ASSESSMENT OF THE RANDHAWA AND PUJAHARI PREOPERATIVE SCORING SYSTEM FOR LAPAROSCOPIC CHOLECYSTECTOMY DIFFICULTLY

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ABSTRACT

Aim : To compare the preoperative predictors of difficult laparoscopic cholecystectomy with intraoperative predictors.

Methods: Our prospective investigation enrolled 133 patients of both sexes, aged 41–67 years, with cholelithiasis and assigned for elective laparoscopic cholecystectomy at King Talal Military Hospital, Mafraq,and Prince Rashid hospital, Jordan, during the years 2018–2019. The preoperative scoring system of Randhawa and Pujahari included: I) gender, age, and previous admission; II) obesity, abdominal scar, and palpable gallbladder; and III) gallbladder wall thickness, pericholecystic collection, and impacted stone. The laparoscopic cholecystectomy difficulty was graded in terms of the preoperative score as: easy (0–5), difficult (6–10), and very difficult (11–15). The intraoperative difficulty scoring considered the surgery time, bile/stone spillage, an insult to a duct, and conversion to open cholecystectomy. Univariate and multivariate logistic regression analyses were performed to anticipate difficulty. A p-value of less than 0.05 was considered statistically significant.

Results: Previous admission ($P < 0.003$(OR=9.56) and 0.04(OR=3.12)) and wall thickness ($P < 0.004$(OR=8.21) and 0.03(OR=2.55)) anticipated difficult laparoscopic cholecystectomy in univariate and multivariate analyses, respectively. Age ($P < 0.0041$(OR=8.34)), BMI greater than 30 ($P < 0.02$(OR=2.44)), palpable gallbladder ($P < 0.0033$(OR=9.40)), and impacted stone ($P < 0.035$(OR=2.78)) anticipated difficult laparoscopic cholecystectomy. Gender, abdominal scar, and pericholecystic collection did not anticipate difficult laparoscopic cholecystectomy.

Conclusion: The preoperative scoring system can help anticipate the surgical outcome in laparoscopic cholecystectomy. A previous admission for acute cholecystitis and the wall thickness of the gallbladder were the best predictors of difficult laparoscopic cholecystectomy.

Keywords: scoring system, preoperative, intraoperative, laparoscopic cholecystectomy.

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INTRODUCTION

Cholelithiasis is the most frequent biliary disease. Gallstones are found in 10–15% of people and are asymptomatic in more than 80% [(1)]. One to two percent of asymptomatic patients will experience clinical features needing cholecystectomy as the most frequent surgery [(2)]. Laparoscopic cholecystectomy is the technique of choice for symptomatic gallstone disease [(3)]. Surgery is complicated by acute inflammation or gangrenous gallbladder, dense adhesions at Calot's triangle, fibrotic and contracted gallbladder, and cholecystoenteric fistula [(4)]. Risk factors for difficult laparoscopic surgery include male gender, old age, obesity, attacks of acute cholecystitis, previous abdominal surgery, and ultrasonographic findings, such as thickened gallbladder wall, distended gallbladder, pericholecystic fluid collection, and impacted stone [(5)].

The risk factors for conversion are: more than 65 years old, male gender, previous upper abdominal surgery, and history of acute cholecystitis [6]. Ultrasonography is the most frequent investigation for cholecystitis and cholelithiasis and can help to predict intraoperative difficulty.

Here we assess how well a preoperative scoring system for difficult laparoscopic cholecystectomy predicts intraoperative difficulty.

Methods

This prospective investigation enrolled 133 patients of both genders, aged 41–67 years, with cholelithiasis and scheduled for elective laparoscopic cholecystectomy at King Talal military hospital, Mafraq,and Prince Rashid hospital, Jordan, during the years 2018–2019. Written informed consent was obtained from all patients and approval from our local ethical and research board review committee of the Royal medical services. Patients with acute cholecystitis, empyema of GB, CBD stones, and cholangitis were ruled out.

The preoperative anticipative factors of difficult laparoscopic cholecystectomy (scoring system of Randhawa and Pujahari[7]) are: (I) age, gender, and previous admission for acute cholecystitis; (II) BMI, abdominal scar, and palpable gallbladder; and (III) ultrasound findings, such as wall thickness of gallbladder, pericholecystic collection, and impacted stone (Table 1). Intraoperative findings were evaluated for grading of difficult laparoscopic cholecystectomy (scoring system of Randhawa and Pujahari) [7] (Table 1). The preoperative scores were compared with intraoperative scores as predictors. The laparoscopic cholecystectomy difficulty was graded in terms of the preoperative score as: easy (0–5), difficult (6–10), and very difficult (11–15), with a maximum score of 15. The intraoperative scoring system (easy, difficult, very difficult surgery) considers surgery time, bile/stone spillage, insult to a duct, and conversion to open cholecystectomy.

Statistics

Univariate and multivariate logistic regression analyses were performed to anticipate difficulty. Multivariate analysis of logistic regression was used to find the predictive factors for predicting preoperative outcome namely easy and difficult in which three categories of difficulty were clustered in .A p-value of less than 0.05 was considered statistically significant.

RESULTS

Most patients were females [n = 110 (82.7%)] with a female to male ratio of 4.8:1, and the median age was 51 years (range: 41–67 years) (Table 2). In terms of ultrasound findings, 100 patients (75.2%) had multiple calculi, while 33 patients (24.8%) had solitary stone; 40 patients (30.1%) had impacted stone, 28 patients (21.1%) had wall thickening more than or equal to 4 mm, and a pericholecystic collection was recorded in 25 patients (18.8%) (Table 2). The association between the anticipation of difficulty before surgery and the outcome is demonstrated in Table 3.On preoperative assessment, 39 (29.3%) patients were classified as difficult/very difficult, of whom 35 (89.7%) patients had a difficult/very difficult surgery, and four (10.3%) an easy surgery. Most (94, 70.7%) patients were classified as easy on preoperative assessment, of whom 84 (89.4%) patients had an easy surgery, and ten (10.6%) had a difficult/very difficult surgery (Table 3). Eleven (28.2%) patients were converted to open cholecystectomy from 39 patients anticipated difficult/very difficult on preoperative assessment. Eight (8.5%) patients were

converted to open from 94 patients anticipated easy on preoperative assessment. There were 19 (14.3%) conversions, of which 12 were males, and seven patients were females. The cause of conversion was: dense adhesions at Calot's triangle (13 patients), Mirrizi's syndrome (three patients), and uncontrolled bleeding (three patients).

In the univariate and multivariate analyses of the outcome before surgery with risk factors, the previous admission for acute cholecystitis and wall thickness were statistically significant predictors for difficult laparoscopic cholecystectomy. In the univariate analysis, age, BMI more than 30, palpable gallbladder, and impacted stone were predictors of difficult laparoscopic cholecystectomy (Table 4). In terms of univariate and multivariate analyses of outcome during surgery with risk factors, previous admission and wall thickness were predictors of difficult laparoscopic cholecystectomy. In the univariate analysis, age, gender, palpable gallbladder, and impacted stone were statistically significant predictors for difficult laparoscopic cholecystectomy (Table 5). There was an association ($P < 0.0045$(OR=11.12)) between the preoperative score and the intraoperative score of laparoscopic cholecystectomy patients; patients with an easy preoperative score mainly have an easy intraoperative score.

Table 1. predictors scoring system (Randhawa and Pujahari), before and during surgery, for laparoscopic cholecystectomy.

	Score	Maximum score	Difficulty grading
Preoperative			
Age (years) <50 >50	 0 1	1	Total maximum score: 0–5 (easy) 6–10 (difficult) 11–15 (very difficult)
Gender F M	 0 1	1	
Admission No Yes	 0 4	4	
BMI <25 25–27.5 >27.5	 0 1 2	2	
Abdominal scar None Infraumbilical supraumbilical	 0 1 2	2	
Palpable gallbladder No Yes	 0 1	1	
Wall thickness Thin <4 mm Thick >4 mm	 0 2	2	

Pericholecystic collection No Yes	 0 1	1	
Impacted stone No Yes	 0 1	1	
Intraoperative			
Surgery time <1 h; no bile spillage; no insult to artery or duct		0–5	Easy
Surgery time 1–2 h; and/or bile or stone spillage; and/or insult to duct		6–10	Difficult
Surgery time > 2 h or conversion		11–15	Very difficult

Table 2. Patient demographics.

	No (%)
Age (years) <50 >50	 105(78.9%) 28(21.1%)
Gender F M	 110(82.7%) 23(17.3)
Admission	35(26.3%)
BMI <25 25-29.5 >30	 90(67.7%) 12(9.0%) 31(23.3)
Abdominal scar None Infraumbilical supraumbilical	 85(63.9%) 35(26.3%) 13(9.8%)
Palpable gallbladder	32(24.1%)
Wall thickness Thin <4 mm Thick >4 mm	 108(81.2%) 25(18.8%)
Pericholecystic collection	28(21.1%)
Impacted stone	38(28.6%)
Conversion	13(9.8%)

Number of stones Solitary Multiple	 30(22.6%) 103(77.4%)

Table 3. Association between preoperative assessment and intraoperative surgery.

Preoperative score		easy	difficult	Very difficult	total
0–5		84	7	3	94
	Intraoperative	84	10		94
6–10		4	26	9	39
	Intraoperative	4	35		39
Total preoperative		88	33	12	133
	Total intraoperative	88	45		133

Table 4. Study of preoperative anticipation.

	Total Preop. easy; n=94	Total Preop.diff.; n=39	P-value (UNI- MULTI-variate)
Age: <50, >50	80(85.1%) 14(14.9%)	20(51.3%) 19(48.7%)	P(UNI)< 0.0041(OR=8.34)
Gender: female, male	82(87.2%) 12(12.8%)	30(76.9%) 9(23.1%)	
Admission: no, yes	75(79.8%) 19(20.2%)	18(46.2%) 21(53.8%)	P UNI<0.003(OR=9.56) P MULTI<0.04(OR=3.12)
BMI: <25, 26–29.5, >30	70 (74.5%) 7 (7.4%) 17(18.1%)	20(51.3%) 4(10.3%) 15(38.5%)	P UNI <0.02(OR=2.44)
Abdominal scar: none, infraumbilical, supraumbilical	62(65.9%) 25(26.6%) 7(7.5%)	23 (58.9%) 9(23.2%) 7(17.9%)	
Palpable gallbladder: no, yes	75(79.8%) 19(20.2%)	19(48.7%) 20(51.3%)	P UNI <0.0033(OR=9.40)
Wall thickness: thin (<4 mm), thick (>4 mm)	80(85.1%) 14(14.9%)	24(61.5%) 15(38.5%)	P UNI <0.004(OR=8.21) P MULTI <0.03(OR=2.55)
Pericholecystic collection: no, yes	77(81.9%) 17(18.1%)	32(82.1%) 7(17.9%)	
Impacted stone: no, yes	74(78.7%) 20(21.3%)	22(56.4%) 17(43.6%)	P UNI <0.035(OR=2.78)

Table 5. Study of intraoperative anticipation.

	Total intraop.easy ;n=88	Total intraop.diff.;n=33	P-value (UNI- MULTI-variate)
Age: <50, >50	75(85.2%) 13(14.8%)	16 (48.5%) 17(51.5%)	P UNI <0.0041(OR=8.34)
Gender: female, male	80(90.9%) 8(9.1%)	25(75.8%) 8(24.2%)	P UNI <0.037(OR=3.11)
Admission: no, yes	73(82.9%) 15(17.1%)	17(51.5%) 16(48.5%)	P UNI <0.003(OR=9.56) P MULTI <0.04(OR=3.12)
BMI: <25, 26–29.5, >30	68(77.3%) 6(6.8%) 14(15.9%)	20(60.6%) 5(15.2%) 8(24.2%)	
Abdominal scar: none, infraumbilical, supraumbilical	58(65.9%) 23(26.2%) 7(7.9%)	23(69,7%) 3(9.1%) 7(21.2%)	
Palpable gallbladder: no, yes	74(84.1%) 14(15.9%)	16(48.5%) 17(51.5%)	P UNI <0.0033(OR=9.40)
Wall thickness: thin (<4 mm), thick (>4 mm)	77(87.5%) 11(12.5%)	18(54.5%) 15(45.5%)	P UNI <0.004(OR=8.21) P MULTI <0.03(OR=2.55)
Pericholecystic collection: no, yes	73 (82.9%) 15(17.1%)	24(72.7%) 9(27.3%)	
Impacted stone: no, yes	72 (81.8%) 16(18.2%)	17(51.5%) 16(48.5%)	P UNI <0.035(OR=2.78)

DISCUSSION

Laparoscopic cholecystectomy can be complicated by dense adhesions in Calot's triangle, empyema of the gallbladder, Mirrizi's syndrome, and acute cholecystitis [8]. Age above 50 years has also been identified as a significant risk factor for difficult laparoscopic cholecystectomy [9]. In our investigation, by univariate analysis regarding preoperative and intraoperative findings, there was a remarkable association between age above 50 years and difficult operation. Male gender was correlated with difficult laparoscopic cholecystectomy [10]. A high conversion frequency has been recorded in males [2]. In our investigation, 12 of 23 (52.2%) male patients were converted to open surgery. By univariate analysis of intraoperative findings, there was a remarkable association between male gender and operative difficulty.

Patients with repeated admissions for acute cholecystitis have more frequency of difficult laparoscopic cholecystectomy and conversion because of dense adhesions at Calot's triangle and GB fossa [2]. In our investigation, admission was remarkably recorded as a predictor for difficult laparoscopic cholecystectomy in both univariate and multivariate analyses in preoperative and intraoperative findings. Laparoscopic surgery is difficult in obese patients as port insertion requires greater

time, and dissection at the Calot's triangle is difficult [11]. In our investigation, BMI more than 30 was a predictor of difficult laparoscopic cholecystectomy, but only by univariate analysis of the preoperative findings. Supra and infraumbilical scars can lead to adhesions, risking insult to any structures and associated with increased conversion [2]. In our investigation, the abdominal scar was insignificant in both univariate and multivariate analyses of preoperative and intraoperative findings. A palpable gallbladder is caused by a distended gallbladder, mucocele of the gallbladder, and adhesions. In univariate analysis of preoperative and intraoperative findings, a palpable gallbladder was identified as a significant predictor.

Increased thickness of the gallbladder wall is correlated with difficult dissection at the bed and at Calot's triangle. In our investigation, there was a remarkable correlation between the gallbladder wall thickness and the operative difficulty in univariate and multivariate analyses of preoperative and intraoperative findings. The pericholecystic collection was a predictor of difficult laparoscopic cholecystectomy [12], while it was insignificant in other trials [7]. In our investigation, there was no correlation between pericholecystic collection and the operative difficulty in univariate and multivariate analyses of preoperative and intraoperative findings. Impacted stone at the neck of the gallbladder can be problematic in laparoscopic cholecystectomy. In our investigation, the impacted stone at the neck of the gallbladder was remarkable in univariate analysis of preoperative and intraoperative findings.

Conversion frequency was recorded in other studies as 7–35% [2] or 25% in difficult patients [13]. The preoperative scoring system is a good test for anticipating the operative result in laparoscopic cholecystectomy [2]. Laparoscopic surgical intervention for cholecystectomy is the optimum technique for symptomatic gallbladder stone disease management as minimal invasiveness operation with minimal pain, early emergence, with less insult of access and no obscuring of the surgical field [14].

Conclusion

The preoperative Randhawa and Pujahari scoring system can anticipate the surgical difficulty outcome in laparoscopic cholecystectomy.A previous admission for acute cholecystitis and the wall thickness of the gallbladder were the best predictors of difficult laparoscopic cholecystectomy.

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REPLY

1. Multivariate analysis of logistic regression was used to find the predictive factors for predicting preoperative outcome namely easy and difficult in which three categories of difficulty were clustered in.
2. Odds ratio was added to logistic regression in text and tables ae required by referee.
3. P value was re-written in exact numbers as required although we wrote as 0.05 to make life easy for the reader.
4. In tables 4 and 5: OR means odds ratio and was corrected as so.
5. Gender and BMI were not mentioned because we did not refer to them in our follow up.
6. P value less than 0.05 or equal to 0.05 are not the same, but we for simplifying things we made them as same but we made chnges as required.
7. All changes were made in red color in text and tables.
8. Conclusion was corrected to be the same as in abstract and in discussion.
9. The tables are very difficult to change as they contain a lot of data and we tried our best to look like this.As for P value ,we cannot change the values.
10. Prince Rashid hospital was added to King Talal hospital as place of study.
11. conclusion was rephrased again to be c