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The Laparoscopic Challenge of Cholecystitis

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ABSTRACT

Objective: To evaluate the efficacy of laparoscopic cholecystectomy (LC) in acute and chronic cholecystitis and compare it with the open procedure.

Methods: This is a 5-year retrospective analysis performed at our hospital. Surgical treatment of gallbladder disease was performed in 1003 patients. Acute cholecystitis was present in 120 (11.9%) patients, and chronic cholecystitis was present in 830 (88.1%). Acute patients underwent surgery within 72 hours of symptom onset. The patients selected for LC or open cholecystectomy (OC) depended on the severity of disease, comorbid factors, and surgeon's preference. We reviewed age, sex, operating time, length of stay, perioperative complications, conversion rates, and cost.

Results: Patients chosen to undergo LC for acute cholecystitis tended to be younger females. Patients treated with LC for acute or chronic cholecystitis on average had a shorter operating time and length of hospital stay when compared with patients treated with OC ($P < 0.005$ by ANOVA with Bonferroni).

Conversion rates (CR) for all LC decreased considerably from the first to the fifth year: 9% in 1995 (10/103), 9% 1996 (22/232), 4% in 1997 (8/188), 2% in 1998 (5/226) and 2% in 1999 (5/193).

Conclusions: LC appears to be a reliable and cost-effective procedure for acute and chronic cholecystitis; however, the surgical approach should be chosen with caution because of the potential spectrum of technical difficulties. CR is also improving as surgeons' experience broadens.

Key Words: Laparoscopy, Laparoscopic cholecystectomy, Cholecystitis.

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INTRODUCTION

Laparoscopic cholecystectomy (LC) has clearly become the choice over open cholecystectomy (OC) for treating hepato-biliary disease since the introduction of LC by Mouret in 1987. The use of laparoscopy in cholecystectomy can reduce surgery time and hospital stay.[1]

Our previous study[2] demonstrated the safety and the potential hazards of LC in acute cholecystitis because of the technical challenge presented by the presence of edema and inflammation. Several studies have reported varying results.[3-6] This longitudinal study evaluates a series of consecutive patients with acute and chronic cholecystitis who were treated with LC or OC and assesses the outcomes of both techniques.

METHODS

We report a retrospective analysis of the charts of 1003 patients treated for gallbladder disease at North Oakland Medical Centers from January 1, 1995, to January 1, 2000. We defined acute cholecystitis by the acuity of clinical symptoms (24 to 72 hrs), physical findings of right upper quadrant tenderness, guarding or rebound, laboratory data showing leukocytosis ≥ 12,000/mL, intraoperative gross morphologic findings of acute cholecystitis and histologic findings of neutrophil infiltration, edema, necrosis, or microperforation.

We divided the patients into the following 4 groups based on their diagnosis and treatment modality: acute cholecystitis treated by LC, acute cholecystitis treated by OC, chronic cholecystitis treated by LC, and chronic cholecystitis treated by OC.

These groups were compared on the basis of mean age, male/female ratio, operation time, length of hospital stay, hospital costs, and conversion rates from LC to OC when applicable.

For statistical comparative analysis among the groups, ANOVA and Bonferroni were used for the age, length of hospital stay and operation time; Mann-Whitney for the sex ratio; and chi-square for the conversion rate.

RESULTS

Of the 1003 patients reviewed, 201 were males and 802 were females. As expected, more female patients had gallbladder disease overall, but no statistical difference was delineated when the groups' ratios were tested by Mann-Whitney. The overall age, expressed as mean ± SD, was 48 ± 17 years, and no statistical difference was observed in age among the 4 groups by ANOVA.

One hundred twenty (11.9%) patients had acute cholecystitis. Of these, 110 (10.9%) had acute calculous cholecystitis, and 10 (1%) had acute acalculous cholecystitis. Eight hundred eighty-three patients (88.1%) had chronic cholecystitis. Of these, 727 (72.5%) were diagnosed as chronic calculous cholecystitis and 156 (15.6%) with chronic acalculous cholecystitis.

LC was initiated in 94 patients with acute cholecystitis. Of these, 76 cases were successfully completed, and 18 required conversion to OC. The reasons for conversion to an open procedure in acute cholecystitis was severe inflammation creating potential technical hazards in 14 patients (77%), laceration of the liver with bleeding in 2 patients (11%), and adhesions in 2 patients (11%). Twenty-six patients had OC primarily due to the surgeon's preference for the open procedure because of lack of experience in laparoscopy. In the chronic cholecystitis group, 883 underwent LC, of which, 825 procedures were successfully completed and 32 were converted to OC. The reason for conversion to an open procedure in the chronic cholecystitis group was laceration of the liver with bleeding in 9 (28%) patients; adhesions in 13 (40%); and poor visualization due to abnormal anatomy, body habitus, and other factors in 10 (32%). OC was performed in 26 patients with chronic cholecystitis primarily again due to the same reasons as mentioned above **(Figure 1)**.

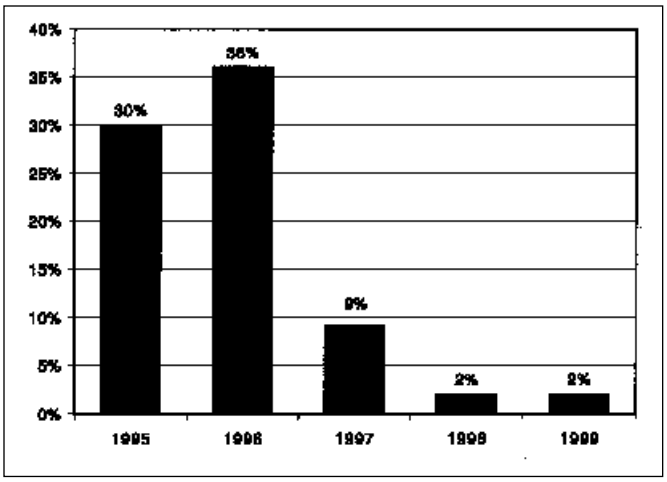

Figure 1. Graph depicting the conversion rates from laparoscopic cholecystectomy (LC) to open cholecystectomy (OC) over the 5 years of the study.

Table 1 provides the operating times, lengths of hospital stay, and conversion rates for all 4 groups. The operating times over the first 2 years for the LC procedure for both acute and chronic cholecystitis was high but decreased over the next 3 years resulting in a lower average operating time. The operating times for the OC group for both acute and chronic cholecystitis was longer for the

Table 1.

Procedure	OR Time (min) (mean ± SD)	LOS (days)	Conversion (%)
AC (LC) n = (94)	132 ± 37	2.43 ± 1.94	18 cases (22%)
AC(OC) n = (26)	157 ± 55	9.28 ± 3.7	NA
CC(LC) n = (883)	112 ± 33	2.06 ± 1.73	32 cases (5.5%)
CC(OC) n =(26)	156 ± 58	7.21 ± 3.6	NA

procedures that were converted to open from the LC group. The operating times for patients who primarily received OC were relatively consistent. LC had a significantly shorter operating time than OC in the acute and chronic groups ($P < 0.05$ by ANOVA) despite the fact that the patients who were converted to an open procedure from LC were deleted for the analysis.

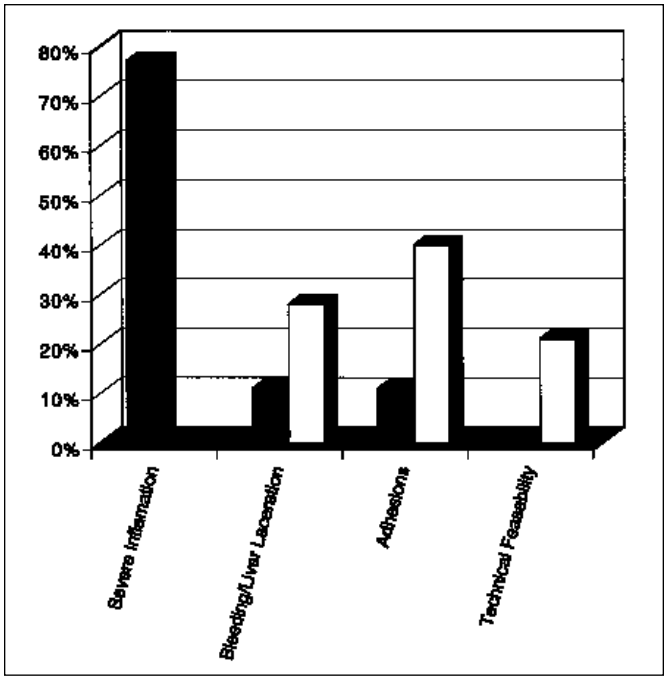

Figure 2. Graph depicting the most common reasons for conversion from laparoscopic cholecystectomy (LC) to open cholecystectomy (OC).

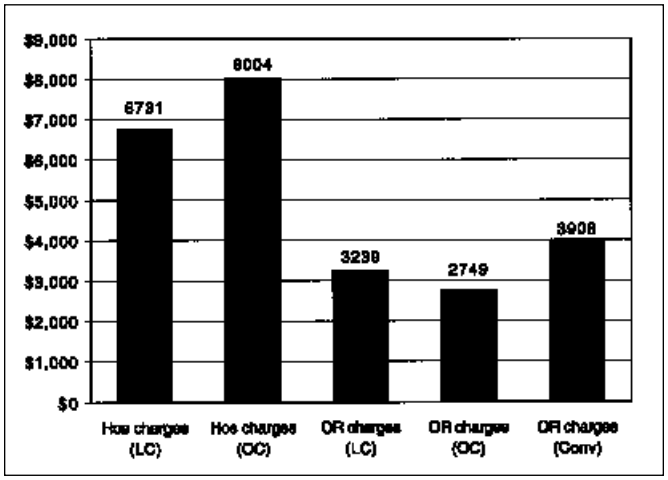

Figure 3. Graph comparing the hospital (Hos) and operating room (OR) charges between laparoscopic cholecystectomy (LC), open cholecystectomy (OC) and converted cases (Conv).

The length of hospital stay was significantly shorter for LC than for OC in both acute and chronic groups ($P < 0.04$ by ANOVA).

The conversion of a laparoscopic to an open procedure for all LC cases decreased over time: 9% in 1995 (10/103), 9% in 1996 (22/232), 4% in 1997 (8/188), 2% in 1998 (5/226) and 2% in 1999 (5/193). **Figure 2** provides the reasons for conversions.

Overall, the most frequent early complications were respiratory, including atelectasis and pneumonia in 8% of patients; gastrointestinal, including ileus and intolerance of diet in 6%; urinary, including urinary retention and infection in 2.5%; wound infections in 3%; cardiovascular, including arrhythmias and infarction in 1.2%; and iatrogenic injuries to the liver, small bowel, and common bile duct in 0.8%. We encountered 3 mortalities in the postoperative period in the LC group, 2 of them due to respiratory failure and 1 due to a myocardial infarction. In the OC group, we encountered 3 mortalities also, all 3 due to cardiac arrest. One patient in the LC group with bile duct stricture due to thermal injury presented with obstructive jaundice and required stenting 3 months postoperatively, which was similar to findings of other studies.[7] The mortality rate was 0.3% for LC and 5% for OC and was also comparable to that of other series.[3]

When we analyzed cases for hospital charges, a reduction in LC costs was seen **(Figure 3)**.

DISCUSSION

In today's surgical arena, laparoscopic cholecystectomy has become the predominant procedure for treating symptomatic gallbladder disease. LC, although an accepted modality of treatment for acute disease states, is not without hazards. Herein, we report the data of 1003 patients who underwent LC for both acute and chronic cholecystitis.

It is interesting that in this study patients who were selected for OC primarily in both acute and chronic groups were similar, although the distinction was not statistically significant. The male to female ratio was higher in the OC group, again not statistically significant. These results concur with that of previous series,[8] which show

that males tend to become symptomatic later in life and have associated comorbidities.

Shorter operating times in LC versus OC in the acute and chronic groups were noted; however, this was only statistically significant in the chronic group, but it did not reach statistical significance for the acute group. The operating times over the first 2 years for the LC procedure for both acute and chronic cholecystitis was high but decreased over the next 3 years resulting in a lower average operating time but still longer than the current national average. Faster recovery was noticed in the LC group as compared with that of the OC group, as evidenced by shorter hospital stays. We found the shorter hospital stays in the LC group to be statistically significant. Similar figures have been reported in other studies.[9] The length of stay of these patients is relatively longer than the current national average. The 2 factors affecting the length of hospital stay in this study are that the length of stay of patients with complications was included in the analysis and the decreased length of stay was not reflected in this study because during the earlier years the length of stay was significantly longer resulting in a higher average stay. The length of hospital stay has decreased substantially in the LC group from 1999 to the present as LC is essentially done as an outpatient procedure with patients being discharged the same day. Hospital costs were also lower for the LC group versus the OC group, because of the significantly shorter hospital stay and operating time for the LC procedure. The economic implications of such figures may be substantial, when considered on a national basis, where over 300,000 procedures are performed in the US annually.

The conversion rate of LC to OC was higher for the acute than that for the chronic group, the most frequent reason for conversion being technical difficulty encountered because of the inflammatory process, which is similar to that described by other authors.[5]

We noticed a decrease ending in a low plateau of the conversion rates to 2% over the 5-year period. Complications inherent in laparoscopic versus open methods, such as iatrogenic injuries to the common bile duct and the liver, were also noted to have decreased over this time.

CONCLUSION

LC appears to be a reliable, safe, and cost-effective procedure for acute cholecystitis with increasing surgeon experience. We believe that with a cautionary approach to acute cholecystitis, LC will provide better outcomes in the management of this condition.

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