

Incidence of Superficial Port Site Infection in Laparoscopic Cholecystectomy in relation to Spilt Stone and Bile Spillage

Paudel Suresh Raj ¹, Gurung Narendra Vikram ¹, Adhikari Dhruva Bahadur ¹, Acharya Arjun ¹, Shrestha Santosh ¹, Gurung Amar ¹, Shrestha Devendra ¹, Paudel Amrita Ghimire ²

¹ Department of Surgery, Pokhara Academy of Health Sciences, Western Regional Hospital.

² Department of Pediatrics, Pokhara Academy of Health Sciences, Western Regional Hospital.

Corresponding Author:

Dr. Suresh Raj Paudel,
Consultant Surgeon,
Pokhara Academy of Health Sciences,
Western Regional Hospital,
Pokhara Nepal

Email: poudelsuresh6@gmail.com

Article received : February 8, 2018

Article accepted : March 14, 2018

ABSTRACT

Introduction: Laparoscopic cholecystectomy is the choice of operation for symptomatic gallstones. Gallstone and bile spillage can occur during laparoscopic cholecystectomy during dissection by cautery or due to perforation of gall bladder by grasper. The complication of spilt stone and bile may range from simple superficial surgical site infection, adhesion, obstruction, abscess formation to none. **Methods:** This study was conducted at Western Regional Hospital (WRH), Pokhara from July 2015 to December 2016. A total of one hundred and twenty patients who underwent laparoscopic cholecystectomy were included. All patients' age, sex, pre-operative ultrasound findings, intra operative spillage of stone and bile and post-operative superficial surgical site infection were noted. Statistical analysis was done using Microsoft Excel software and SPSS-21. Result obtained from the study was discussed with reference to current world literature.

Results: Out of one hundred and twenty patients, one hundred and nine were female and eleven were male with mean age of 42.68 years. Spillage of stones and bile occurred in twelve patients (10%). Spillage of stone and bile was common with multiple stones. Only four patients (one male and three females) developed superficial port site infection (3.3%). Two patients among spillage and two among non spillage developed superficial surgical site infection ($p < 0.05$). Most common organism was Staphylococcus aureus followed by Escherichia coli. **Conclusion:** The incidence of split stone or bile is 10 % and is common with multiple gallstones. The chance of superficial surgical site infection is more in male patients and with spillage of stone and bile.

Keywords– Laparoscopic cholecystectomy, spilt stone, superficial surgical site infection.

INTRODUCTION

Laparoscopic cholecystectomy has become the gold standard treatment for symptomatic cholelithiasis. Although minimally invasive, it is associated with an increased frequency of bile duct injury and gallstone spillage into the abdominal cavity in comparison to open surgery.¹ Spilt gallstone is well known complication during either laparoscopic or open cholecystectomy. Gallbladder perforation with stone spillage into the peritoneal cavity is more frequent in laparoscopic cholecystectomy than in open cholecystectomy. The adverse effect of gallstones left in the peritoneal cavity is controversial. Some authors stated that the risk of having surgical site infection, intra abdominal adhesion, obstruction and abscess formation is present while others

stated that the unretrieved stones had no deleterious effect.^{2,3,4}

There are many normal bacterial floras in the human body. These floras may, sometimes become opportunistic in certain conditions and cause infection. This can occur in both laparoscopic and open surgeries. Surgical site infection (SSI) could be intrinsic or extrinsic. There are many factors in human body which leads to higher risk of infection after surgical intervention.⁵ Generally minimal invasive surgeries are associated with lesser chance of infection so is laparoscopic cholecystectomy.⁶ However with increasing number of laparoscopic cholecystectomy and incidental spillage of gallstone and bile, there are an increasing number of port site infections.

The main objective of our study is to find out the incidence of spilt stone and bile spillage during laparoscopic cholecystectomy in our setup and determine the factors associated with port site superficial SSI.

MATERIALS AND METHODS

This study was conducted at Western Regional Hospital, Pokhara from July 2015 to December 2016. A total of one hundred and twenty patients were included in the study. All patients of gallstones undergoing laparoscopic cholecystectomy were enrolled. Parameters like age and sex, pre-operative ultrasound findings, intra operative spillage of stone and bile, post-operative superficial surgical site infections were noted. Patients were called for follow up in one week and in one month post-operatively in outpatient department. Statistical analysis was done using Microsoft Excel software and SPSS-

21. Result obtained from the study was discussed with reference to current world literature.

RESULTS

Out of one hundred and twenty patients enrolled in the study, eleven were male and one hundred and nine female with Male: female ratio of 1:9. The youngest patient was 19 years old and the eldest was 75 years old with the mean age of 42.68 years. Spillage of stones and bile occurred in twelve patients with the incidence of 10%. Out of them four patients developed superficial surgical site infection (3.3%).

Table 1: Spillage of stones and bile in relation to number of stones

Spillage	Numbers / total	Percentage
Single	1 / 31	3.2
Multiple	11 / 89	12

In our study, 1 patient with single stone in gallbladder and 11 patients with multiple stones were spilt in the peritoneal cavity. With this we can conclude that patients having multiple stones had high chance of spillage of stone and bile during surgery.

Table 2: Relationship between port site infection and gender

Gender	Infected/total	Percentage
Male	1 / 11	9
Female	3 / 109	2.7

In this study, one male patient (9% among males) and three female patients (2.7% among females) developed port site infection. This shows an association between male patients and infection.

Table 3: Relation between port site infection and spillage of stones and bile

Port site infection	Infected/total	Percentage
With spillage	2 / 12	16
Without spillage	2 / 108	1.8

Out of twelve patients who had spillage of stone and bile during surgery, only two patients (16% among spillage) developed superficial surgical site infection. On the other hand two patients out of 108 without spillage (1.8%) had superficial surgical site infection. This showed positive association between port site infection and spillage of stone and bile (P value<0.05). Most common organism isolated from the wound site was Staphylococcus aureus followed by Escherichia coli. Superficial SSI occurred in the umbilical port site because gallbladder was extracted from the umbilical port in all the patients.

DISCUSSION

The introduction of minimally invasive procedures has revolutionized the field of surgery. Nowadays, laparoscopic cholecystectomy is the gold standard treatment for symptomatic cholelithiasis. The increasing use of minimally invasive cholecystectomy has led to an increase in the frequency of gallbladder perforation and subsequent stone spillage.⁷ Laparoscopic cholecystectomy is associated with perforation of gallbladder and spillage of gallstones and bile at a rate of 5% to 40%.^{8, 9} Perforation occurs due to traction applied by grasping forceps or because of thermal injury during dissection of the gallbladder from its bed. The presence of acute cholecystitis, obesity, older age, male gender, and the surgeon's experience have been considered as possible risk factors for gallbladder injury during laparoscopy.¹⁰ In our study, spillage occurred in twelve patients (10%). Out of which one patient had single stone and eleven patients had multiple stones. It showed that presence of multiple stones in gallbladder had higher chance of spillage.

In our study, majority of patients, one hundred and nine patients (90.8%) out of one hundred and twenty, were female. Even though most of the superficial port site infection occurred in females (three out of one hundred and nine patients), male gender was found to be associated

with higher incidence of superficial port site infection may be because of difficult operation in male patients leading to higher chance of perforation of gallbladder. Our study result was comparable with the study of Jasim D et.al, who had three hundred and one (81.57%) females and sixty eight (18.43%) males out of three hundred and sixty nine total patients. Their study reported port site infection in eleven patients (2.98%), with seven females (63.63%) and four males (36.36%).¹¹

In our study, two out of twelve (16%) of patients with spillage and two out of one hundred and eight patients (1.85%) without spillage developed superficial port site infection. Similar study in AL-Kindy medical college in Iraq showed similar relation between port site infection and intraoperative spillage during laparoscopic cholecystectomy.¹² Spillage of bile or stones retained inside the abdomen or in the wound is highly associated with port site infection and abscess formation.¹³ Spilt pigment stones have high chance of infection than cholesterol stones if not retrieved as it harbors viable bacteria.¹⁴ Every effort should be made to retrieve the stones in case of gallstone spillage. A variety of instruments like laparoscopic spoons, graspers, suction devices are used for stone retrieval.¹⁵ Conversion to open surgery remains a matter of controversy. Although unretrieved stones may remain asymptomatic for a long time or forever, occasionally they can cause serious complications.¹⁶ The most frequent complication is abscess formation at the subhepatic and subphrenic region and less frequently at the port sites.¹⁷ Furthermore, rarely spilt stones can cause erosion into adjacent organs and can migrate to distant sites, causing a variety of retroperitoneal, cardiothoracic, and urological complications.^{18, 19} In a few cases, stone migration have been reported to extrude through the skin.²⁰ Our study revealed *Staphylococcus aureus* and *Escherichia coli* as two most common organisms involved in SSI, which is similar to the findings of Atul K.sharma, Rakish Sharma et.al.²¹

CONCLUSION

The incidence of spilt stone or bile spillage is 10% and is more common with multiple gallstones. The chance of superficial surgical site infection is more in case of spillage of stone and bile. Superficial surgical site infection is more common in male in comparison to females. Most common organisms isolated were *Staphylococcus aureus* and *Escherichia coli*.

REFERENCES

1. Fitzgibbons RJ, Annibali R, Litke BS. Gallbladder and gallstone removal, open versus closed laparoscopy, and pneumoperitoneum. *Am J Surg.*1993 Apr;165(4):497–504.
2. Memon MA, Deeik RK, Maffi TR. The outcome of unretrieved gallstones in the peritoneal cavity during laparoscopic cholecystectomy. A prospective analysis. *Surg Endosc.*1999 Sep;13(9):848–857.
3. Yerdel MA, Alacayir I, Malkoc U, Baba F, Erverdi N, Pak I et al. The fate of intraperitoneally retained gallstones with different morphologic and microbiologic characteristics: an experimental study. *J Laparoendosc Adv Surg Tech A.*1997 Apr;7(2):87–94.
4. Welch N, Hinder R. Laparoscopic capture of escaped gallstones. *Surg Lap Endosc.*1991 Mar;1(1):42–44.
5. Shindhohimath, AA, Seenu V, Parshad R, Chaudhry R, Kumar A. Factors influencing wound infection following laparoscopic cholecystectomy. *Tropical Gastroenterology.*2002;24(2): 90-92.
6. Jan WA, Ali SI, Shah NA, Ghani A, Khan M, Khan AS .The frequency of port-site infection in laparoscopic cholecystectomies. *Journal of Postgraduate Medical Institute.*2011 Jan; 22(1):66-70.
7. Woodfield JC, Rodgers M, Windsor JA. Peritoneal gallstones following laparoscopic cholecystectomy: incidence, complications, and management. *Surg Endosc.*2004 Aug; 18(8):1200–1207.
8. Sathesh-Kumar T, Saklani A, Vinayagam R, Blackett R. Spilled gall stones during laparoscopic cholecystectomy: a review of the literature. *Postgraduate Medical Journal.*2004 Feb;80(940):77-79.
9. Brockmann JG, Kocher T, Senninger NJ, Schürmann GM. Complications due to gallstones lost during laparoscopic cholecystectomy. *Surgical Endoscopy.*2002 Aug; 16(8):1226-1232.
10. Hui TT, Giurgiu DI, Margulies DR, Takagi S, Iida A, Phillips EH. Iatrogenic gallbladder perforation during laparoscopic cholecystectomy: etiology and sequelae. *Am Surg.* 1999 Oct; 65(10):944–948.
11. Saud JD, Abu Al-Hail MC. Surgical site infection after laparoscopic cholecystectomy. *Basrah Journal of Surgery.*2010 Mar; 16(2): 119-121.
12. Al-Naser KH. Port site infection after laparoscopic cholecystectomy. *Int J Med Res Health Science.*2017; 6(6):132-137.
13. Zehetner J, Shamyeh A, Wayand W. Lost gallstones in laparoscopic cholecystectomy: All possible complications. *Am J surgery.* 2007 Jan; 193(1):73-78.
14. Zinner MJ, Ashley SW. Maingot's abdominal operations.12th ed. New York. McGraw-Hill Publications, 2013. p 1014-1088.
15. Schafer M, Suter C, Klaiber C, Wehrli H, Frei E, Kra'henbu'h ll. Spilled gallstones after laparoscopic cholecystectomy. A relevant

- problem? A retrospective analysis of 10,174 laparoscopic cholecystectomies. *Surg Endosc.* 1998 Apr; 12(4):305–309.
16. Tumer AR, Yu`ksek YN, Yasti AC, Go`zalan U, Kama NA. Dropped gallstones during laparoscopic cholecystectomy: The consequences. *World J Surg.* 2005 Apr; 29(4):437– 440.
 17. Horton M, Florence MG. Unusual abscess patterns following dropped gallstones during laparoscopic cholecystectomy. *Am J Surg.* 1998 May;175(5):375–378.
 18. Rioux M, Asselin A, Gregoire R, Dallaire C. Delayed peritoneal and retroperitoneal abscesses caused by spilled gallstones: A complication following laparoscopic cholecystectomy. *Abdom Imaging.* 1995 Apr;20(3):219 –221.
 19. Lutken W, Berggren P, Maltbaek J. Passage of gallstone via the urethra: a complication of laparoscopic cholecystectomy. *Surg Laparosc Endosc.* 1991 Dec;1(2):246 –247.
 20. Yamamuro M, Okamoto B, Owens B. Unusual presentations of spilled gallstones. *Surg Endosc.* 2003 Sep;17(9):1498.
 21. Sharma AK , Sharma R, Sharma S. Port site infection in laparoscopic surgeries- Clinical study. *Indian Medical Gazette.* 2013 Jun;147(6);224-229.