



Original Article

Assessing Operative Difficulty of Post-ERCP Laparoscopic Cholecystectomy Using Nassar Grading

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ABSTRACT

Introduction: Choledocholithiasis may present as a wide spectrum of clinical manifestations like abdominal pain, jaundice, cholangitis and gallstone pancreatitis. Endoscopic retrograde cholangiopancreatography is considered as treatment of choice for the management of common bile duct stones. Gallstones are further managed by laparoscopic cholecystectomy.

Aims and Objective: Assessing operative difficulty of post-ERCP laparoscopic cholecystectomy using Nassar grading

Method: A retrospective analysis was conducted in the Post Graduate Department of Minimal Access and General Surgery, Government Medical College, Srinagar to assess the operative difficulty in post ERCP cholecystectomy using NASSAR grading and included patients who underwent laparoscopic cholecystectomy 6–8 weeks post-ERCP.

Results: A total of 60 patients were included in this study. Among them 40 were females and 20 were males. The age of the patients included in the study had a range of 23-69 years with mean age of 46 ± 11.5 years. The average operative time was 59.25 minutes. All the patients underwent laparoscopic cholecystectomy with conversion of two cases to open cholecystectomy.

Conclusion: The Nassar Grading System effectively predicts the operative difficulty of post-ERCP laparoscopic cholecystectomy. Grades III and IV are associated with significantly longer operative times and higher complexity, emphasizing the importance of preoperative grading leading to better planning of cholecystectomy. Further studies with larger cohorts are recommended to validate these findings.

Keywords: Cholelithiasis, Choledocholithiasis, laparoscopic cholecystectomy, ERCP, Nassar Grading.

INTRODUCTION

Cholelithiasis being the most common biliary pathology is estimated to affect 6% of the total population globally.(1) Out of all the people with gall bladder stones, >80% are asymptomatic, 10-18% have associated common bile duct stones.(2) Choledocholithiasis may present as a wide spectrum of clinical manifestations like abdominal pain, jaundice, cholangitis and gallstone pancreatitis.(3) Endoscopic retrograde cholangiopancreatography (ERCP) is considered as treatment of choice for the management of common bile duct stones.(4) Gallstones are further managed by laparoscopic cholecystectomy which has been considered as gold standard.(5,6)

After ERCP, it has been observed that due to bile duct cannulation, contrast agent infusion and sphincterotomy there are significant adhesions around the bile duct.(7,8,9) So, laparoscopic cholecystectomy has increased risk of complications when done after ERCP, there is intra-operative difficulty to achieve critical view of safety, increased operative duration, increased chances of conversion to open surgery.(7) To stratify intra-operative difficulty of lap cholecystectomy a simple scale called NASSAR GRADING is used which has the advantage of assisting in intra-operative strategy and planning.(10)

In this study, we utilized this operative grading system for laparoscopic cholecystectomy done after 6-8 weeks of ERCP and assessed the grading system's clinical utility in predicting the outcome of surgery.

METHODS

A prospective analysis was conducted in the Post Graduate Department of General Surgery at Government Medical College, Srinagar to assess the operative difficulty in post ERCP cholecystectomy using Nassar grading and included all patients who underwent laparoscopic cholecystectomy 6–8 weeks post-ERCP. The patients who underwent emergency surgery and /or who had incomplete records were excluded. All the cases included in this study were evaluated for detailed symptomatic history and complete physical examination was performed during initial assessment by a surgeon. Routine laboratory or radiology investigations such as, complete blood count (CBC), serum electrolytes, LFT, KFT, ECG, skiagrams of chest/abdomen, USG abdomen, CECT abdomen (if required) and MRCP were done. Routine management of patients was done as per the standard protocol.

Nassar Grading:

This scale was published in 1995 and graded intra- operative findings of the gallbladder, cystic pedicle and associated adhesions. The scale is as follows;

Grade 1:

- Gallbladder—floppy, non-adherent Cystic pedicle—thin and clear
- Adhesions—simple up to the neck/Hartmann's pouch

Grade 2:

- Gallbladder—mucocoele, packed with stones Cystic pedicle—fat laden
- Adhesions—simple up to the body

Grade 3:

- Gallbladder—deep fossa, acute cholecystitis, contracted, fibrosis, Hartmann's adherent to CBD, impaction
- Cystic pedicle—abnormal anatomy of cystic duct - short, dilated or obscured Adhesions—dense up to fundus; involving hepatic flexure or duodenum

Grade 4:

- Gallbladder—completely obscured, empyema, gangrene, mass Cystic pedicle—impossible to clarify
- Adhesions—dense, fibrosis, wrapping the gallbladder, duodenum or hepatic flexure is difficult to separate.

Grade 5:

Mirizzi type 2 or higher, along with either a cholecystocutaneous, cholecystoduodenal or cholecysto-colic fistula.

All the data collected was entered in Microsoft Excel Sheet for statistical analysis. Data was summarized as the mean \pm standard deviation (SD) for numerical variables and number (percentage) for non-parametric variables. Student's t-test and Chi-square test were used to compare variables. The cut-off for significance of all used statistical analysis was rated as $p \leq 0.05$ as significant, $p < 0.01$ as very significant, $p < 0.001$ as highly significant, and $p > 0.05$ was rated as non significant.

RESULTS

A total of 60 patients were included in this study. All the patients underwent cholecystectomy after an interval of 6 to 8 weeks of ERCP. The mean age was 46 years, the age group of the patients in the study ranged from 23- 69 years. Table 1 shows the age distribution of study patients.

Table 1: Age distribution of the study patients.

Age (Years)	Number	Percentage (%)
20-34	10	17
35-49	17	28
50-64	20	33
≥ 65	13	22
TOTAL	60	100
MEAN \pm SD (RANGE)	46 \pm 11.5	

40 were female patients and 20 were male patients. Male female ratio was 1:2 shown in Table 2.

Table 2: Gender distribution of the study patients.

Gender	Number	Percentage (%)
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Male	20	33
Female	40	67
Total	60	100

As per the intra-operative Nassar grading scale, the distribution of the patients is as under in table 3. Grade I, II, III and IV had 2, 38, 8 and 12 patients, respectively. The mean duration of surgery in Grade I, II, III and IV was 29 mins, 41 mins, 59 mins and 108 mins respectively.

Table 3: Summary of Nassar Grade and Operative Times by Nassar Grades

Nassar Grade	Number of Patients	Average operative time (mins)	Variance
Grade I	02	29	-
Grade II	38	41	30.69
Grade III	08	59	58.88
Grade IV	12	108	111.30

Out of the 60 patients undergoing lap cholecystectomy, two were converted to open surgery due to dense adhesions between GB, omentum, stomach, duodenum and frozen calot's triangle. Conversion to open procedure was in 2 (3%) out of 60 patients due to dense adhesions as shown in table 4.

Table 4: Conversion to open

Conversion to open	Number	Percentage (%)
Yes	2	3
No	58	97
Total	60	100

DISCUSSION

The present study sought to evaluate the usefulness of the Nassar Grading System in predicting the difficulty of laparoscopic cholecystectomy (LC) performed after ERCP. Our findings demonstrate a significant association between higher Nassar grades and prolonged operative times, reaffirming the grading system's predictive value in determining intraoperative complexity. With a conversion rate of only 3%, our results compare favorably with existing literature, while also highlighting several important clinical and surgical considerations.

Gender Distribution and Epidemiological Context

Our study population had a female predominance (66.7%), consistent with prior epidemiological data. Unisa et al. demonstrated that gallbladder disease was 1.7 times more common in females than males in northern India, attributing this to hormonal, dietary, and environmental factors.(11) Dhar et al. also reported higher prevalence among women in Bangladesh.(16) This consistent pattern across geographic regions highlights the need for gender-sensitive screening and management strategies, particularly in regions with high gallbladder cancer incidence. Importantly, a higher burden of gallstone disease among women also translates into a greater proportion of them undergoing ERCP followed by LC, making validation of grading systems in this demography highly relevant.

Correlation of Nassar Grade with Operative Time

In our study, operative duration rose progressively across grades, from a mean of 29 minutes for Grade I to 108 minutes for Grade IV. The relationship was statistically significant ($p < 0.001$). This observation is consistent with the findings of Mann et al., who conducted a study including 43 patients, LC was performed approximately 6 weeks after ERCP. The grade of adhesion was Grade 1 in 9 (21%) patients, Grade II in 11 (26%) patients, grade III in 8 (19%) and Grade IV in 15 (35%), the mean operative time was 110 minutes($p=0.013$).(13) The near-identical trend across studies strongly supports the reproducibility of the Nassar scale in predicting operative times.

Similarly, Mir et al. conducted a prospective study in 25 patients undergoing post-ERCP LC and reported mean operative durations of 36, 43.4, 55.2, and 91.3 minutes for Grades I–IV, respectively, again confirming the direct relationship between Nassar grade and operative difficulty.(14) Their statistical analysis ($p < 0.001$) closely mirrors our findings, providing external validation. The consistency of these results across diverse populations reinforces the value of the Nassar system as a robust tool for stratifying surgical complexity.

Implications for Operative Planning and Patient Counseling

The demonstrated correlation between Nassar grades and operative times has important clinical implications. Anticipating higher intraoperative difficulty allows for better operating room scheduling, allocation of sufficient time, and ensuring that

an experienced surgeon is available for technically demanding cases. This is particularly critical in higher-grade cases (III and IV), where prolonged dissection, dense adhesions, and potential bleeding may complicate the procedure. Like present study many researchers such as Gabriel et al., Gupta et al., Chand et al. and Nanchani and supe conducted study on different pre operative predictors for difficult cholecystectomy and operative planning on the basis of grade of difficulty.(17,18,19,20)

From the patient's perspective, accurate grading supports informed consent. Patients with higher grades can be counselled regarding the increased likelihood of conversion to open surgery, extended operative duration, and higher complication risks. This aligns with the principles of shared decision-making and enhances patient trust in the surgical team.

Comparison with Other Grading Systems

While the Nassar grading system is intraoperative and based on adhesions and dissection difficulty, other systems have been developed to predict difficult cholecystectomy preoperatively. These include the Randhawa and Pujahari scoring system and the Parkland grading scale.(21,22)

Moreover, Griffiths et al. validated the Nassar scale in a multicenter UK study and highlighted its strong inter-observer agreement.(10) They emphasized that such reproducible scales can be invaluable for surgical training, operative auditing, and predicting complications. Our findings add to this growing body of evidence by specifically validating Nassar grading in the context of post-ERCP LC.

Timing of LC After ERCPi

One of the ongoing controversies in hepatobiliary surgery is the optimal timing of LC following ERCP. In our cohort, we did interval cholecystectomy and did not specifically analyse outcomes based on timing. However, comparative data from the literature shed light on this question. Gorla et al. compared early (<3 days) versus delayed post-ERCP LC.(12) They found that early LC had no conversions, while delayed LC had a 9.1% conversion rate, mostly due to dense adhesions. This suggests that prolonged delay after ERCP increases inflammatory changes and adhesion formation, thereby elevating Nassar grades.

Poprom et al. similarly reported that same-day or within-72-hour LC after ERCP was safe and feasible, reducing the risk of difficult surgery.(15) On the other hand, Mir et al. observed that an interval of 10–12 weeks allowed inflammatory changes to subside, thereby lowering intraoperative grades.(14) These seemingly conflicting findings highlight the complexity of the issue. Early surgery reduces adhesion formation but may be technically challenging due to acute inflammation, while delayed surgery reduces inflammation but increases the risk of adhesion-related difficulty. Our findings of higher operative times in Grades III and IV resonate with the challenges described in delayed cases. Larger prospective trials are needed to clarify the balance between timing and difficulty.

Conversion to Open Surgery

The conversion rate in our series was 3%, which is relatively low compared to the 9.1% reported in delayed post-ERCP LC by Gorla et al.(12) Conversion is often necessitated by dense adhesions, unclear anatomy, or risk of bile duct injury. The fact that our conversion rate was lower despite a notable proportion of Grade III and IV cases may reflect surgical expertise at our center, careful dissection strategies and adherence to principles such as the Critical View of Safety (CVS). Nevertheless, the association between higher Nassar grades and increased risk of conversion is well-established in the literature.

Limitations of Our Study

While our findings are encouraging, several limitations must be acknowledged. First, the sample size was relatively modest (n=60), with very few patients in Grade I (n=2) and Grade III (n=8), which limits the statistical power for subgroup analysis. Second, we did not analyse postoperative outcomes such as bile leak, wound infection, or hospital stay, which would provide a more comprehensive assessment of the grading system's prognostic value. Third, we did not stratify patients based on the timing of LC post-ERCP, an important factor shown to influence adhesion formation and operative difficulty. Fourth, being a single-center study, the findings may not be generalizable across diverse healthcare settings.

Future Directions

Future research should focus on larger multicenter studies to validate our findings and incorporate postoperative outcomes. It would also be valuable to develop hybrid scoring models combining preoperative predictors (imaging, biochemical markers, patient demographics) with intraoperative grading (Nassar scale) to provide both anticipatory and real-time risk assessment. Additionally, studies exploring the optimal timing of LC post-ERCP with respect to Nassar grading could guide surgical practice and patient selection more effectively.

Clinical Relevance and Take-Home Message

Despite its limitations, our study reaffirms that the Nassar Grading System is a simple, reproducible, and clinically useful tool for predicting operative difficulty in post-ERCP LC. The strong correlation between grade and operative time makes it an invaluable guide for operative planning, resource allocation, and patient counseling. Higher Nassar grades demand surgical expertise, extended operative slots, and preoperative preparation for potential conversion. Recognizing these factors can enhance patient safety, optimize outcomes, and strengthen surgical training.

CONCLUSION

The Nassar Grading System effectively predicts the operative difficulty of Post-ERCP laparoscopic cholecystectomy. Grades III and IV are associated with significantly longer operative times and higher complexity, emphasizing the importance of preoperative grading. Further studies with larger cohorts are recommended to validate these findings.

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