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ORIGINAL ARTICLE

EVALUATION OF VARIOUS PRE-OPERATIVE PARAMETERS FOR PREDICTION OF DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY

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ABSTRACT:

Background: Cholecystectomy is one of the commonest surgical procedures performed throughout the world. Various parameters like age, sex, body mass index (BMI), history of previous abdominal surgery, ultrasonography findings of gall bladder wall thickness, contracted gall bladder, peri-cholecystic fluid, size of stone and haematological findings like raise total leucocytes count, alkaline phosphatase; liver enzymes were added in recent studies to predict difficult Laparoscopic Cholecystectomy. This study was conducted to analyse whether these parameters could be used pre-operatively for prediction of difficult laparoscopic cholecystectomy and conversion. **Materials & methods:** The present study included patients who attended the Outdoor Patient Department (OPD) with history of symptomatic Gallstone Disease were enrolled and elective surgery was performed after clinical assessment, Routine Investigations and Ultrasonography of the abdomen. Patient of all ages and both gender were included in the study. Detail medical history of all patients were recorded, demographic data like age, sex, weight, height and body mass index (BMI) were measured before the surgery. Heamatological blood investigations were done prior to surgery. Special emphasis were given to total leukocyte count (TLC), Alkaline phosphatase (ALP), S.Bilirubin, and liver enzymes. Ultrasonography of the abdomen was done in all patients before surgery and various parameters were recorded. After the surgery, patients were group into 2 categories; those who had a successful laparoscopic cholecystectomy, those cases who had conversion to open cholecystectomy Laparoscopic cholecystectomy was performed in all the patients. All the results were recorded and analyzed by SPSS software. **Results:** Age > 50 years was associated with risk of conversion/difficult laparoscopic cholecystectomy. Sensitivity was 95.9% with a positive predictive value of 95%. Conversion rate among male was 27.7% where as in female it was 8.5%. Body Mass Index (BMI) > 30 kg/m^2 had a significant co-relation with risk of conversion to open cholecystectomy Sensitivity was 96.9% and positive predictive value was 94.1%. p value was 0.000, the conversion rate among cases with BMI >30 kg/m^2 was 70%. **Conclusion:** Parameters like age, sex, obesity, history of upper abdominal surgery, raised total leucocytes count etc. are risks factors and predictors for conversion to open cholecystectomy.

Key words: Cholecystectomy, Laparoscopic, Pre-operative.

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INTRODUCTION

Cholecystectomy is one of the commonest surgical procedures performed throughout the world. At present around 80% of cholecystectomy are done by Laparoscopy in the developed world. Laparoscopic cholecystectomy is now considered as the 'gold standard' for the treatment of symptomatic gall stone disease.[1] Carl Langenbuch was the first person to perform open cholecystectomy in 1882.[2] since then open cholecystectomy had been the gold standard for the treatment of gall bladder stone disease for more than a hundred years. Then in 1987, the first Laparoscopic Cholecystectomy was performed by Philipe Mouret in Lyon, France. He removed the gall bladder successfully through an unmagnified mechanical rigid pipe.Dubois is credited for popularising laparoscopic cholecystectomy.[3]

Various parameters like age, sex, body mass index (BMI), history of previous abdominal surgery, ultrasonography findings of gall bladder wall thickness, contracted gall bladder, peri-cholecystic fluid, size of stone and haematological findings like raise total leucocytes count, alkaline phosphatase; liver enzymes were added in recent studies to predict difficult Laparoscopic Cholecystectomy. These parameters/ predictors are important because if chances of conversion can be accurately predicted pre-operatively, then the surgeon can prepare for a possible longer and more difficult surgery and patient can also be forewarned about the possibility of conversion.[4- 6] This study was conducted to analyse whether these parameters could be

used pre-operatively for prediction of difficult laparoscopic cholecystectomy and conversion.

MATERIALS & METHODS

The study was conducted in the department of surgery, Guru Gobind Singh Medical College, Faridkot, Punjab. It was a prospective study from 1st March 2014 to 31st August 2015. Patients who attended the Outdoor Patient Department (OPD) with history of symptomatic Gallstone Disease were enrolled and elective surgery was performed after clinical assessment, Routine Investigations and Ultrasonography of the abdomen. Patient of all ages and both gender were included in the study. Operating Surgeons were the same throughout the study and each of them have the experience of laparoscopic cholecystectomy of more than 25 cases. Before proceeding to surgery, patients were screened for any disease that was contraindicated to surgery or any exclusion criteria were ruled out. All patients with symptomatic gall stone disease not listed in the exclusion criteria were included in the present study.

EXCLUSION CRITERIA

1) Patient not fit for general anaesthesia
2) Patient with bleeding disorder
3) Patient with generalised peritonitis
4) Patient with cholangiogenic shock
5) Patient with chronic pulmonary obstructive disease
6) Patient with heart disease
7) Cirrhosis of liver with portal hypertension
8) Cholecystic-intestinal fistula
9) Gall bladder carcinoma
10) Pregnant women
11) Gangrenous cholecystitis
12) Common bile duct stone

Patients enrolled for the study were informed about the study and a written consent was taken, patients were also informed about the possibility of conversion to open cholecystectomy before proceeding to surgery. Detail medical history of all patients were recorded, demographic data like age, sex, weight, height and body mass index (BMI) were measured before the surgery. Heamatological blood investigations were done prior to surgery. Special emphasis were given to total leukocyte count (TLC), Alkaline phosphatase (ALP), S.Bilirubin, and liver enzymes. Ultrasonography of the abdomen was done in all patients before surgery and various parameters were recorded.

At the time of surgery, duration of surgery was recorded. The duration of surgery was taken from the time the veress'neddle was inserted or incision made in case of Hasson technique, to the closure of the skin. 90 minutes of time was considered as ample time to complete a Laparoscopic Cholecystectomy without any difficulty. Duration of more than 90 minutes of surgery was considered as having difficulty and further delaying was unfruitful and laparoscopy was converted to open cholecystectomy. The decision to convert was solely taken by the operating surgeon reasons for conversion such as adhesions, bleeding, common bile duct injury etc were recorded at the end of the surgery.After the surgery, patients were group into 2 categories;

- those who had a successful laparoscopic cholecystectomy
- those cases who had conversion to open cholecystectomy

Laparoscopic cholecystectomy was performed in all the patients. All the results were recorded and analyzed by SPSS software. Chi- square test and student t test were used for the assessment of level of significance.

RESULTS

A prospective analytical study on 112 cases of laparoscopic cholecystectomy was done from March 2013 to August 2015. All the cases were elective surgery and operated by the same surgeons in a single surgical unit throughout the study period. In our study age > 50 years was associated with risk of conversion/difficult laparoscopic cholecystectomy. Sensitivity was 95.9% with a positive predictive value of 95% (**p-value < 0.05**). Conversion rate among the age group >50 years was 61.5% whereas the conversion rate among the age group <50 was only 5%. Male gender was associated with a higher rate of conversion to open cholecystectomy/difficult laparoscopic cholecystectomy. Sensitivity was 86.8% and positive predictive value was 91.4% with a p value 0.035. Conversion rate among male was 27.7% where as in female it was 8.5%. Body Mass Index (BMI) > 30kg/m^2 had a significant co-relation with risk of conversion to open cholecystectomy Sensitivity was 96.9% and positive predictive value was 94.1%. p value was 0.000, the conversion rate among cases with BMI >30kg/m^2 was 70%. Conversion rate in those cases with BMI < 30 kg/m^2 was 5.8%. In obese cases there was difficulty in accessing the abdominal cavity.

Table 1: Distribution of the patients on the basis of age

Age	Frequency	Percent
<50	100	89.3
≥50	12	10.7
Total	112	100

Graph 1: Distribution of the patients on the basis of age

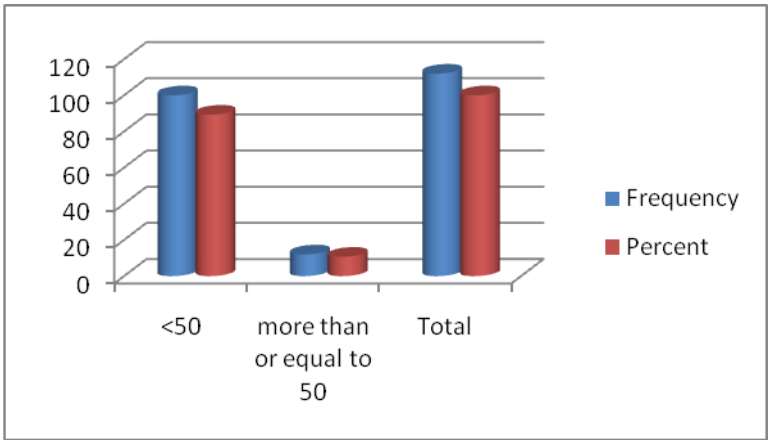

Table 2: Correlation of patients undergoing laparoscopy divided on the basis of age

Age	Prediction		Total	Chi Sq.	P value
	Laparoscopic	Conversion			
<50	95	5	100	39.712	.000
≥50	4	8	12		
Total	99	13	112		

Table 3: Correlation of patients undergoing laparoscopy divided on the basis of gender

Age	Prediction		Total	Chi Sq.	P value
	Laparoscopic	Conversion			
Female	86	8	94	5.466	.035
Male	13	5	12		
Total	99	13	112		

Table 4: Correlation of patients undergoing laparoscopy divided on the basis of BMI

BMI	Prediction		Total	Chi Sq.	P value
	Laparoscopic	Conversion			
<30	96	6	102	36.492	.000
≥30	3	7	10		
Total	99	13	112		

DISCUSSION

Since 1987, when Philipe Mouret first performed the first Laparoscopic Cholecystectomy,[7] it has been widely performed throughout the world. It is believed that around 80% of cholecystectomy is performed through laparoscopy in the west which is not the case in the developing countries due to factors like cost, non-availability of equipment, poor health infrastructure etc. nonetheless Laparoscopic Cholecystectomy has become the gold standard for the treatment of symptomatic gall stone disease.[1]

A large number of studies have reported the conversion rate of Laparoscopic Cholecystectomy to open cholecystectomy at 2 to 15 %.[8, 9] Conversion to Open Cholecystectomy is not a setback to the surgeon but is considered a wise decision on the part of the operating surgeon. The risk of conversion to Open Cholecystectomy is related to various factors like the surgeon factor, equipment failure and more importantly patient's factors. Surgeon learning curve may be a factor as experience surgeon has lesser rate of conversion. A large number of clinical studies have reported patient's risk factors like age, sex, BMI and previous abdominal surgery. USG findings like contracted gall bladder, large single stone, gall bladder wall thickness and peri-cholecystic fluid collection are associated with difficult laparoscopic cholecystectomy.[8] Heamatological parameters like raised total leucocytes count and serum Alkaline phosphatase are reported as risk factors for difficult laparoscopic cholecystectomy.[10, 11]

Various studies had found male gender as a risk factor for conversion with probable reasons being due to more frequent association with severe disease i.e. both acute and chronic cholecystitis and due to higher percentage of intra-abdominal and visceral adipose tissue than women.[12- 14] Men are also less likely to seek medical attention than women.[15] In contrast other authors did not find any significant relation between conversion and male gender[16], but in this study male gender was a significant factor for conversion of Laparoscopic to open cholecystectomy (**p value= .035**).

Many studies had found morbid obesity to be associated with increased risk of conversion. Various body mass index (BMI) level like BMI > 27, BMI>30 and BMI> 35 were studied. On the other hand some studies found no such association.[16, 17] In this study BMI > 30kg/m^2 was found to be associated with higher rate of conversion of laparoscopic cholecystectomy to open cholecystectomy (**p-value< .005**). Obesity gives rise to technical difficulty in accessing the abdominal cavity due to thick abdominal wall, canula displacement, fat laden omentum and Falciform ligament and a heavy liver which is difficult to elevate.

Agrawal et al evaluated a scoring method to predict difficult LC preoperatively. There were 30 cases operated by a single experienced surgeon. There are total 15 score from history, clinical and sonological findings. Score up to 5 predicted easy, 6–10 difficult and >10 are very difficult. Prediction came true in 76.4% for easy and 100% difficult cases; there were no cases with a score above 10. The factors like previous history of hospitalization (P - 0.004), clinically palpable gallbladder (GB) (P - 0.009), impacted GB stone (P - 0.001), pericholecystic collection (P - 0.04), and abdominal scar due to previous abdominal surgery (P - 0.009) were found statistically significant in predicting difficult LC.The proposed scoring system is reliable with a sensitivity of 76.47% and specificity of 100%.[18]Gupta et al analyzed various risk factors and to predict difficulty and degree of difficulty preoperatively by the use of a scoring system.The parameters considered in the preoperative scoring method were old age, male sex, history of hospitalization, obesity, previous abdominal surgery scar, palpable gall bladder, wall thickness of gall bladder, pericholecystic collection and impacted stone. A total of 210 patients were included in the study. They found that history of hospitalization, palpable gall bladder, impacted stone and gall bladder wall thickness were statistically significant factors for prediction of difficult laparoscopic cholecystectomy. Sensitivity and specificity of this preoperative scoring method were found to be 95.74% and 73.68% respectively. Positive predictive values of this scoring method were 90% and 88% for easy and difficult cases respectively. Area under ROC curve was 0.86. Conversion rate from laparoscopic to open cholecystectomy was found to be 4.28%.With the help of accurate prediction, high risk patient may be informed before-hand regarding the probability of conversion and hence they may have a chance to make arrangements accordingly.[19]

Joshi et al conducted a study to develop and validate a scoring system to predict difficult LC preoperatively. History, physical examination, abdominal ultrasound and biochemical parameters were included to develop a scoring system. Hundred patients undergoing LC were included and preoperative scores were calculated preoperatively to predict difficult LC which was compared with operative assessment.Sensitivity and specificity of the preoperative scoring for difficult case was 53.8 % and 89.2 % respectively with PPV of 63.64 % and NPV of 84.62%. Only three parameters were statistically significant to predict difficult LC individually. Area under ROC curve was 0.779.Preoperative scoring system can be used to predict difficult LC. Surgeons can plan operation based on predicted difficulty. Patients and relatives can be counselled preoperatively for the possibility of difficult operation, prolonged hospital stay and increased cost in predicted difficult case.[20]

CONCLUSION

From the above results, the authors conclude that parameters like age, sex, obesity, history of upper abdominal surgery, raised total leucocytes count etc are risks factors and predictors for conversion to open cholecystectomy.

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