	58.71±10.37	60.26±12.73	<sup>a</sup> 0.490
Sex (Male)	30 (62.5)	35 (53.8)	<sup>b</sup> 0.358
ASA			<sup>b</sup> p>0.05
-1	10 (20.8%)	14 (21.5%)	
-2	17 (35.4%)	27 (41.5%)	
-3	21 (43.8%)	34 (52.3%)	
PTGBD	6 (12.5%)	13 (20.0%)	<sup>b</sup> 0.292

<sup>a</sup>Student's t-test, <sup>b</sup>Pearson's Chi-square. SD: standard deviation, PTGBD: percutaneous transhepatic gall bladder drainage.

**Table 2:** Determinations according to diagnoses

	LSC (n=48)	CC (n=65)	p
Acute calculous cholecystitis	10 (20.8%)	14 (21.52%)	<sup>b</sup> 0.928
Acute attack of chronic calculous cholecystitis	21 (43.8%)	28 (43.1%)	<sup>b</sup> 0.943
Chronic calculous cholecystitis ± cirrhosis	3 (6.3%)	7 (10.8%)	<sup>c</sup> 0.513
Chronic calculous atrophic cholecystitis + dense fibrosis	14 (29.2%)	16 (24.6%)	<sup>b</sup> 0.588

<sup>b</sup>Pearson Chi-square test, <sup>c</sup>Fisher's exact test.

**Table 3:** Complications and hospital stay

	LSC (n: 48)	CC (n: 65)	P
Major complications			
- CBD injury	0	1 (1.5%)	<sup>c</sup> 0.999
- Vascular injury	0	0	-
- Duodenum injury	0	1 (1.5%)	<sup>c</sup> 0.999
Minor complications			
- Bile leakage	2 (4.2%)	1 (1.5%)	<sup>c</sup> 0.574
- Subhepatic abscess	2 (4.2%)	1 (1.5%)	<sup>c</sup> 0.574
- Residual stone	1 (2.1%)	0	<sup>c</sup> 0.425
- Wound infections	1 (2.1%)	4 (6.2%)	<sup>c</sup> 0.393
- Liquid collections	3 (6.3%)	3 (4.6%)	<sup>c</sup> 0.698
- Bleeding	1 (2.1%)	0	<sup>c</sup> 0.425
Hospital stay (day); (median)			
- Hospital stay	4.06 ± 3.20 (3)	5.02 ± 2.84 (4)	<sup>d</sup> 0.001**
- ICU stay	0.65 ± 2.02 (0)	0.97 ± 1.50 (0)	<sup>d</sup> 0.001**
Clavien-Dindo			
- Class 1	5 (10.4%)	6 (9.2%)	<sup>c</sup> 0.999
- Class 2	4 (6.3%)	3 (4.6%)	<sup>c</sup> 0.456
- Class 3	1 (2.1%)	2 (3.1%)	<sup>c</sup> 0.999
- Class 4	0	0	-

<sup>d</sup>Fisher's exact test, \*\*p<0.01.

(n=65, 57.52%) were statistically compared. There was no statistically significant difference between the two groups in terms of age, sex, ASA scores, and rates of performed percutaneous transhepatic cholecystectomies (p>0.05) (Table 1).

There was no statistically significant difference in terms of diagnoses such as acalculous cholecystitis, chronic cholecystitis with acute attack, cirrhosis, chronic cholecystitis, acalculous atrophic cholecystitis, and dense fibrosis (p>0.05) (Table 2).

No statistically significant difference was determined between the LSC and OCC groups in terms of minor and severe complications (p>0.05). There was statistically significant difference in terms of length of hospital stay between the LSC and OCC groups (p=0.001 and p=0.001, respectively). In the OCC group, length of hospital stay was significantly longer than the LSC group. There was statistically significant difference in terms of length of intensive care unit stay (p=0.001, p<0.01, respectively).

There was no statistically significant difference in the Clavien-Dindo classification between groups (p>0.05) (Table 3).

## DISCUSSION

The gold standard technique for LC includes a thorough dissection of the Calot's triangle from outside of the gallbladder, with identification of the cystic duct and artery. Then the gallbladder infundibulum is dissected, keeping in close contact with the gallbladder wall, avoiding an injury to an anomalous right hepatic duct. When present, an anomalous right hepatic duct is at risk of injury if the plane of dissection is too deep and not close to the gallbladder wall. This concept is widely accepted in the surgical world and is called the "flag technique", "critical view technique", "window technique" or "safety zone" (9-13).

However, this standard technique is not easy to perform in difficult cholecystectomies, when isolated or combined local risk factors for bile duct injury are present, such as severe acute cholecystitis, severe sclero-atrophic gallbladder with obliteration of Calot's triangle, small fibrotic gallbladder, Mirizzi syndrome, liver cirrhosis with portal hypertension, or anomalous biliary anatomy (14-16).

Open SC was reported as a safe procedure in these circumstances (17). However, with increased experience in laparoscopic surgery and developing technologies, in

cases with dense fibrosis, LSC has evolved as a safe and useful alternative to LC (18-20). In our opinion, the difficulty of dissection in laparoscopic surgery was similar to open surgery and open surgery does not guarantee avoidance of biliary and vascular injuries. Although no significant differences were determined, in our study, regarding major complications between both groups, high complication rates in open surgery should not be underestimated.

Contrarily, according to our study results, length of hospital stay, especially in the intensive care unit, was increased in open surgery. In our experience LSC is more useful and marginally safer than open surgery. LSC allows better visualization of the anatomy during laparoscopic exploration, dissection becomes easier, and reduces possibility of contamination. LSC can be preferred in cases of "frozen Calot" with dense fibrosis or in cases of hepatic cirrhosis with extreme intra-abdominal vascular collaterals. We should also note that LSC was not without problems. In LSC, there is a possibility of external biliary fistulas or new sludge or calculus formation. In these cases, open surgery would be needed. Also there was a risk of contamination with bile and calculus.

We removed all spilled stones and gallbladder specimens via a protective endobag, and destroyed

any residual gallbladder mucosa with an Argon beam coagulator, copiously washed the operative field at the end of the operation, and routinely used a subhepatic peritoneal drainage catheter. By treating possible common bile duct stones before or during surgery via an endoscopic approach, by performing routine IOC and by using stitches instead of clips to allow hermetic cystic duct closure and avoid further clip dislodgement, we encountered no postoperative cystic biliary leakage in the present series, as reported by other authors (21-24). Transient bile leakage after SC is reported to occur in 5-73% of patients, which requires endoscopic management in only in 0.8-15% (16,18,25,26).

The limitation of this study was not being able to ascertain operative time data. Another limitation of our study was the obligation in long-term follow-up for complications.

In conclusion, subtotal cholecystectomy should be actively pursued only if total cholecystostomy is not possible, because of the possible complications of LSC. Only experienced surgeons should perform this procedure. Inexperienced surgeons may choose to use it but must do so with extreme caution. The main purpose to use this technique should be to keep cholecystectomy safe, not to avoid laparotomy.

## REFERENCES

1. Festi D, Reggiani ML, Attili AF, et al. Natural history of gallstone disease: Expectant management or active treatment? Results from a population-based cohort study. *J Gastroenterol Hepatol* 2010; 25: 719-724.
2. Shamiyeh A, Wayand W. Laparoscopic cholecystectomy: early and late complications and their treatment. *Langenbecks Arch Surg* 2004; 389: 164-171.
3. VanBibber M, Zuckerman RS, Finlayson SR. Rural versus urban in patient case-mix differences in the US. *J Am Coll Surg* 2006; 203: 812-816.
4. Harris JD, Hosford CC, Sticca RP. A comprehensive analysis of surgical procedures in rural surgery practices. *Am J Surg* 2010; 200: 820-825.
5. Keus F, Gooszen HG, van Laarhoven CJ. Open, small-incision, or laparoscopic cholecystectomy for patients with symptomatic cholelithiasis. An overview of Cochrane Hepato-Biliary Group reviews. *Cochrane Database Syst Rev* 2010; CD008318.
6. Kaplan D, Inaba K, Chouliaras K, Low GM, Benjamin E, Lam L, Grabo D, Demetriades D. Subtotal cholecystectomy and open total cholecystectomy: alternatives in complicated cholecystitis. *Am Surg* 2014; 80: 953-955.
7. Davis B, Castaneda G, Lopez J. Subtotal cholecystectomy versus total cholecystectomy in complicated cholecystitis. *Am Surg* 2012; 78: 814-817.
8. Elshaer M, Gravante G, Thomas K, Sorge R, Al-Hamali S, Ebdewi H. Subtotal cholecystectomy for "difficult gallbladders": systematic review and meta-analysis. *JAMA Surg* 2015; 150: 159-168.
9. De Watteville JC, Testas P. La coelioscopie dans le surgences digestives. In: Testas P, Delaitre B (Eds). *Chirurgie Digestive par Voie Coelioscopique*. Paris: Maloine; 1991. pp. 170-86.
10. Callery MP. Avoiding biliary injury during laparoscopic cholecystectomy: technical considerations. *Surg Endosc* 2006; 20: 1654-1658.
11. Connor S, Garden OJ. Bile duct injury in the era of laparoscopic cholecystectomy. *Br J Surg* 2006; 93: 158-168.
12. Taniguchi Y, Ido K, Kimura K, et al. Introduction of a "safety zone" for the safety of laparoscopic cholecystectomy. *Am J Gastroenterol* 1993; 88: 1258-1261.
13. Ido K, Isoda N, Kawamoto C, et al. Confirmation of a "safety zone" by intraoperative cholangiography during laparoscopic cholecystectomy. *Surg Endosc* 1996; 10: 798-800.

14. Gigot J, Etienne J, Aerts R, et al. The dramatic reality of biliary tract injury during laparoscopic cholecystectomy. An anonymous multicenter Belgian survey of 65 patients. *Surg Endosc* 1997; 11: 1171-1178.
15. Kum CK, Eypasch E, Lefering R, Paul A, Neugebauer E, Troidl H. Laparoscopic cholecystectomy for acute cholecystitis: is it really safe? *World J Surg* 1996; 20: 43-48.
16. Palanivelu C, Rajan PS, Jani K, Shetty AR, Sendhilkumar K, Senthilnathan P, Parthasarathi R. Laparoscopic cholecystectomy in cirrhotic patients: the role of subtotal cholecystectomy and its variants. *J Am Coll Surg* 2006; 203: 145-151.
17. Rai R, Sinha A, Rai S. Randomized clinical trial of open versus laparoscopic cholecystectomy in the treatment of acute cholecystitis. *Br J Surg* 2005; 92: 494.
18. Chowbey PK, Sharma A, Khullar R, Mann V, Baijal M, Vashistha A. Laparoscopic subtotal cholecystectomy: a review of 56 procedures. *J Laparoendosc Adv Surg Tech A* 2000; 10: 31-34.
19. Michalowski K, Bornman PC, Krige JE, Gallagher PJ, Terblanche J. Laparoscopic subtotal cholecystectomy in patients with complicated acute cholecystitis or fibrosis. *Br J Surg* 1998; 85: 904-906.
20. Ransom KJ. Laparoscopic management of acute cholecystitis with subtotal cholecystectomy. *Am Surg* 1998; 64: 955-957.
21. Bickel A, Shtamler B. Laparoscopic subtotal cholecystectomy. *J Laparoendosc Surg* 1993; 3: 365-367.
22. Ibrarullah MD, Kacker LK, Sikora SS, Saxena R, Kapoor VK, Kaushik SP. Partial cholecystectomy-safe and effective. *HPB Surg* 1993; 7: 61-65.
23. Crosthwaite G, McKay C, Anderson JR. Laparoscopic subtotal cholecystectomy. *J R Coll Surg Edinb* 1995; 40: 20-21.
24. Rohatgi A, Singh KK. Mirizzi syndrome: laparoscopic management by subtotal cholecystectomy. *Surg Endosc* 2006; 20: 1477-1481.
25. Soleimani M, Mehrabi A, Mood ZA, et al. Partial cholecystectomy as a safe and viable option in the emergency treatment of complex acute cholecystitis: a case series and review of the literature. *Am Surg* 2007; 73: 498-507.
26. Beldi G, Glättli A. Laparoscopic subtotal cholecystectomy for severe cholecystitis. *Surg Endosc* 2003; 17: 1437-1439.