

Laparoscopic cholecystectomy in the hands of post-graduate trainees: the need for guidelines

M. Rafique Memon, Salim Ahmed Soomro, Asif Qureshi, Mumtaz Maher

Abstract:

Objective: The purpose of this study is to evaluate the safety of elective Laparoscopic Cholecystectomy done by post-graduate trainees under supervision and the introduction of proper training of Laparoscopic surgery in post-graduate residency programs.

Design: Descriptive study.

Material and Methods: This study includes 800 cases undergoing Laparoscopic Cholecystectomy for symptomatic gall-stones, conducted at surgical ward 2, Jinnah Post-graduate Medical Center Karachi, during a period of last 5 years (Jan 2004 to Dec 2008). These Laparoscopic Cholecystectomies were performed by post-graduate trainees under supervision of senior laparoscopic surgeon (Professor).

Results: Among 800 cases, there are 200 (25 %) males and 600 (75 %) females. The age of patients ranged from 18-70 years. All the cases were done by residents of year III & IV with minimal complications. The results and observations were made for the operating time, difficulty in dissection, open conversion rate and complications. The mean operating time is 60 minutes. The open conversion is 1.5 %. CBD and gut injury is 0.37% and 0.12 % respectively. Mortality is 0.25% because of hepatic failure in patients with decompensated cirrhosis.

Conclusion: Laparoscopic Cholecystectomy is integrated early in surgical training according to the concept "Observe, Assist, and then Operate under the assistance of an experienced laparoscopic surgeon". The introduction of clinical laparoscopic training into general surgery residency programs should influence the widespread adoption of this new procedure.

Key Words: Laparoscopic Cholecystectomy, Post-graduate trainees, Residency training programs.

**Ghulam Muhammad
Maher Medical College,
Sukkur**
MR Memon

**Consultant Surgeon,
Karachi**
A Qureshi

**Jinnah Postgraduate
Medical Centre, Karachi**
M Maher (Retd.)

Correspondence:
Dr M Rafique Memon
House No.B/1703,
Memon Muhalla, Rohri,
Sindh
Cell: 0300 3142800
drrafiqsuk@yahoo.com

Introduction:

The first Laparoscopic Cholecystectomy was performed by Mouret in Lyons France in 1987. Although Mouret has never published an account of this; the operation was rapidly adopted by Dubios & co-workers in Paris and the technique spread rapidly through France and Germany.

Laparoscopic Cholecystectomy is the "gold standard" treatment for patients with symptomatic cholelithiasis. It is now one of the most common operations performed by general surgeons¹.

The introduction of laparoscopic cholecystecto-

my into the Pakistan has been haphazard and uncontrolled with about a third of surgeons being completely self-taught. There is a risk that Laparoscopic Surgery will fall into disrepute unless adequate steps are taken to reassure the public. Some form of accreditation after a recognized training scheme would go a long way towards allaying these fears. Adequate training will probably pay dividends in reduced litigations². Indeed, most surgeons performing Laparoscopic Cholecystectomy today are trained outside of a structured residency program. Much debate regarding appropriate post-graduate training and credentialing has surfaced. Little attention has been given, however, to the impact of the new

technique on resident training³.

The purpose of this study is two fold. The first goal is to assess the value of laparoscopic cholecystectomy as a training procedure for residents of year III & IV. The second goal is to determine the outcome data for residents performing laparoscopic cholecystectomy. The ideal training for the laparoscopic procedure includes, in order, a video, a pelvitrainer, hands-on training, and training under an experienced laparoscopic surgeon².

Material and methods:

This study includes 800 cases undergoing Laparoscopic Cholecystectomy for symptomatic gall-stones, conducted at surgical ward #2, Jinnah Post-graduate Medical Center Karachi,

during a period of last 5 years (Jan 2004 to Dec 2008). These Laparoscopic Cholecystectomies were performed by post-graduate trainees under supervision of senior laparoscopic surgeon (Professor).

Clinical data was recorded and routine investigations along with ultrasound abdomen were carried out. All patients were admitted a day before surgery. Nature of the procedure was explained and consent for open conversion was also taken. All clinical data, investigations, operative findings, operative difficulties, operating time, and post-operative complications recorded. The data was compiled and results drawn.

Results:

Among 800 cases, there are 200 (25 %) males and 600 (75 %) females. The age of patients ranged from 18-70 years. The results and observations are as under:

1. **Operating Time:** In early 50 cases, the total operating time was one hour in simple cases and a 1 ½ to 2 hours in difficult cases. Later the operating time was decreased to 45 minutes in simple cases and 1 to 1 ½ hours in difficult cases.
2. **Difficulty in Dissection:** In early 30 cases, difficulty found in dissection, especially in the gall-bladder with dense adhesions of omentum all around and dense adhesions at Callot's triangle. So help was sought by senior surgeon to manage the difficulty.
3. **Open Conversion:** Only 12 (1.5 %) cases were converted into open procedure for reasons mentioned in Table 1 and managed accordingly.
4. **Complications:** Per-operative and post-operative complications found in this series are summarized in Table 2.

Discussion:

In today's modern world of surgery, laparoscopy has major role in many general surgical procedures. Laparoscopic surgery is superior and beneficial to open surgery. Open surgery may

Table 1: Reasons for conversion to open procedure

Cause of open conversion	No. of Cases	Management
Mirizzi Syndrome	2	Stones removed and T-tube placed
CBD-transacted	3	Roux-en-y Hepatico jejunostomy
Acute gall-bladder with dense adhesions	4	Open Cholecystectomy done
Cystic duct avulsed and CBD-containing stones	1	Stones removed and T-tube placed
Agenesis of gall-bladder and CBD-containing stones	1	Stones removed and T-tube placed
Peritonitis due to spillage of stones during lap chole.	1	Laparotomy done on 2nd post-operative day with peritoneal lavage

Table 2: Per-operative and post-operative complications

Complications	No. of Patients	Percentage	Management
Bleeding from Liver bed	50	6.25 %	Controlled by diathermy/ sponge stone
CBD Injury (transacted)	03	0.37 %	Roux-en-y Hepatico-jejunostomy
Gut Injury (small gut)	01	0.12 %	Laparotomy and repair done
Omental bleeding	10	1.25 %	Controlled by diathermy or suture ligation
Spillage of stones	01	0.12 %	Laparotomy with peritoneal lavage
Hepatic Encephalopathy in patients with decompensated cirrhosis	02	0.25 %	Expired on 3rd post-operative day because of hepatic failure & hepato-renal syndrome
Post-operative biliary collection	07	0.87 %	In 3 cases U/S guided drainage, 2 cases managed conservatively and in 2 cases open drainage
Avulsion of cystic duct	08	1 %	5 managed by suture ligation and 3 by clipping
Avulsion of cystic artery	14	1.75 %	Managed by clipping/ diathermy
Retained CBD stones	06	0.75 %	Stones retrieved by ERCP

result in increased post-operative pain, delayed mobility, prolonged hospital stay, adhesions formation and incisional hernia⁴. On the contrary, after laparoscopic surgery, patient returns to home and work early. The benefit of minimally invasive surgery has been well-demonstrated in the treatment of biliary colic, turning laparoscopic Cholecystectomy in most instances in to a truly out-patient procedure⁵.

In this study, total number of cases is 800, which were performed by post-graduate residents of year III & IV under the direct and indirect supervision of professor (Senior Surgeon) successfully with minimal complications.

The operating time was recorded to see if laparoscopic Cholecystectomy could be performed in a timely fashion regardless of the level of resident involved as the operating surgeon. The chief resident on the attending surgeon's service performed the assignment of cases. All cases had a laparoscopic fellow scrubbed and the attending surgeon scrubbed and present during the dissection of the cystic duct and artery. When examining our overall mean operating time, compared to other published data, our mean of 60 minutes compared favorably to others of 62.2 minutes⁶. Operative times from other major teaching institutions are reported from 37 to 93 minutes. Our data indicate that those two seemingly mutually exclusive goals, teaching and operative efficiency can be balanced. The surgical resident education may contribute to increased operating time, thus increasing costs at teaching institutions. It is possible that junior residents, in particular, with less experience could contribute to longer operating times. In one study, operating time was compared among three groups of residents, according to their seniority, but, there were no difference in the mean operating time of all the three groups. So, in that study, it was found that resident level did not affect the operating time⁶. In our study, the operating time of resident year III & IV was not much different. But there is an increase in the amount of time required to perform an operation when the procedure involves training a surgical resident. This increased time does not translate into a financial burden for the

hospital⁷.

In this series, the most technically difficult cases especially with difficult dissection at Callot's triangle or with dense adhesions were performed by the experienced laparoscopic surgeon or senior resident. So whenever post-graduate resident felt difficulty in dissection, the most experienced surgeon should intervene and also help and demonstrate the junior how to handle that difficulty. Indeed, studies have been compiled which demonstrated the financial impact of educating residents in the operating room⁸.

The open conversion in this study is only about 1.5 %, which is better in comparison to 6.9 %⁹. In one of the local series, it was found 12.73 % in acute cholecystitis, in others 2%, 6%, and 14%¹⁰. The present study resorts findings concerning the impact of the learning environment on the conversion rate of laparoscopic cholecystectomy to open cholecystectomy. At Metro-west Medical Center (Framingham, M.A.) seven surgeons performed 866 laparoscopic cholecystectomies between 1990 and 1995. Group I consisted of three surgeons who learn the procedure as part of their general surgery residency training. Whereas the remaining four surgeons representing Group II learned the procedure through private courses. Operative times and conversion rates were lower for cases done by surgeons from group I. The complication rates were higher for surgeons in group II. So there was a statistically significant difference in favor of surgeons who learned the procedure as part of a structured curriculum. These data suggest a long-lasting influence of the learning environment on the conversion rates and operative times¹¹.

The purpose of this study is also to evaluate the safety of elective laparoscopic cholecystectomy as a supervised teaching procedure. The peri-operative and post-operative complications as shown in table 2 in this series is not significantly high as compared to one study in Vienna, in which minor intra-operative complications were 40% and 46% in beginners¹². Chief resident experience with laparoscopic cholecystectomy in a study at Staten Island university hospital, New

York, USA, showed the overall complication rate of bile duct injury and leaks is 2 %¹³. In this study, CBD injury is only 0.37 % which is comparable to that reported in the current literature.

The study done at St. Antonius hospital, Nieuwegein, the Netherlands, reported that residents following a traditional surgical training perform laparoscopic cholecystectomy as quickly as and with the same conversion and complication rates as their teachers¹⁴.

Typical mishaps of laparoscopic surgery by laparoscopic surgeons are reviewed according to the literature. Set-up of the pneumoperitoneum (morbidity up to 0.2%), bleeding from trocar sites and vascular injury (mortality up to 0.2%), biliary leaks and bile-duct injuries (0.2% to 0.8%) are the main complications¹⁵. In this study vascular injury is 1.75% and bile-duct injury is 0.37%, which is comparable to the literature.

Intra-operative non-biliary injuries (duodenal perforation, diaphragmatic injury, small bowel injury, portal vein injury, liver laceration) during laparoscopic cholecystectomy occur as frequently as biliary injuries and can be life-threatening and difficult to manage¹⁶. The incidence of bowel injury is 0 to 5% in different series¹⁷. In this study the bowel injury is only 0.12%. Gallstone spillage during laparoscopic cholecystectomy is relatively common occurrence. These intra-peritoneal gallstones are considered to be harmless. Rarely, they may give rise to complications¹⁸. In this study, spillage of stones found in 0.12%.

The laparoscopic cholecystectomy can be performed safely by supervised residents acting as primary surgeon with outcomes similar to those obtained by trained attending surgeons¹⁹. In one local study, it is reported that proper selection of patients, two or more experienced surgeons operating together and low threshold for conversion to open procedure reduces the risk of serious complications in the learning phase of laparoscopic surgery²⁰. Elective laparoscopic cholecystectomy for symptomatic cholelithiasis done by post-graduate trainees under supervi-

sion does not increase surgical morbidity.

Conclusion:

Laparoscopic Cholecystectomy is integrated early in surgical training according to the concept "Observe, Assist, and then Operate under the assistance of an experienced laparoscopic surgeon". The introduction of clinical laparoscopic training into general surgery residency programs should influence the widespread adoption of this new procedure.

References:

1. Wilson RG. The results of laparoscopic cholecystectomy. In: Wilson RG editor. Practical Laparoscopic surgery. IMC Macintyre: Butterworth: Heine Mann 1999: 208-230.
2. Royston CM, Lansdown MR, Brough WA. Teaching Laparoscopic surgery: the need for guidelines. *BMJ*. 1994;308:1023-5.
3. Schauer PR, Page CP, Stewart RM, Schwesinger WH, Sirinek KR. The effect of Laparoscopic Cholecystectomy on resident training. *Am J Surg* 1994; 168: 566-70.
4. Sinha I, Smith ML, Safranek P, Dehn T, Booth M. Laparoscopic subtotal cholecystectomy without cystic duct ligation. *Br J Surg* 2007;94:1527-
5. Madan AK, Aliabadi-Wahle S, Tesi D, Flint LM, Steinberg SM. How early Laparoscopic treatment of acute cholecystitis. *Am J Surg* 2002; 183: 232-236.
6. Wang WN, Melkonian MG, Marshall R, Haluck RS. Post-graduate year does not influence the operating time in Laparoscopic Cholecystectomy. *J Surg Res*. 2001; 101 (1): 1-3.
7. Babineau TJ, Becker J, Gibbons G, Sentovic S, Hess D, Robertson S, Stone M. The "cost" of operative training for surgical residents. *Arch Surg*. 2004; 139(4):366-9.
8. Bridges, M. and Diamond, D.L. The financial impact of teaching surgical residents in the operating room. *Am. J. Surg*. 177:28, 1999.
9. Bhopal FG, Khan JS, Yusuf A, Iqbal W, Iqbal M. surgical audit of Laparoscopic cholecystectomy. *J Surg* 2007; 17-19: 13-19.
10. Gondal KM, Akhtar S, Shah TA, Experience of Laparoscopic cholecystectomy at Mayo Hospital, Lahore. *Annals* 2002; 8 (3): 216-18.
11. Ayerdi J, Wiseman J, Gupta SK, Simon SC. Training background as a factor in the conversion rate of laparoscopic cholecystectomy. *Am Surg*. 2001;67(8):780-5.
12. Imhof M, Zacheri J, Rais A, Lipovac M, Jakesz R, Fuegger R. Teaching laparoscopic cholecystectomy: do beginners adversely affect the outcome of the operation? *Eur J Surg*. 2002; 168(8-9): 470-4.
13. Ferzli GS, Fiorillo MA, Hayek NE, Sabido F. Chief resident experience with laparoscopic cholecystectomy. *J Laparoendosc Adv Surg Tech A*. 1997 Jun;7(3): 147-50.
14. Crolla RM, van Ramshorst B, Janeson A. Complication rate in laparoscopic cholecystectomy not different for residents in training and surgeons. *Ned Tijdschr Geneekd*. 1997; 141(14):681-5.
15. Shamiyeh A, Wayand W. Laparoscopic cholecystectomy: early and late complications and their treatment. *Langenbacks Arch Surg* 2004; 389 (3): 164-71.
16. Singh R, Kaushik R, Sharma R, Attri AK. Non-biliary mishaps during Laparoscopic cholecystectomy. *Indian J Gastroenterol* 2004;23(2):47-9.
17. Kum CK. Laparoscopic cholecystectomy for acute cholecystitis, is it really safe. *W J Surg* 1996; 2: 43-8.
18. Koe E, Suher M, Otugut SU, Ensari C, Karakurt M, Ozlem

- N. Retroperitoneal abscess as a late complication following laparoscopic cholecystectomy. *Med Sci Monit* 2004; 10 (6): CS27-CS29.
19. Atabek U, Spence RK, Pello MJ, Alexander JB, Villanueva D, Camishion RC. Safety of teaching laparoscopic cholecystectomy to surgical residents. *J Laparoendosc Sur.* 1993 Feb 3(1): 23-6.
20. Zafar A, Hassan H, Yousuf A, Syed R. Laparoscopic complications in the learning phase: Our experience in the first 75 cases. *Pak J. Med Sci.* Jan-Mar 1999; 15(2): 91-96.