

Comparison in Terms of Postoperative Morbidity and Hospital Stay between Open Cholecystectomy and Laparoscopic Cholecystectomy

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Abstract

Type of study: Comparative.

Aim: To compare the postoperative morbidity in terms of post-operative pain, gait disturbances, wound and respiratory infections along with length of hospital stay in patients undergoing laparoscopic cholecystectomy with those undergoing open surgery for symptomatic gallstone disease to compare the effectivity of minimally invasive surgery with open surgery in reducing postoperative morbidity and thus length of hospital stay.

Place and duration of study: Surgical Unit Khyber Teaching Hospital, Peshawar, Pakistan; from July 2006 to December 2006.

Materials and methods: This study included a total of 50 patients who underwent either open or laparoscopic cholecystectomy in our unit (SDW KTH). Their clinical data, admission dates and date of surgery were noted. Postoperative progress was followed and requirement of analgesia, nausea, vomiting, febrile morbidity, wound infections and respiratory tract infections, if any were noted. Their date of discharge from hospital was also recorded. Re-admission (if any) for any complication of surgery was noted and further days spent in hospital were recorded. This data was analyzed to see the post-operative morbidity and length of hospital stay in these patients.

Results: Out of the 50 patients included in this study, the mean hospital stay for the patients who underwent laparoscopic cholecystectomy was 2.06 days as against 3.93 days for those having open surgery for symptomatic gallstone disease. Also pain (and thus analgesia requirement) and other complications were significantly lower for the patients who had minimally invasive surgery indicating the superiority of laparoscopic technique as regards postoperative hospital stay and morbidity.

Conclusion: Minimally invasive surgery is in fact very effective in reducing postoperative morbidity and thus hospital stay in patients with gallstones. Although open cholecystectomy is still performed in our hospitals, the time is near when it will be largely replaced by the laparoscopic technique.

Keywords: Laparoscopic cholecystectomy; minimally invasive surgery; open cholecystectomy; hospital stay.

INTRODUCTION

Cholecystectomy is one of the most frequently performed operations. Open cholecystectomy (OC) has been the gold standard for over 100 years. Laparoscopic cholecystectomy (LC) was introduced in the 1980s.¹ Since its foundation, laparoscopic cholecystectomy has become the procedure of choice for symptomatic gallstone disease.² Although both of these procedures are fairly well tolerated, wound infection remains the most common postoperative complication which not only prolongs hospital stay, increases cost of treatment but can also lead to long-term complications.³ LC is highly praised and demanded by patients due to less pain, shortened hospital stay and diminished disability. LC abolishes the trauma and transient ileus that follows open surgery, thus patients are free of postoperative pain and there is requirement of analgesia.⁴ A minimal impact on immune system, minimal exposure to external environment, carbon dioxide pneumoperitoneum, better visualization of tissues for dissection and hemostasis reduces the frequency of infections and other morbidity in patients undergoing LC.³ Thus, aim of this study was to observe and compare the postoperative morbidity in terms of pain, GI upsets,

wound infections and duration of hospital stay in patients undergoing LC and OC.

MATERIALS AND METHODS

This study was conducted in Surgical D Unit Khyber Teaching Hospital, Peshawar from July 2006 to December 2006. One hundred two symptomatic cases of gallstone disease presented to the unit in these 6 months out of which 50 cases were included in the study as the rest did not fit into the inclusion criteria and were thus excluded. Inclusion criteria was: (1) Patients with symptomatic gallstone disease only, (2) Patients with normal or near normal BMI (up to 10 kg over the ideal BMI was considered near normal), (3) Non-pregnant. Exclusion criteria included: (a) Past history of surgery especially in the upper abdomen, (b) Diabetes mellitus or any other co-morbid condition, e.g. hypertension, CAD/IHD, peripheral vascular disease, chronic lung condition, etc. which may hamper postoperative progress, (c) Patients using oral contraceptives, steroids or any other medication which may have a bearing on the postoperative recovery.

Patients admitted both as emergency and OPD were included and their clinical data was obtained on pre-formed proformas. Their date of admission, date of surgery and the surgical procedure they underwent were noted. All operations were performed by senior consultant surgeons or senior residents under supervision. Postoperatively the patients were followed for their requirement of analgesia, time of mobilization, tolerance of oral feeds, signs of infection (e.g. fever, chest infection, wound infection) and their date of discharge from hospital was also recorded. The patients were followed for upto 4 weeks for any complications. From this data mean hospital stay, frequency of analgesic requirement, chest infection, febrile morbidity, mobilization and discharge with return to activity were calculated to compare the difference between the two groups. Most important parameter that was closely followed was wound infection in the two groups. Wound infection was graded as follows:

1. *Grade I*: skin and superficial subcutaneous tissue infection only requiring wound dressing.
2. *Grade II*: Deep subcutaneous tissue infection requiring antibiotics, drainage of pus and dressings with prolonged hospital stay.
3. *Grade III*: Widespread infection or systemic infection requiring hospitalization and I/V antibiotics.

RESULTS

Hospital Stay

Out of the 50 patients who were included in the study, 15(30%) patients underwent open surgery, 31(62%) had laparoscopic cholecystectomy and 4(8%) patients were those in which an attempt at laparoscopic cholecystectomy was made which failed

and they were converted to open cholecystectomy. Of these 2 patients had severely distorted anatomy of the Calot's triangle making dissection impossible, and in 2 cases there was iatrogenic injury to the cystic artery and cystic duct (1 case each).

Thirty-one patients had laparoscopic cholecystectomy, out of which 7 (25.9%) patients had a 1 day postoperative hospital stay, 14 patients (45.16%) stayed 2 days in the hospital, 7 (25.9%) had a 3 days hospital stay, 2 (7.4%) had 4 days stay, and only 1 (3.7%) had a 5 days stay in the hospital (this patient had a slight biliary leak which stopped by itself by the 5th postoperative day). The mean hospital stay in these patients thus came out to be 2.06 days. The patients who underwent open surgery had a 2-day hospital stay in only 1 patient (6.66%), 4 patients (26.6%) stayed 3 days in the hospital, 6 (40%) had a stay of 4 days, and 3 (20%) had a hospital stay of 5 days. Only 1 patient stayed for 6 days in the hospital (6.66%). The mean in this group came out to be 3.93 days of postoperative hospital stay, which is significantly higher than the laparoscopy group. The 4 cases converted to open from laparoscopic form showed variable lengths of hospital stay, i.e. 1 had a 5 day stay, 7 days in two and 25 days in one patient. Mean stay came out at 11.25 days in this group. Only the patient who had iatrogenic injury to the cystic duct had a prolonged hospital stay of 25 days and even she was discharged on the 6th postoperative day, but she returned a day later with biliary leak from wound site and had to be re-admitted. Except this, all the rest had uneventful postoperative recoveries with no complications.

Postoperative Morbidity

The other parameters of postoperative progress that we considered also showed a clear advantage of LC over OC. Pain was significantly lower in the LC group with 18 patients (58.06%) having mild pain, 12 (38.7%) having moderate pain and only 1 case (3.22%) complaining of severe pain requiring analgesia for 2 days. Severe pain requiring prolonged analgesia was seen in 3 cases (15.7%) of OC, 14 (73.68%) having moderate pain and 2 (10.5%) having mild pain. Fever was noted in 5 cases of OC (26.31%) as against only 1 case (3.22%) of LC. Wound infection was not seen in any patients with LC and 11 cases (57.8%) of OC, whereas 2 cases (10.5%) of OC showed grade 1 infection and 1 case each (5.2%) of grade 2 and 3 infections were seen. 4 cases of OC (21%) and 2 cases (6.45%) showed mild chest infection. Mild GIT disturbances (nausea, vomiting, etc.) were seen in all patients in the immediate postoperative period and in no case later than 6 hours post-op. 3 patients (15.7%) with OC had prolonged vomiting and required I/V anti-emetics.

DISCUSSION

Gallstones are a major cause of surgical morbidity as well as admissions.⁵ The estimated prevalence of GS disease in Pakistan is 15%⁶ and may be responsible for 22% admissions in a surgical unit.⁷

Since the introduction of laparoscopic cholecystectomy (LC) in 1987, numerous advances have been made in the technique. LC has been shown to be safe for the emergency treatment of acute cholecystitis.⁸ In this era of increasing minimally invasive surgery, conversion to open in cases of difficult dissection may prove a difficult task for the exclusively laparoscopic surgeon.⁹

Age is one of the critical factors affecting the morbidity and mortality rates after open cholecystectomy in both acute and chronic cholecystitis (Table 1).^{10, 11} Increasing age in patients undergoing open cholecystectomy has been associated with increased length of hospital stay as well (Table 2).¹² In a retrospective study by Jatzko GR, Lisbog PH and associates age has been identified as the only significant factor in increasing the morbidity rate after laparoscopic cholecystectomy as well (Table 3).¹³ Julio Mayol and his associates have, however, shown that Laparoscopic cholecystectomy is safe in the aged (even above 70 years) for symptomatic gallbladder disease and is associated with a short hospital stay, low rates of readmissions and recurrent biliary surgery.¹⁴ Age has never been a contraindication for laparoscopic cholecystectomy,¹⁵ although initially this approach was reserved for low-risk patients.¹⁰

In addition to the traditional four-port technique, three trocars (ports) and even two trocars are used to perform LC^{16,17} along with using mini-instruments, authors of these new techniques claim that these techniques take a similar time to perform and cause less postoperative pain than the standard laparoscopic cholecystectomy.^{16,18}

Trihac in his prospective trial addressed the safety and advantages of the three port technique in terms of analgesia requirement¹⁹ and found no improvement in the postoperative hospital stay. In a comparison study by Dhafir Al-Azawi and associates Diclofenac and pethidine were the most commonly used postoperative analgesics prescribed after LC.²⁰ Patients who underwent three-port LC needed lesser pethidine than those who underwent four-port LC however diclofenac use did not relate to the technique used.²¹ The operating time was also lower in the three-port technique. So the introduction of the three-port technique means patients need fewer pain-killers, shorter hospital stays (2.8 vs 3.7), fewer scars and most cost savings; it has however its own shortcomings and should only be attempted by experienced surgeons.²¹

Our study also reports a very low incidence of postoperative complications. However, despite the fact that we have reported a very low complication rate, there is always an element of doubt as regards patient feedback. This may be secondary to many reasons, e.g. (1) Most of the patients presenting to KTH come from far flung areas, especially from Afghanistan, with poor access to tertiary care facilities so that some may have reported to local doctors if/when any complication arose, (2) general habit of ignoring mild/moderate problems due to financial and/or social limitations.

U Berggren and associates had noted that although laparoscopic cholecystectomy has rapidly become established as the treatment of choice for cholelithiasis there is very little evidence to support the claimed benefit to patients and they tried, with success in their study to prove its effectiveness as in their study the mean duration of hospital stay and sick leave was significantly longer in patients who underwent open surgery for GS.²² Same results have been obtained in our study.

J Wenner and his associates compared the financial aspects of both these procedures and reported a 10% lower hospital cost in patients who had laparoscopic surgery with lesser number of days off work (14 versus 35 in open cholecystectomy) showing laparoscopic cholecystectomy to be more cost-effective.²³ Although we did not compare the costs of these two procedures, the reduced hospital stay itself is an indicator of its cost-effectivity (as patients spend lesser time and thus lesser resources in the hospital and report back earlier to their jobs). However, Kory Jones and his associates argued that surgeons should feel comfortable in converting from laparoscopic to open cholecystectomy in cases of tedious dissection as it does not

TABLE 1: Age and sex distribution

Charachteristic		Open cholecystectomy n = 19(15+4*)		Laparoscopic cholecystectomy n = 31	
		No.	%	No.	%
Sex	Male	3	15.7	3	15.7
	Female	16	84.2	28	90.3
Age	< 20 years	0	0	2	6.45
	21-30 years	1	5.2	3	9.6
	31-40 years	8	42.1	13	41.9
	41-50 years	9	47.3	10	32.25
	51-60 years	1	5.2	2	6.45
	> 60 years	0	0	1	3.22

*Cases converted to OC after failed attempt at LC.

TABLE 2: Hospital stay

No. of days	Open cholecystectomy n = 19(15+4*)		Laparoscopic cholecystectomy n = 31	
	No. of cases	%	No. of cases	%
Day care	0	0	7	22.58
1-2 Days	1	5.2	14	45.16
2-3 Days	4	21	7	22.58
3-4 Days	6	31.5	2	6.45
4-5 Days	4 (3+1*)	21	1	3.22
>5 Days	4 (1+3*)	21	0	0

*Cases converted to OC after failed attempt at LC.

TABLE 3: Postoperative morbidity

Characteristic		Open cholecystectomy n = 19(15+4*)		Laparoscopic cholecystectomy n=31	
		No. of pts.	%	No. of pts.	%
Pain	Severe	3	15.7	1	3.22
	Moderate	14 (10+4*)	73.68	12	38.7
	Mild	2	10.52	18	58.06
Fever		5	26.31	1	3.22
Wound infection	Nil	11	57.89	0	0
	Grade I	2	10.52	0	0
	Grade II	1	5.2	0	0
	Grade III	1	5.2	0	0
Chest infection		4	21.05%	2	6.45%
GIT disturbances Vomiting		3 cases of severe	15.7%	Nil	Nil

*Cases converted to OC after failed LC.

prolong the hospital stay much.²⁴ Theodoros Syrakos and associates however argued that mini-laparotomy (small incision) technique was better than both open and laparoscopic cholecystectomy showing that morbidity was similar in both open and laparoscopic groups in their study (3.8%) while it was only 0.8% in the mini-lap group. Operating time was also significantly shorter (46 mins) in this group as compared to open and LC (61 mins). Hospital stay was longer for open cholecystectomy group but a very small difference was seen in the LC and mini-lap patients (2.5 vs 2.7 days). They thus questioned whether the claimed benefits of laparoscopic cholecystectomy were enough to justify the use of this procedure which has a significantly higher cost.²⁵

Although we have established the reduced hospital stay after laparoscopic cholecystectomy in our patients, an analysis of its cost-effectiveness is necessary especially taking into account the limited resources our people have.

CONCLUSION

As evidenced by our results and results of papers published elsewhere, laparoscopic cholecystectomy does indeed have a significant bearing on smoother postoperative progress of the patient, requiring lesser analgesia and causing earlier mobilization and earlier discharges from hospitals. Thus, laparoscopic cholecystectomy should be considered as the procedure of choice in patients with symptomatic gallstone disease as it decreases postoperative morbidity and hospital stay significantly.

ABBREVIATIONS

<i>Pre-op:</i>	Preoperative
SDW-KTH	: Surgical D Ward, Khyber Teaching Hospital
GIT	: Gastrointestinal tract
BMI	: Body mass index
CAD	: Coronary artery disease
IHD	: Ischemic heart disease
DM	: Diabetes mellitus
HTN	: Hypertension
PVD	: Peripheral vascular disease
CLD	: Chronic lung disease
OC	: Open cholecystectomy
LC	: Laparoscopic cholecystectomy
GS	: Gallstones
GB	: Gallbladder

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