

## Clinical Audit

# Complications of laparoscopic cholecystectomy performed by junior surgeon in resource-restricted settings

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### ABSTRACT

**Background:** The aims of this audit were to determine the rate of complications of laparoscopic cholecystectomy performed by a junior surgeon, to identify changes that can be made to reduce the complications, and to re-audit the complication rate after the changes have been made.

**Methods:** Laparoscopic cholecystectomies performed by the surgeon between August and November, 2018 were assessed retrospectively. Data was collected from electronic records and operation notes and entered in the format as enclosed within. A re-audit was conducted between December 15th, 2018 and June 15th, 2019.

**Results:** In the initial audit, the complication rate of laparoscopic cholecystectomy was 40% and the incidence of bile leaks was 6%. The re-audit showed a significant reduction in the overall complication rate to 24% with no incidence of bile leaks.

**Conclusions:** The learning curve of surgeons for laparoscopic procedures is steep and cases should be chosen carefully depending on the current skill set and comfort level of the surgeon. Recommended standard practices should be followed in all situations, and all the team members should be involved in identifying risks during the surgery.

**Keywords:** Audit, Laparoscopic cholecystectomy, Safe techniques

## INTRODUCTION

Laparoscopic cholecystectomy was first performed by the German professor, Muhe, in 1985.<sup>1</sup> Although it was initially rejected, it was later described to be “one of the greatest achievements of German medicine in recent history”.<sup>2</sup>

Since then, there have been many advances in the field of laparoscopy, and laparoscopic cholecystectomy has become one of the most common surgeries required of surgeons in India.<sup>9</sup> However, the complications of the procedure have been proven to be higher when the procedure is performed by surgeons with less experience.<sup>3</sup>

Several articles describe ways to prevent the high rate of complications of laparoscopic cholecystectomy, such as meticulous technique, anatomical knowledge, and intra operative cholangiogram.<sup>10-12</sup>

However, it is not clear whether there are ways to reduce the complications of laparoscopic cholecystectomy when a junior surgeon, out of necessity, performs it alone in a resource-restricted setting.

Hence, this audit was conducted to identify the complications of laparoscopic cholecystectomy performed by a junior surgeon working alone, and to identify the changes that can be made to prevent the same.

## Aim

This audit aimed to assess the complication rate of laparoscopic cholecystectomy performed by a junior surgeon and to identify the changes that can be made to reduce them. A re-audit was performed to reassess the complication rate after the changes were made.

## Audit standards

The rates of the following complications were assessed: bile/stone spill, bleeding, bile leak, and conversion to open. These complication rates were compared with their respective accepted standard complication rates: 10-30% for bile or stone spill without ductal injuries, 10% for bleeding 1-11% for bile leaks, which is inclusive of the level of training of the surgeon and of elective and emergency procedures, and 5-10% for conversion to open.<sup>4-7,13</sup>

## METHODS

The laparoscopic cholecystectomies performed by the surgeon at Baptist Christian Hospital, in a small city called Tezpur, in the North eastern state of Assam between August and November, 2018 were assessed retrospectively. The data was collected from electronic

records and operation notes and were entered in the format as enclosed within.

Based on the results of the audit, recommendations were made which were implemented over the succeeding six months at the above mentioned center (between 15th December, 2018 and 15th June, 2019). A retrospective re-audit was then conducted in June 2019 on the prospectively collected data to determine whether there was a reduction in the rate of complications. Since there was no senior surgeon, the senior scrub nurse or anaesthetist was called to confirm the anatomy prior to clipping the duct.

Data was entered and analyzed in Microsoft Excel and proportion of various types of complications was calculated and compared with existing literature.

## RESULTS

Forty-five patients underwent laparoscopic cholecystectomy between August and November, 2018. Among them, 18 patients (40%) (all three bile spills were converted to open and 1 patient with bile spill had bleeding too) developed complications secondary to the procedure. Approximately 50% of the patients who had developed complications had active cholecystitis at the time of surgery.

**Table 1: Complication rates during audit and re-audit as compared to literature.**

Complication	Initial audit (n=45)	Re-audit (n=54)	Rate in literature
	N (%)	N (%)	Percentage (%)
<b>Bile spill</b>	16 (35)	12 (22.2)	10-30
<b>Bleeding</b>	1 (2)	1 (1.8)	10
<b>Bile duct injury</b>	3 (6)	0 (0)	1-11
<b>Conversion to open</b>	3 (6)	0 (0)	5-10

In the re-audit, 54 patients underwent laparoscopic cholecystectomies in the six month period between 15th December, 2018 and 15th June, 2019. Among them, 13 patients (24%) developed complications.

## DISCUSSION

Laparoscopic cholecystectomy is one of the most commonly performed major surgical procedures.<sup>9</sup> However, the needs and demands of the patient often exceed the skill set of the surgeon. Many a time, surgeons in rural settings may not have the resources or the guidance of seniors to learn the procedure in the ideal way. It then becomes the responsibility of the surgeon to ensure that the patient does not suffer as a consequence of the inadequacy of the operating surgeon. The bile or stone spill in the literature due to inadvertent perforation of gall bladder is the commonest complication and ranges between 10-30%.<sup>4</sup> Our initial audit showed that 16 out of 45 patients (35%) had a bile spill, but in the re-audit there was a significant reduction and only 12 out of 54 patients (22.2%). This improvement is probably due to careful

selection of cases and improvement in the hand eye coordination with experience.

Similarly there was a reduction in bile duct injuries too from 6% to 0%. In literature, the rate is varied, depending on the volume of cases handled by the center and the experience of the surgeon and varies between 0.2-10%.<sup>14-17</sup> This drop in complication rate is due to better awareness of anatomy with experience and improvement in technique in dissecting the Calot's triangle. A major role is also played by the meticulous case selection, wherein acute cholecystitis with edematous GB wall were managed conservatively and operated at a later date. This audit revealed that the skills of the surgeon did improve with time as seen by the reduction in the complication rates as given in the tables above. Furthermore, following the critical view of safety and confirming the same with a second person decreased the chance of bile duct injuries even in patients with distorted anatomy. However, significance could not be established as the sample size was small.

For similar reasons the rate of conversion and bleeding had also decreased with time and experience of the surgeon. The rates in the re-audit is comparable to literature rates of conversion 5-10% and bleeding 1-11%.<sup>11,13</sup> The reduction in conversion rate is also due to the ability of the surgeon to manage the complications laparoscopically

These show that it is prudent of the surgeon to choose cases carefully while avoiding complicated ones, such as active cholecystitis with inflamed gallbladder wall and contracted gallbladder, which could suggest a chronic pathology.

In summary, there has been an 18% reduction in the complication rates with time. Hence, as witnessed by this audit, carefully selecting cases and following the critical view of safety can reduce the complication rate of laparoscopic cholecystectomy performed by junior surgeons. However, an audit with a larger sample size should be conducted to get a clearer idea of the improvements made by the surgeon and the areas where the surgeon is lacking. Moreover, this audit reaffirms that surgeons should remain up-to-date on all the recent recommendations and standards of care and should aim at improving the hand-eye co-ordination to reduce bile and stone spills.

## CONCLUSION

There was a significant reduction (approximately 15%) in the number of complications that occurred after laparoscopic cholecystectomy in a resource-restricted setting when cases that matched the skill set of the surgeon were chosen. The percentages of individual complications reduced and were within the accepted limits. Following the critical view of safety eliminated bile duct injuries.

## Recommendations

To be aware of limitations as a junior surgeon and to choose cases carefully, avoiding patients with contracted gall bladder and active cholecystitis during the learning period, to check the critical view of safety in all patients prior to clipping the duct and artery and to involve another surgeon or senior staff prior to clipping the cystic duct.

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