

# SURGICAL AUDIT OF LAPAROSCOPIC CHOLECYSTECTOMY AT THE JORDANIAN ROYAL MEDICAL SERVICES HOSPITALS

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## ABSTRACT

**Objective:** To assess the achieved quality level of laparoscopic cholecystectomy in the Royal Medical Services hospitals after 13 years from its application in treatment of gallstone disease, and to compare this with the quality level of laparoscopic cholecystectomy in widespread use.

**Methods:** During the period from the 1<sup>st</sup> of January 1995 to the 31<sup>st</sup> of May 2004, 1410 patients underwent laparoscopic cholecystectomy by one out of eight surgical teams. These patients were enrolled in a retrospective analysis. Data were collected in the following categories: individual patient data, risk factors, preoperative work up, intra-operative findings, intra-operative complications, operative time, histopathological findings, and postoperative course and complications. Results were compared with recent similar worldwide data.

**Results:** Out of the 1410 patients, 1125 (79.8%) were females and 285 (20.2%) were males. Age ranged between 12 and 90 years with a mean of 46.7. Average weight for females was 70.5 kg and 80.6 kg for males. Operative time ranged between 25 to 126 minutes with a mean of 56 minutes. Intra-operative complication rate was 34.3%. Most of them were minor and only 1.9% needed conversion to conventional cholecystectomy. In 65 patients (4.6%) laparoscopic cholecystectomy was converted to conventional open cholecystectomy. Conversion rate was related to sex and histopathological diagnosis with a high statistical significance. Postoperative complications occurred in 83 patients (5.9%). Histopathological diagnosis was chronic cholecystitis in 1252 patients (88.8%), acute cholecystitis in 149 patients (10.6%) and adenocarcinoma of the gall bladder in 9 patients (0.64%). There were no mortalities. Data compared favorably with worldwide similar data.

**Conclusion:** Laparoscopic cholecystectomy as a gold standard procedure in the treatment of gall bladder stone related disease has reached a high quality level in the Royal Medical Services hospitals compared to that in worldwide use.

**Key words:** Laparoscopic, Cholecystectomy, Surgical, Audit.

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## Introduction

The first laparoscopic cholecystectomy (LC) in the Royal Medical Services (RMS) hospitals was done on June 1991 at Queen Alia Military Hospital, one of RMS hospitals. Since that time LC has become the gold standard for the treatment of symptomatic gall stone disease even in complicated cases. It is necessary after

this time from applying LC to assess the achieved quality level in the RMS hospitals. To do so the following quality parameters were used: Intra-operative complications, conversion rate (CR) to open cholecystectomy (OC), postoperative complications, re-operation rate, and post-operative mortality. Results were compared with the worldwide quality level of LC.

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## Methods

During the period from the 1<sup>st</sup> of Jan. 1995 to the 31<sup>st</sup> of May 2004, 1410 patients underwent LC. They were enrolled in a retrospective analysis. The analyzed data include: individual patient data, risk factors, preoperative work up, intra-operative findings, intra-operative complications, operative time, histopathological findings, postoperative course and complications.

It should be made clear that these 1410 patients were not the only patients who underwent LC at the RMS hospitals during the above-mentioned period, but they were the patients who were operated upon by one of the RMS surgical teams.

Surgery was done under general anesthesia. The surgical technique was the same for all patients. A one-centimeter incision was made under the umbilicus. The abdominal wall was elevated by the hands of the surgeon and the assistant, and a 10-millimeter trocar was introduced to the peritoneal cavity blindly. Veress needle was not used to induce pneumo-peritoneum. The telescope was introduced through this infra-umbilical trocar to check its position in the peritoneal cavity before carbon dioxide inflation. Pneumo-peritoneum was maintained at a pressure of 10 mmHg. The peritoneal cavity was explored by the telescope. Another three trocars were introduced in the upper abdomen, a 10-millimeter one in the epigastric area, and two 5-millimeter trocars in the right hypochondrium. The Calot's triangle was dissected using pointed tip diathermy hook. The cystic artery then the cystic duct were identified, clipped using titanium clips and then transected. The gall bladder was dissected from its liver bed and extracted through the epigastric wound. A small negative suction drain was left in the bed of gall bladder in 141 (10%) of patients to prevent collection when there was acute inflammation and the operative field is not completely clean. Operative cholangiography was not done laparoscopically to any of the patients.

## Results

Of the 1410 patients, 1125 (79.8%) patients were females while 285 (20.2%) were males. Their age ranged between 12 and 90 years with a mean of 46.7. The average weight for females was 70.5 kg, and for males was 80.6 kg. According to the

American Society of Anesthesiologists score (ASA) patients were classified into: ASA 1: 66.1%, ASA 2: 32.2%, ASA 3: 1.7%, and none of them was ASA 4. Indications for surgery were symptomatic cholecystolithiasis 78%, acute calculus cholecystitis 16%, asymptomatic cholecystolithiasis 1%, and biliary Pancreatitis 5%. Preoperative investigations included abdominal ultrasonography, complete blood count, blood grouping, liver and kidney function tests, chest

X-ray, and electrocardiography. Preoperative endoscopic retrograde cholangio-pancreatography (ERCP) was done for 113 patients (8%). Operative time ranged between 25 and 126 minutes with a mean of 56 minutes. Intra-operative complications are shown in Table I. The commonest one was injury of the gall bladder wall during dissection with or without loss of stones, it occurred in 240 (17%) patients. The second commonest was intra-abdominal bleeding from the cystic artery or from the liver bed. Bleeding occurred in 179 (12.7%) patients, in 88.27% (158) of them it was managed laparoscopically and only in 11.73% (21) of them the procedure had to be converted to OC to control the bleeding. Injury of the common bile duct (CBD) occurred in one patient (0.07%).

**Table I.** Intra-Operative Complications.

| Intra-Operative Complications                | Number of Patients | Percent |
|--|--------------------|---------|
| Bleeding during incorporation of trocars     | 29                 | 2       |
| Injury of the gall bladder during dissection | 240                | 17      |
| Loss of the gall bladder stones              | 36                 | 2.6     |
| Intra abdominal bleeding                     | 179                | 12.7    |
| Common bile duct (CBD) injury                | 1                  | 0.07    |

The Procedure was completed in 95.4% of patients and converted to conventional OC in 4.6% of them. Causes for conversion are shown in Table II. Conversion rate was found to be related to patient sex. It was 3.3% in females and 9.8% in males as shown in Table III. Conversion rate was also found to be related to the histopathological diagnosis as shown in Table IV. Using Chi-square test, a highly significant statistical relation was found in the relation of CR to sex and histopathological diagnosis with a  $p < 0.01$ .

Postoperative complication occurred in 83 (5.9%) patients, 75% of these complications were mild, see Table V.

There were no mortalities in this study.

**Table II.** Cause of conversion from laparoscopic to open cholecystectomy.

| Causes of Conversion                          | Number of Patients | Percentage |
|---|--------------------|------------|
| Difficult dissection in the triangle of Calot | 24                 | 1.7        |
| Bleeding                                      | 21                 | 1.5        |
| Difficult gall bladder wall dissection        | 20                 | 1.4        |
| Total number                                  | 65                 | 4.6        |

**Table III.** Conversion rate related to gender.

| Sex     | Conversion Rate |
|---------|-----------------|
| Females | 3.3%            |
| Males   | 9.8%            |

**Table IV.** Histopathological diagnosis and its relation to conversion rate.

| Histopathological Diagnosis        | Percent | Conversion Rate |
|------------------------------------|---------|-----------------|
| Chronic cholecystitis              | 88.78   | 3%              |
| Acute cholecystitis                | 10.58   | 16.8%           |
| Adenocarcinoma of the gall bladder | 0.64    | 22.22%          |

**Table V.** Postoperative complications.

| Post-Operative Complications                        | Number of Patients | Percentage |
|---|--------------------|------------|
| Mild wound infection                                | 30                 | 2.13       |
| Incisional hernia                                   | 18                 | 1.3        |
| Wound hematoma                                      | 15                 | 1.06       |
| Bile leak   | 12                 | 0.85       |
| Acute pancreatitis                                  | 6                  | 0.43       |
| Chronic wound infection due to retained gall stones | 2                  | 0.14       |
| Total number  | 83                 | 5.9        |

## Discussion

With the introduction of a new technique specific measures are required to evaluate this technique and its efficacy and safety and this is called quality management.

Quality management is a prerequisite of modern health care concerning cost bearers, service provider, and patients themselves.<sup>(1)</sup> Quality management answers two important questions: first, does the new method provide an improvement over the traditional one? Second, are there any differences between various users of this new method?

In surgery this means: it clarifies whether a specific procedure is justified in the treatment of a surgical disorder, (i.e. it is an efficient & safe procedure), and further it clarifies if this procedure is used in the right hands (i.e. well trained & qualified surgeons).<sup>(1)</sup> This knowledge is important when a new technique is confronted with a criticism and as starting point for quality improvement.<sup>(2)</sup>

In this study we used the following quality parameters: intra-operative complications, conversion rate of LC to OC, postoperative complications, re-operation rate, and post-operative mortality.<sup>(3,4)</sup> Conversion rate was used as a parameter because conversion of LC to OC is associated with longer hospital stay, more postoperative pain, later return to normal activities, and worse

cosmetics as proved by many studies. These are the most important end points in the patients' opinion.<sup>(5,6)</sup>

In this study, Veress needle was not used to inflate the peritoneal cavity with carbon dioxide. Instead a sharp-tipped metallic reusable trocars (the tips of which remain out during incorporation) were used directly. This caused mild bleeding in 2% of patients that was stopped spontaneously. Injury to any of the intra-abdominal organs was not reported. This was explained by the very careful elevation of the patients' anterior abdominal wall by the hands of the surgeon and his assistant during insertion of the trocar. In literature, Veress needle or trocar insertion caused intra abdominal organ injury in 0.1- 0.4%,<sup>(7)</sup> Yerdel MA *et al* found that direct insertion of shielded disposable trocars had much less complications than insertion of Veress needle (0.9% versus 14.4%).<sup>(8)</sup>

In literature perforation of the gall bladder and spillage of gall stones occurred frequently (32% and 20% respectively). In spite of that complications related to lost gallstones occurred in sporadic case reports. The cause of this low incidence of complications is the copious irrigation of the operative field.<sup>(9)</sup> This was supported by the findings of Z'graggen *et al* from Switzerland where a perforation rate and lost stones rate were found to be 16% and 5.7% respectively.<sup>(10)</sup> In this study the perforation of the gall bladder and gall stones spillage occurred in 17% of cases, most probably due to the use of the pointed tip diathermy hook for dissection. Gall bladder perforation was managed by suctioning of spilled bile, retrieval of the spilled stones and peritoneal wash by copious amounts of isotonic saline. Patients with lost stones were covered by intravenous antibiotics during the first postoperative day followed by an oral antibiotic for few days. There were no late complications from these lost stones.

Intra-operative bleeding leading to conversion of LC to OC was reported to occur in 0.22%-0.9% of patients.<sup>(11,12)</sup> This happened in 1.5% of patients of this study; again the use of the pointed tip diathermy hook can be accused to be responsible of this higher rate.

Incidence of biliary tract injuries in LC was reported to be in the range between 0.2% and 0.4%.<sup>(7,10,13,14)</sup> Most of major bile duct injuries were not detected intra-operatively because of the basic misconception.<sup>(7,10)</sup> Biliary tract injury in conventional OC ranges between 0.1% and 0.2%<sup>(15-18)</sup> and up to 0.3% in other studies.<sup>(19)</sup> By having high conversion rate and high rate of duct injury after conversion in their series; M-T Cheung *et al* wonder whether laparoscopic surgery actually reduces the incidence of duct injury compared to open surgery; they believed that the so-called "difficult cholecystectomy" would be difficult in the laparoscopic as well as in the open approach.<sup>(13)</sup> Biliary tract injuries, like most other technical complications of laparoscopic surgery, most commonly occur early in

the experience of the laparoscopic surgeon.<sup>(7)</sup> In the Southern Surgeons Club report in USA, the bile duct injury rate was 2.2% in the first 13 cases of any participant's experience, compared with 0.1% after the 13<sup>th</sup> case.<sup>(20)</sup> Z'graggen *et al.* in Switzerland found a significant decrease of common bile duct injury rates as laparoscopic experience increase. The decrease was noted particularly in patients operated upon by surgeon who performed more than one hundred laparoscopic cholecystectomies.<sup>(10)</sup> In this study common bile duct (CBD) injury occurred in one patient (0.07%) in the hands of a junior surgeon in his first case un-attended by a senior surgeon. The injury was recognized in the first postoperative day where a sub hepatic drain drained out large amount of bile. ERCP showed complete cut of the CBD. The injury was managed by Roux-en-Y hepatico-jejunostomy in the second postoperative day; the patient has been doing well for the last five years.

In the treatment of biliary tract injuries, Hepatico-jejunostomy has 95% initial success rate and 100% final success rate.<sup>(21)</sup> Diathermy hook dissection was considered a dangerous instrument that could increase the chance of an irremediable bile duct injury.<sup>(11)</sup> This was disproved by the results of this study.

Conversion of LC to OC occurred in approximately 4-5% of cases.<sup>(7)</sup> In the early reports from the Netherlands by Go *et al*, conversion rate was 6.8%.<sup>(19)</sup> In 1994 Collet D. from France reported conversion rate of 6.9%.<sup>(22)</sup> Edward HL *et al.* reported conversion rate range from 5% to 10% in USA.<sup>(23)</sup>

High rates up to 12.4% were reported in Hong Kong.<sup>(13)</sup>

In most reports indications for conversion were almost the same with slight differences in their percent. Conversion rate in this study was 4.6%; it was mainly due to difficult dissection in the Calot's triangle, difficult dissection of the gall bladder or due to uncontrolled bleeding. As expected and proved by many studies conversion rate was higher in acute cholecystitis and malignancy of the gall bladder.

In male patients; LC is expected to be more difficult than in female patients. This is supported by the finding of this study that conversion rate in male patients is three time more than in female patients ( $p < 0.01$ ). Presumably men are more reluctant than women to seek medical attention, so at time of surgery they have developed more adhesions and scarring leading to conversion of LC to OC.<sup>(11)</sup> Risk factors leading to conversion of LC to OC were studied and found to be: choledocholithiasis with cholelithiasis, acute cholecystitis, obesity, the presence of associated malignancy, psychiatric disorders, and male sex.<sup>(23,24)</sup> In patients with acute cholecystitis whose symptoms are present for less than 96 hours, conversion rate was comparable to that in patients with elective

cholecystectomy and rises sharply after that point.<sup>(23)</sup> Understanding these risk factors allows surgeons to provide accurate information with improved consent to patients at highest risk for conversion, and result in quicker recognition that conversion is required, avoiding long operating times and complications.<sup>(25)</sup> It should be stressed that conversion of laparoscopic procedure to open one when indicated must not be considered a mistake or failure but only a safe completion of the operation.<sup>(11)</sup>

Postoperative complications rate in this study was low (5.9%), which is comparable to the rates in large worldwide studies.<sup>(10)</sup> Most of the complications (4.5%) of this study were mild. The cases of pancreatitis were managed successfully by conservative measures. After exclusion of biliary tract injury, postoperative bile leak that occurred in 0.85% of our patients was managed successfully by: ultrasound guided drainage, intravenous antibiotics for few days, and ERCP and sphincterotomy of sphincter of Oddi.

Although this study did not report any mortality, international literature reported mortality rate range between 0.12% and 0.5% (19, 22).

## Conclusion

Laparoscopic cholecystectomy as a gold standard procedure in the treatment of gall bladder stones related disease has reached a high quality level in the Royal Medical Services hospitals compared to that in worldwide use.

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