ORIGINAL RESEARCH

Assessment of efficacy of nassar scale in prediction of difficulty in laparoscopic cholecystectomy

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Received: 22 February, 2023 Accepted: 26 March, 2023

ABSTRACT

Background: This study was conducted for the assessment of efficacy of Nassar scale in prediction of difficulty in laparoscopic cholecystectomy. **Material and methods:** The present study was conducted in the Department of General Surgery of the Guru Gobind Singh Medical College & Hospital, Faridkot, Punjab. Patients presenting in the surgery OPD of Guru Gobind Singh Medical College & Hospital, Faridkot were involved in the study. Demographic and clinicoradiologic factors were recorded. A routine pre-anaesthetic check-up was done and patients were taken up for conventional four port laparoscopic cholecystectomy.Intraoperative findings and post operative complications were recorded. **Results:** In the present scenario, on clinical evaluation most common symptom was pain abdomen which was present in 100% cases i.e. 60 patients. Nausea was next common symptom which was present in 12 patients and 6 patients had complaint of vomiting. Pallor was present in 8 patients and no patient had icterus. Per abdomen examination was unremarkable in all 60 patients. 38 patients had previous attack of cholecystitis and results found statistically significant. Out of 60 patient 33 patient had grade 2, 32 patient hand grade 3, 18 patient had grade 1 and 3 patient had grade 4 as per intraoperative gallbladder status during laparoscopic cholecystectomy. Patients outcome was recorded postoperatively according to Nassar Scale. Among this one patient (1.7%) had bleeding postoperatively, belonged to grade 4; oone patient (1,7%) had postoperative bile leak, belonged to grade 3. Postoperatively fever and wound infection was present in 2 patients (3.3%) and 3 patients (5%) respectively. **Conclusion:** Nassar intraoperative scale provides a potential for accurately grading the intraoperative difficulty during LC. It can help to standarise the description of operative findings by multiple suregons,in terms of disease severity and technical difficulty encountered.The study confirmed the efficacy of Nassar scale as rising grades had significant correlation with difficulty encountered and complications. Thus helps in facilitating training assesment, research and comparing outcomes from difficult locations. It can also help in early decision for conversion for a novoic surgeon in difficult LC.Sample size of our study was small and validation of this scoring system will require good level of evidence. Hence, we recommend routine use of this scoring system in cases of laproscopic cholecystectomy.

INTRODUCTION

Cholelithiasis remain the major health problem and one of the most prevalent gastrointestinal diseases affecting the general population, with a significant amount of burden to health care systems.[1] Gallstone formation occurs due to different underlying disorders.[2] Gallstone disease is a chronic disease of the hepatobiliary system which is basically formed by the impaired metabolism of the cholesterol, bilirubin and bile acids. Gallstone disease can be characterised by the formation of stones in the gallbladder, common bile duct or hepatic duct.[3] Gallstone disease is the avoidable cause of mortality among the gastrointestinal disorders.[4]

The disease prevalence varies from one region to other. The prevalence of disease ranges from approximately 16.6 percent among females and 7.9 percent among males in the western countries.[5] With the prevalence of gallstone disease ranging from 10 to 20 percent, it is a leading cause of morbidity in the Indian population.[6] Present therapeutic options may be as follows: Asymptomatic patients and those with flatulence and dyspepsia who have gallstones should be observed. Those who have symptoms of biliary pain, gallstone-induced pancreatitis, or common duct stones should have corrective surgery. Cholecystectomy is the treatment of choice for patients with symptomatic gallstone disease.[7]

Laparoscopic cholecystectomy was first performed by Erich Mühe,[8] a surgeon from Böblingen, Germany in 1985, which is now Gold standard treatment for symptomatic gallstone disease for more than a hundred year. Carl Langenbuch, the founder of open cholecystectomy, had very clearly stated that the gallbladder stones are formed due to the diseased gallbladder. So, the removal of the gallbladder is necessity of treatment of cholelithiasis.[9] Other alternative methods like oral dissolution agents and lithotripsy are of little significance in cholelithiasis and are rarely used in the clinical scenario.[10,11]

There are many preoperative scoring systems available to predict difficult LC but a very few intraoperative difficulty grading scale are available or published and none are widely used in clinical practice to predict degree of difficulty of LC and have been validated. The conversion rate of laparoscopic cholecystectomy (LC) to open cholecystectomy ranges from 7% to 35%. Our aim was to assess the different predictors intraoperatively for difficult LC and ascertain the validity of the scoring system devised by Nassar et al. in predicting the difficult LC.[13]

MATERIAL AND METHODS

The present study was conducted in the Department of General Surgery of the Guru Gobind Singh Medical College & Hospital, Faridkot, Punjab. Patients presenting in the surgery OPD of Guru Gobind Singh Medical College & Hospital, Faridkot were involved in the study. Signed a pre-prepared performa, demographic and clinic-radiologic factors were recorded. Clinical examination and ultrasound was done for all patients. A routine pre-anaesthetic check-up was done and patients were taken up for conventional four port laparoscopic cholecystectomy. Patient was taken in classical supine position with 30 degree head up and 15 degree right side up tilt and access to peritoneal cavity was made through 10mm Infraumbilical port using hasson's cannula open method and telescope was inserted at 30 degree, inflation was done and 10-14 mmHg intraabdominal pressure was created. Rest of the ports were inserted through, 5mm incision at right anterior axillary line for grasping fundus of the gall bladder, 5mm incision at right midclavicular line for holding infundibulum and 10 mm incision at epigastrium for dissection and extraction of gall bladder. After exposing the cystic pedicle and achieving the critical view of safety, metal clips of LT300 and LT400 were used for clipping. Gall Bladder was separated and extracted through epigastric port. After inspection suction & irrigation and hemostasis, a drain was placed in Morisson's pouch which was inserted through right anterior axillary line and was positioned under vision. Desufflation was done and ports were removed. Wound made at port site were close. Antiseptic dressing was done at suture site at the end of operation. Patient was shifted to the ward thereafter. Data were described in terms of range; mean ±standard deviation (± SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. For comparing categorical data, Chi square ($\chi 2$) test was performed and fisher exact test was used when the expected frequency is less than 5. A probability value (p value)less than 0.05 was considered statistically significant.All statistical calculations were done using (Statistical Package for the Social Science)SPSS 21version (SPSS Inc., Chicago, IL, USA)statistical program for Microsoft Windows.

RESULTS

TABLE 1: DISTRIBUTION OF PATIENTS ACCORDING TO CLINICAL PRESENTATIONS

Clinical Presentation	No. of cases	Percentage
Pain Abdomen	60	100%
Fever	0	0.0%
Nausea	12	20.0%
Vomiting	7	11.7%
Jaundice	0	0.0%
Previous attack of Acute Cholecystitis	38	67.30%
Pallor	8	13.3%
Icterus	0	0.0%
Murphy's Sign	0	0.00%

In the present scenario, on clinical evaluation most common symptom was pain abdomen which was present in 100% cases i.e. 60 patients. Nausea was next common symptom which was present in 12 patients and 6 patients had complaint of vomiting. In the present scenario clinically, pallor was present in 8 patients and no patient had icterus. Per abdomen examination was unremarkable in all 60 patients. In the present scenario 38 patients had previous attack of cholecystitis and results found statistically significant.

TABLE 2: DISTRIBUTION OF PATIENTS AS PER GALL BLADDER STATUS IN DIFFERENT GRADES ACCORDING TO NASSAR SCALE

	Gall bladder	No of cases	Percentage	Total cases	Overall %age
GRADE 1	Floppy GB	5	8.3%	18	30.0%
	Non-adherent	13	21.7%		

GRADE 2	Packed with multiple stones	31	51.7%	33	55.0%
	Mucocele	2	3.3%		
GRADE 3	Acute Cholecystitis	3	5.0%	32	53.33%
	Contracted GB	12	20.0%		
	Fibrosis	4	6.7%		
	Impaction	7	11.7%		
	Hatman's attached to CBD	3	5.0%		
	Deep fossa	3	5.0%		
GRADE 4	GB completed obscured	2	3.3%	3	5.00%
	Empyema	1	1.7%		
	Mass	0	0.0%		
	Gangrene	0	0.0%		

In the present study out of 60 patient 33 patient had grade 2, 32 patient hand grade 3, 18 patient had grade 1 and 3 patient had grade 4 as per intraoperative gallbladder status during laparoscopic cholecystectomy.

TABLE 3: DISTRIBUTION OF PATIENTS AS PER CYSTIC PEDICLESTATUS IN DIFFERENT GRADES ACCORDING TO NASSARSCALE

	Cystic pedicle	No of cases	Percentage	Total	Overall % age
GRADE 1	Thin and Clear	17	28.3%	17	28.3%
GRADE 2	Fat Laden	26	43.3%	26	43.3%
GRADE 3	Abnormal anatomy	3	5.0%	16	26.7%
	Cystic duct short dilated or Obscured	13	21.7%		
GRADE 4	Impossible to clarify	2	3.3%	2	3.3%

In the present study, out of 60 patients; 25 patients belong to grade 2,17 patients belong to grade 1, 16 patient belongs to grade 3 and 2patient belongs to grade 4 as per cystic pedicle status intraoperativelyduring laparoscopic cholecystectomy.

TABLE 4: DISTRIBUTION OF PATIENTS AS PER ADHESION IN DIFFERENT GRADES ACCORDING TO NASSAR SCALE

	Adhesion	No of cases	%age	Total	Overall %age
GRADE 1	Adhesion Simple; upto Neck/Hartmann'sPouchsimple up to body	22	36.7%	22	36.7%
GRADE 2	simple up to body	25	41.7%	25	41.7%
GRADE 3	Deep upto fundus	9	15.0%	11	18.3%
	Dense involving hepatic flexure or duodenum	2	3.3%		
GRADE 4	Dense, fibrosis, wrapping the GB Duodenum/hepatic flexure difficult to separate	1	1.7%	1	1.7%

In the present study; out of 60 patients, 25 patients came out under Grade 2, 22 patients came out under grade 1, 10 patient came out under grade 3 and one patient came out under grade 4 as per adhesion intraoperatively during laparoscopic cholecystectomy.

TABLE 5: DISTRIBUTION OF PATIENTS AS PER OVERALL GRADING ACCORDING TO NASSAR DIFFICULTY GRADING SCALE

Intraoperative Grade	No. of cases	Percentage
GRADE 1	14	23.3%
GRADE 2	30	50.0%
GRADE 3	13	21.7%
GRADE 4	3	5.0%
TOTAL	60	100.0%

In the present study; 30 patients (50.0%) belonged to grade 2, grade 1 and grade 3 had 14 patients (23.3%) and 13 patients (21.7%) in number respectively. Only 3 patients(5.0%) belonged to grade 4 overall as per nassar difficulty grading scale.

TABLE 6: DISTRIBUTION OF PATIENTS AS PER USG WHOLE ABDOMEN FINDINGS AND OVERALL GRADING ACCORDING TO NASSAR SCALE INTRAOPERATIVELY

USG findings		Intraoperative Finding				
		Grade 1	Grade 2	Grade 3	Grade 4	Total
	CONTRACTED	0	0	3	0	3
	DISTENDED	11	8	1	0	20

GB status	OVER DISTENDED	0	2	0	1	3
	PARTIALLY DISTENDED	3	17	4	1	25
	PARTIALLY CONTRACTED	0	3	5	1	9
No. of Calculi	MULTIPLE	4	25	8	1	38
	SINGLE	10	5	5	2	22
Size of Calculi GP	<10	6	27	10	2	45
	> 10	8	3	3	1	15
Wall Thickness1	< 4mm	14	25	6	0	45
	> 4mm	0	5	7	3	15
Pericholecystic Fluid	NO	14	29	12	3	58
	Yes	0	1	1	0	2
Others	-	14	30	12	3	59
	Sludge Present	0	0	1	0	1
Total		14	30	13	3	60

Significant results were found for this correlation between preoperative USG Whole Abdomen findings and intraoperative findings

TABLE 7: DISTRIBUTION OF PATIENTS AS PER CONVERSION TO OPEN CHOLECYSTECTOMY ACCORDING TO NASSAR DIFFICULTY GRADING SCALE

Converted to open cholecystectomy	Grade 1	Grade 2	Grade 3	Grade 4	No. of cases	Percentage
No	14	30	13	0	57	95.0%
Yes	0	0	0	3	3	5.0%
Total	14	30	13	3	60	100.0%

In the present scenario, 3 patients (5%) converted to open cholecystectomy, while rest of 57 patients went under successful cholecystectomy. These 3 patients (5%) converted to open belonged to grade 4 as per intraoperative Nassar scale.

Table 8: DISTRIBUTION OF PATIENTS ACCORDING TO POST OPERATIVE COMPLICATIONS

	Grade 1	Grade 2	Grade 3	Grade 4	No. of cases	%age
Post Operative Bleeding	0	0	0	1	1	1.7%
Post Operative Bile Leak	0	0	1	0	1	1.7%
Post op. Fever	0	1	1	0	2	3.3%
Wound infection	0	1	1	1	3	5.0%

In the present scenario, patient outcome was recorded postoperatively. Among this one patient (1.7%) had bleeding postoperatively, belonged to grade; one patient (1,7%) had postoperative bile leak, belonged to grade 3. Postoperatively fever and wound infection was present in 2 patients(3.3%) and 3 patients (5%) respectively.

TABLE 9: DISTRIBUTION OF PATIENTS ACCORDING TO POSTOPERATIVE PAIN SCORE

Post operative pain	GRADE 1	GRADE 2	GRADE 3	GRADE 4	No. of cases	Percentage
2	1	0	1	0	2	3.3%
3	1	1	1	0	3	5.0%
4	0	4	5	0	9	15.0%
5	2	5	2	0	9	15.0%
6	6	4	2	0	12	20.0%
7	3	12	1	2	18	30.0%
8	1	4	1	1	7	11.7%
Total	14	30	13	3	60	100.0%

In the present study, Assessment of pain score was done by visual analog scale; the majority of patients i.e. 46 patients belonged to score.

DISCUSSION

Laparoscopic cholecystectomy (LC) has become the procedure of choice for the management of symptomatic gallstone disease, the gold- standard approach for cholecystectomy. Laparoscopic cholecystectomy is high variable surgery ranging from simple routine operation to difficult surgery leading to increased morbidity and mortality. In LC, the surgeons encountered difficulties with acutely inflamed or gangrenous gallbladder (GB), dense adhesions at Calot's triangle, fibrotic and contracted GB, and cholecystoenteric fistula. Depending on the difficulty faced during the surgery, the outcome of LC may vary from abandoning the procedure or partial

cholecystectomy or conversion into open cholecystectomy. Due to anatomical variations, complications related to biliary tract or adjoining structures or vessels may also occur.

Nassar grading system is a simple tool for intraoperative stratification of difficulty in LC with advantage of analysing operative strategy with planning, comparison of different research studies, facilitating risk adjustments for surgical outcomes and providing guidelines to trainees' surgeons with monitoring of progression of training. The actual insight about the operating difficulty on initial assessment of GB status; cystic pedicle; surrounding adhesions have been overlooked and not possiblewith USG prediction alone. Nassar grading scale of operative difficulty (grade 1- 4) with parameters of GB, cystic pedicle and associated adhesions contribute to completion of the procedure is a simple grading tool to assist surgeons in tricky situations. Conversion depends upon safe judgment of the operating team in the best interest of the patient.

In the present study 31 patients(51.7%) had GB packed with multiple calculi, 13 patients (21.7%) had non-adherent GB, 5 patients (8.3%) had Floppy GB and 2 patients (3.3%) had mucocele intraoperatively; all these 51 patients (85%) underwent LC without difficulty. GB was contracted in 12 patients (20%) or had impacted calculus in 7 patients (11.7%) or fibrosis was present in 4 patients (6.7%).Nine patients with three in each (5.0%) either had acutely inflamed GB; deep fossa or Hartman's was attached to CBD These 32 patients (53.3%) had mild to moderate difficulty during LC and one patient with fibrosis around GB converted to open cholecystectomy. GB was completely obscured in 2 patients (3.3%) and empyema was present in one patient (1.7%). All three (5%) had most difficult LC and converted to open cholecystectomy.

Results are in concordance with previous studies. A. Ali et al observed (20.58%) conversion to open due to empyema GB and (14.70%) conversion due to fibrosed GB. Sugrue et al concluded in his study that completely buried GB had difficult LC.[4] Lal et at reported PPV of 80.95% for difficult LC with distended GB, mucocele, fibrosis, contracted GB or stone impacted at neck adding to difficult dissection.[12] Nassar AHM et al reported contracted GB in 11.22% cases, mucocele in 3.86% cases and empyema in 9.34% cases with difficult LC.[13] Nassar AHM, Khan KS et al reported contracted GB in 12.7% cases, mucocele in 5.02% cases and empyema in 8.7% cases with difficult LC.[14]Ng HJ et al reported contracted GB in 18.8% cases, mucocele in 8.9% cases and empyema in 10.7% cases with difficult LC.[15]

Fever was present in 2 patients (3.3%). Wound got infected in 3 patients (5%). Post operatively bleeding and bile leak was recorded in one patient each (1.7%). In the CholeS cohort, higher operative difficulty grade had worse outcome. Similarly, as per Griffiths et al a higher operative difficulty grade was consistently associated with worse outcomes.[16]

CONCLUSION

Nassar intraoperative scale provides a potential for accurately grading the intraoperative difficulty during LC. It can help to standarise the description of operative findings by multiple suregons,in terms of disease severity and technical difficulty encountered.The study confirmed the efficacy of Nassar scale as rising grades had significant correlation with difficulty encountered and complications. Thus helps in facilitating training assesment, research and comparing outcomes from difficult locations. It can also help in early decision for conversion for a novice surgeon in difficult LC.Sample size of our study was small and validation of this scoring system will require good level of evidence. Hence, we recommend routine use of this scoring system in cases of laproscopic cholecystectomy.

REFERENCES

1. Sugrue M, Sahebally SM, Ansaloni L, Zielinski MD. Grading operative findings at laparoscopic cholecystectomy- a new scoring system. World J Emerg Surg. 2015 Mar;10:14.
2. Hanna GB, Shimi SM, Cuschieri A. Randomised study of influence of two-dimensional versus three-dimensional imaging on performance of laparoscopic cholecystectomy. Lancet. 1998 Jan;351(9098):248-51.
3. Nassar AHM, Ashkar KA, Mohamed AY, Hafiz AA. Is laparoscopic cholecystectomy possible without video technology? Minim Invasive Ther Allied Technol. 1995;4:63–5.
4. Sugrue M, Coccolini F, Bucholc M, Johnston A, Contributors from WSES. Intra-operative gallbladder scoring predicts conversion of laparoscopic to open cholecystectomy: a WSES prospective collaborative study. World J Emerg Surg. 2019 Mar;14:12.
5. Lombardo S, Rosenberg JS, Kim J, Erdene S, Sergelen O, Nellermoe J, et al. Cost and outcomes of open versus laparoscopic cholecystectomy in Mongolia. JSurg Res. 2018 Sep;229:186-91.
6. Murphy JB. The diagnosis of gallstones. Am Med News 1903:825–833.
7. Litynski GS. Erich Muhe and the rejection of laparoscopic cholecystectomy(1985): a surgeon ahead of his time. JSLS. 1998;2:341–6.
8. Reynolds W Jr. The first laparoscopic cholecystectomy. JSLS. 5:89-94, 2001.
9. Vivek MA, Augustine AJ, Rao R. A comprehensive predictive scoring method for difficult laparoscopic cholecystectomy. J Min AccessSurg. 2014;10:62–7.
10. de Mestral C, Rotstein OD, Laupacis A, Hoch JS, Zagorski B, Alali AS, et al.Comparative operative outcomes of early and delayed cholecystectomy for acute cholecystitis: a populationbased propensity score analysis. Ann Surg.2014;259:10–5.
11. Takada T, Strasberg SM, Solomkin JS, Pitt HA, Gomi H, Yoshida M, et al. TG13: Updated Tokyo Guidelines for the management of acute cholangitisand cholecystitis. J Hepatobiliary Pancreat Sci. 2013;20(1):1–7.

12. Lal P, Agarwal PN, Malik VK, Chakravarti AL. A difficult laparoscopiccholecystectomy that requires conversion to open procedure can bepredicted by preoperative ultrasonography. JSLS.2002;6(1):59–63.
13. Nassar AHM, Ng HJ, Wysocki AP, Khan KS, Gil IC. Achieving the critical view of safety in the difficult laparoscopic cholecystectomy: a prospective study of predictors of failure. SurgEndosc. 2021 Nov;35(11):6039-6047.
14. Nassar AHM, Khan KS, Ng HJ, Sallam M. Operative Difficulty, Morbidity and Mortality Are Unrelated to Obesity in Elective or Emergency Laparoscopic Cholecystectomy and Bile Duct Exploration. J Gastrointest Surg. 2022 Sep;26(9):1863-1872.
15. Ng HJ, Nassar AHM. Reinterventions following laparoscopic cholecystectomy and bile duct exploration. A review of prospective data from 5740 patients. SurgEndosc. 2022 May;36(5):2809-2817.
16. Griffiths EA, Hodson J, Vohra RS, Marriott P; CholeS Study Group; Katbeh T, Zino S, Nassar AHM; West Midlands Research Collaborative. Utilisation of an operative difficulty grading scale for laparoscopic cholecystectomy. SurgEndosc. 2019 Jan;33(1):110-121.