



ORIGINAL RESEARCH PAPER

General Surgery

STUDY OF UTILITY OF PARKLAND GRADING SCALE IN PREDICTING SURGICAL DIFFICULTY IN LAPAROSCOPIC CHOLECYSTECTOMY.

KEY WORDS: Parkland grading scale, Laparoscopic cholecystectomy, operative difficulty

Dr. Milind Lanjewar*

Junior Resident, Department of General Surgery, Dr. PDMMC, Amravati
*Corresponding Author

Dr. Kaustubh Sarda

Assistant Professor, Department of General Surgery, Dr. PDMMC Amravati

Dr. Anil Darokar

Professor and Head, Department of General Surgery, PDMMC Amravati.

ABSTRACT

Background: Laparoscopic cholecystectomy (LC) is one of the most common procedures performed worldwide. There is need of some objective way of predicting difficulty in laparoscopic cholecystectomy. The Parkland grading scale (PGS) is one such objective way. Few studies have evaluated its utility but there is conflicting evidence with some finding its utility in predicting operative difficulty while some are not, hence we have undertaken current study at our tertiary care institute with the aim to assess its utility. **Methods:** Present study was cross sectional in nature conducted on 150 patients operated for laparoscopic cholecystectomy. Parkland grading scale with five grades have been used to assess the operative difficulty. **Results:** Majority of the cases were from 41-59 years & majority were males. We have seen that outcomes bile leakage, stone spillage, post operative bleeding were significantly associated with grade 4 PGS ($p < 0.01$). Intraoperative time and mean length of hospital stays were also significantly more among patients with grade 4 Parkland grading scale ($p < 0.01$). **Conclusion:** Parkland grading scale is simple & objective way of predicting operative difficulty in patients undergoing laparoscopic cholecystectomy.

INTRODUCTION

Laparoscopic cholecystectomy (LC) is one of the most common procedures performed worldwide.¹ This is gold standard for acute cholecystitis and cholelithiasis but its complexity is affected by factors such as age, gender, thickness of gall bladder wall, adhesions, number of stones etc. and accurate assessment of these factors can be done intraoperatively in open surgery.²⁻⁴ But in LC it led to high incidence of post-operative complications such as bile leakage, conversion to open surgery and adverse patient outcomes. Hence there is need of some objective way of predicting difficulty in laparoscopic cholecystectomy. The Parkland grading scale (PGS) is one such objective way which was developed in 2017 at the Parkland Memorial Hospital in Texas, USA. It is an accurate and reliable grading scale that is easy to remember and with a limited number of grades: one to five.^{5,6} Few studies have evaluated its utility but there is conflicting evidence with some finding its utility in predicting operative difficulty⁷ while some are not, hence we have undertaken current study at our tertiary care institute with the aim to assess its utility.

Objectives

To assess the utility of Parkland grading scale in predicting surgical difficulty in laparoscopic cholecystectomy.

MATERIALS AND METHODS

The present study was a cross sectional in nature, done in central India from June 2022 to May 2023, protocol approval of which was taken from the Institutional Ethical committee of the medical college. Written informed consent was obtained from all study subjects.

All patients who were diagnosed with cholelithiasis and cholecystitis and subsequently underwent LC admitted in Dr. PDMMC and tertiary care hospital, Amravati, during study duration of 6 months was taken for the study.

A total of 150 patients operated for laparoscopic cholecystectomy were recruited in the study. All patients were evaluated by history, clinical examination and appropriate laboratory investigations. Data pertaining to age, sex, duration of symptoms, and preoperative laboratory findings, intraoperative findings and type of surgery, and post-operative data i.e. bile leaks and wound infection was

recorded in a pre-structured proforma. A complete physical examination, vital signs and relevant investigations were noted. The Parkland grading scale (PGS) was applied to all patients. Operative difficulty outcome parameters were bile leakage, stone spillage, bleeding, post-surgical drain placement, open conversion, operative time, and hospital stay.

Table 1. The Parkland Grading Scale (PGS) For Assessing Cholecystitis Severity.^{5,6}

Grade	Description of severity
1	Normal appearing gallbladder ("robin's egg blue") No adhesions present, completely normal gallbladder
2	Minor adhesion at neck, otherwise normal gallbladder Adhesions restricted to the neck or lower of the gallbladder
3	Presence of ANY of the following: Hyperemia, pericholecystic fluid, adhesions to the body, distended gallbladder
4	Presence of ANY of the following: Adhesions obscuring the majority of the gallbladder Grade I-III with abnormal liver anatomy, intrahepatic gallbladder, or impacted stone
5	Presence of ANY of the following: Perforation, necrosis, inability to visualize the gallbladder due to adhesions

Anup Shrestha et al⁸ in their study found that 10% patients had grade 4 & 5 Parkland grading scale predicting surgically difficult laparoscopic cholecystectomy. Considering this proportion, at 95 % confidence interval & 5% error, sample size came out to be 139 but for convenience of calculations we have taken 150.

Data was entered in Microsoft Excel and analyzed using SPSS Software. Means were compared by using ANOVA test while qualitative variables compared by using Chi square & Chi square test with Yates correction.

RESULTS

In the present cross-sectional study, we have analyzed all 150 cases operated for laparoscopic cholecystectomy for assessing operative difficulty with the Parkland grading scale.

Majority, 75 (50%) of the patients were from the age group of 40-59 years followed by 60 (40%) from <40 years, and least i.e. 15 (10%) from ≥60 years. Most, 92 (61.33%) of the patients were of male gender. But the age groups & gender did not differ significantly according to Parkland grades for operative difficulty ($p>0.05$). Among majority, 104 (69.33%) of our patients the type of surgery was elective followed by emergency in 46 (30.67%) and significantly a greater number of cases with grade 3 & 4 of PGS had emergency surgery ($p<0.01$). Ultrasonography finding among significant majority i.e. 56 (37.33%) of the cases was thickened gall bladder with adhesions followed by cholelithiasis in 49 (32.67%) & chronic cholecystitis in 45 (30%) ($p<0.01$). (Table 1)

Table 1. Association Between Parkland Grading Scale For Operative Difficulty With Clinicodemographic Variables.

Characteristic	Sub-category	Parkland grading				Total (n=150)	p
		Grade 1 (n=35)	Grade 2 (n=47)	Grade 3 (n=38)	Grade 4 (n=30)		
Age (years) no. (%)	<40	18 (51.43)	18 (38.29)	18 (47.37)	12 (40)	60 (40)	0.8
	40-59	14 (40)	22 (46.81)	19 (50)	14 (46.67)	75 (50)	
	>60	03 (8.57)	07 (14.89)	01 (2.63)	04 (13.33)	15 (10)	
Gender no. (%)	Male	21 (60)	30 (63.83)	22 (57.89)	19 (63.33)	92 (61.33)	0.9
	Female	14 (40)	17 (36.17)	16 (42.11)	11 (36.67)	58 (38.67)	
Type of surgery no. (%)	Emergency	07 (20)	05 (10.64)	15 (39.47)	19 (63.33)	46 (30.67)	<0.01
	Elective	28 (80)	42 (89.36)	23 (60.53)	11 (36.67)	104 (69.33)	
Ultrasonography finding no. (%)	Chronic cholecystitis	00 (00)	30 (63.83)	09 (23.68)	06 (20)	45 (30)	<0.01
	Cholelithiasis	35 (100)	03 (6.38)	09 (23.68)	02 (6.67)	49 (32.67)	
	Thickened gall bladder /adhesions	00 (00)	14 (29.79)	20 (52.63)	22 (73.33)	56 (37.33)	

- Chi square with Yates correction have been used where Chi square is not applicable.

When assessed the association between Parkland grading scale for operative difficulty and surgery outcome, we have seen that outcomes bile leakage, stone spillage, post operative bleeding were significantly associated with grade 4 PGS ($p<0.01$). Intraoperative time and mean length of hospital stays were also significantly more among patients with grade 4 Parkland grading scale ($p<0.01$). While outcome of post-surgical drain placement & open conversion did not show any association with Parkland grades ($p>0.05$). (Table 2)

Table 2. Association Between Parkland Grading Scale For Operative Difficulty And Surgery Outcome.

Outcome	Parkland grading				p
	Grade 1 (n=35)	Grade 2 (n=47)	Grade 3 (n=38)	Grade 4 (n=30)	
Bile leakage	00	01	12	14	<0.01
Stone spillage	00	00	06	12	<0.01
Bleeding	04	05	12	18	<0.01
Post-surgical drain placement	00	02	04	06	0.07

Open conversion	00	00	01	04	0.05
Operative time in minutes (mean + SD)	60.44 + 12.26	63.33 + 15.67	88.76 + 22.12	120.11 + 30.36	<0.01
Hospital stays in days	2.22 + 1.11	2.27 + 1.12	3.57 + 2.14	5.35 + 2.55	<0.01

DISCUSSION

We have conducted the present cross-sectional study, on 150 cases operated for laparoscopic cholecystectomy for assessing utility of the Parkland grading scale in predicting operative difficulty. Majority (50%) of the patients were from the age group of 40-59 years. Most (61.33%) of the patients were of male gender. But the age groups & gender did not differ significantly according to Parkland grades for operative difficulty ($p>0.05$). Among majority (69.33%) of our patients the type of surgery was elective and significantly a greater number of cases with grade 3 & 4 of PGS had emergency surgery ($p<0.01$). Ultrasonography finding among significant majority (37.33%) of the cases was thickened gall bladder with adhesions followed by cholelithiasis (32.67%) & chronic cholecystitis (30%) ($p<0.01$). Similarly, Shrestha et al⁸ found significant association of thickened bladder wall with grade 4 & 5 of PGS. This is in line with César Giuliano Sisa Segovia et al⁹ who also found that age & gender did not differ according to various PGS grades, but significantly differed in type of jaundice & type of surgery with predominantly obstructive jaundice & emergency LC associated with grade 4 & 5.

When assessed the association between Parkland grading scale for operative difficulty and surgery outcome, we have seen that outcomes bile leakage, stone spillage, post operative bleeding were significantly associated with grade 4 PGS ($p<0.01$). Intraoperative time and mean length of hospital stays were also significantly prolonged among patients with grade 4 Parkland grading scale ($p<0.01$). Consistent to our finding, Ya-qi Liu et al¹⁰ also found that surgical difficulty scores were positively correlated and had shown significantly increasing trend with Parkland grades. Consistently Gloria Guzmán Arguello et al¹¹ also reported that PGS could accurately predict the complexity of gallbladder surgeries & César Giuliano Sisa Segovia et al⁹ noted in their study that use of cavity drainage, conversion to open surgery, prolonged duration of surgery was significantly associated with higher Parkland grades (grade 3, 4 & 5) but did not find significant difference in hospital stays.

CONCLUSION

Parkland grading scale is simple & objective way of predicting operative difficulty in patients undergoing laparoscopic cholecystectomy.

Declaration

There was no source of funding in our study and there was no any conflict of interest in this study.

REFERENCES

- Okamoto K, Suzuki K, Takada T, Strasberg SM, Asbun HJ, Endo I, et al. Tokyo Guidelines 2018: flowchart for the management of acute cholecystitis. J Hepatobiliary Pancreat Sci. 2018; 25: 55-72. <https://doi.org/10.1002/jhbp.516>.
- Mohamed S, Ahmed Z, Mohammed AM. Anticipation of difficulty during laparoscopic cholecystectomy. Arch Surg Clin Res. 2020; 4: 24-8.
- Wakabayashi G, Iwashita Y, Hibi T. Tokyo Guidelines 2018: surgical management of acute cholecystitis: safe steps in laparoscopic cholecystectomy for acute cholecystitis (with videos). J Hepato Biliary Pancreat Sci. 2013; 25: 73-86.
- Ansaloni L, Pisano M, Coccolini F. WSES guidelines on acute calculous cholecystitis. World J Emerg Surg. 2016; 14: 25.
- Baral S, Chhetri RK, Thapa N. Utilization of an Intraoperative Grading Scale in Laparoscopic Cholecystectomy: A Nepalese Perspective. Gastroenterol Res Pract. 2020; 2020: 8954572.
- Madni T, Leshika D, Minshall C. The Parkland grading scale for cholecystitis. Am J Surg. 2018; 215: 625-30.
- Madni TD, Nakonezny PA, Barrios E, Imran JB, Clark AT, Taveras L, et al. Prospective validation of the Parkland Grading Scale for cholecystitis. Am J Surg. 2019; 217: 90-7.
- Shrestha A, Bhattarai A, Tamrakar KK, Chand M, Tamang SY. Utility of the

- Parkland Grading Scale to determine intraoperative challenges during laparoscopic cholecystectomy: a validation study on 206 patients at an academic medical center in Nepal. 2023;1-8.
9. Guggiari B, Cacace K, Acosta R. Application of the parkland grading scale in video laparoscopic cholecystectomies. 2022;46:7-11.
 10. Liu Y, Wang C, Cai X, Zheng Z, Bi J. Can the parkland grading scale predict the difficulty of laparoscopic cholecystectomy? A new approach to validation. 2023;4-9.
 11. Arguello GG, Beltran JB, Cruz IH, Flores JS, Romero A, García B, et al. Is the Parkland grading scale related to surgical difficulty in laparoscopic cholecystectomy? 2022;10 (11):2371-5.