

Three-port Versus Four-port Laparoscopic Cholecystectomy- An Interventional Prospective Study in Public Sector Hospitals

T YUVARAJ¹, KS MANIKANTA², G MONISHA³, MIR MD NOORUL HASSAN⁴

ABSTRACT

Introduction: Cholelithiasis is a common ailment and affects about 10% of general population. Currently, the vast majority of operations for cholelithiasis are performed using laparoscopic techniques.

Aim: To compare the three-port laparoscopic cholecystectomy with conventional four-port laparoscopic cholecystectomy.

Materials and Methods: A prospective interventional study was conducted on 180 cases admitted to the hospitals attached to BMCRI, Bengaluru, from November 2018 to November 2020. The clinical profile of each patient was noted. The cases were confirmed by ultrasonography and they were randomised into two groups. One group underwent three-port laparoscopic cholecystectomy and the other group underwent four-port laparoscopic cholecystectomy. Intraoperative complications, conversion rates, postoperative pain, postoperative complications and duration of stay in the

hospital were compared. Statistical data was analysed using Statistical Package for Social Sciences (SPSS) version 20.0 and data was compared using Chi-square test.

Results: Most of the participants were from 31-40 years (45.6%, 44.4%) in both the groups, more common in females. The mean duration of surgery in three-port and four-port group was 30.43±15.964 and 36.81±15.592 minutes, respectively. Out of 90 (100%), 56 (62.2%) in three-port group had Visual Analogue Scale (VAS) score 2 and 66 (73.3%) in four-port group had VAS score 3 ($\chi^2=71.34$; $p=0.001$). Conversion rates to open cholecystectomy were almost similar in both the groups. Hospital stay was also similar in both groups.

Conclusion: A three-port laparoscopic cholecystectomy had lesser operating time and lesser analgesics requirement with similar intra and postoperative complication when compared to four-port laparoscopic cholecystectomy.

Keywords: Cholelithiasis, Chronic calculus cholecystitis, Gall bladder

INTRODUCTION

Cholelithiasis is the most common biliary pathology, accounts for about 10% of world population. Most of the cholelithiasis patients are asymptomatic. The prevalence of gallstone varies widely in different parts of India. Prevalence in North India is two to four folds when compared to those in South India [1,2]. Changing pattern of the disease is due to westernisation and the availability of ultrasonography in both rural and urban areas. Around 3% of the asymptomatic patients will require cholecystectomy per year. Incidence of gallstone disease increases from 21 years and reaches a peak in 5th and 6th decade of life. Women are commonly affected than men. For gall stone disease that is symptomatic, laparoscopic cholecystectomy is a safe method of treatment. Laparoscopic cholecystectomy is the gold standard treatment for gallstone disease [2]. Surgeons all over the world have refined the techniques in laparoscopic cholecystectomy by reducing the size and number of ports. One of the recent concept is Single Port Laparoscopic Surgery (SILS) [3].

The concept of reducing the number of ports though has many advantages in terms of patient outcome such as improved wound healing and reduced morbidity, such techniques also have disadvantages such as lack of adequate exposure and overcrowding of instruments [4]. A study on 132 patients showed that three-port laparoscopic cholecystectomy method did not require conversion to four-port technique in any of the cases, whereas a study on 710 patients reported that 55 cases required an fourth port intraoperatively [5,6]. The role of fourth port has been debatable and it has been mentioned that laparoscopic cholecystectomy can be performed safely with three-ports [7]. The fourth port which is inserted midway between costal margin and the anterior superior iliac spine over the anterior axillary line can be inserted if the need

arises [8,9]. Majority of public sector hospitals avoid three-port laparoscopic cholecystectomy, in spite of various studies showing an advantage of three-port technique over traditional four-port, this may be because of safety concern arising due to lesser number of ports. Thus, this study was conducted to compare the outcomes of three-port laparoscopic cholecystectomy and four-port laparoscopic cholecystectomy in tertiary care public health hospital.

MATERIALS AND METHODS

A prospective interventional study was conducted on inpatient basis at the General Surgery department in the hospitals attached to Bangalore Medical College and Research Institute, Bengaluru (Victoria hospital and Bowring and Lady Curzon hospital). Study period was from November 2018 to November 2020. Institutional ethical committee approval was taken (BMC/PG/124/2018-19). Sample size selected was 180 based on convenience sampling. The cases were confirmed by ultrasonography and they were randomised into two groups. One group (90) underwent three-port laparoscopic cholecystectomy and the other group (90) underwent four-port laparoscopic cholecystectomy.

Inclusion criteria: Patients aged more than 18 years, diagnosed with chronic calculus cholecystitis by Ultrasonography (USG) and willing to give informed consent were included in the study.

Exclusion criteria: Exclusion criteria were patients with acute cholecystitis/carcinoma gall bladder/common bile duct stones/empyema gall bladder.

Study Procedure

The method for the study included patients presenting with right upper pain abdomen, vomiting, fever, dyspepsia or jaundice. Patients with the above symptoms were studied clinically and investigated

in detail as per the standard hospital protocol. Ultrasound of the abdomen was done for all patients. Routine haematological and biochemical investigations were done. Endoscopic Retrograde Cholangiopancreatography (ERCP) was done when indicated. All patients were randomised into two groups (three-port vs four-port) using simple randomisation application. All patients were given symptomatic treatment and Vitamin K for three days pre-operatively. Medically, fit patients were subjected to laparoscopic cholecystectomy. Intraoperative findings such as adhesion (based on visualisation of calot's triangle, cystic duct, cystic artery, gall bladder dissection from liver bed it was classified into no, moderate and dense adhesion), time taken to complete the surgery, complications and conversion rates were noted.

Variables like age, gender, symptoms, ultrasound findings (thickened Gall Bladder (GB) wall and GB distension), intraoperative findings (adhesions, bile spillage, drain placement, duration of surgery and open conversion) and postoperative findings (pain severity, pain duration and surgical site infection) were compared between three-port and four-port group. Postoperatively patients were followed-up for pain {Severity of pain was assessed using 10 cm long horizontal VAS, before administration of analgesic and assessed every 12th hourly to adjust the dosage of analgesia}, duration of hospital stays, and postoperative complications were noted [10]. All cases were followed up for recurrent symptoms.

STATISTICAL ANALYSIS

Statistical analysis was done using SPSS version 20.0 using Chi-square test. The value of <0.05 was considered as statistically significant.

RESULTS

Among the study subjects, majority of them belonged to the age group 31-40 years in both the group, 45.6% and 44.4% in three-port and four-port, respectively. It was followed by 35.6% each in the age group of 41-50 years in both the groups. Chi-square test showed no statistically significant association with respect to age ($\chi^2=1.628$; $p=0.653$) [Table/Fig-1].

Age group (years)	Procedure n (%)		Total
	Three-port	Four-port	
21-30	11 (12.2%)	15 (16.7%)	26 (14.4%)
31-40	41 (45.6%)	40 (44.4%)	81 (45.0%)
41-50	32 (35.6%)	32 (35.6%)	64 (35.6%)
51-60	6 (6.7%)	3 (3.3%)	9 (5.0%)
Total	90 (100.0%)	90 (100.0%)	180 (100.0%)

[Table/Fig-1]: Distribution of subjects according to age group. Chi-square=1.628; p-value=0.653

Gender-wise distribution of the subjects. Out of 90 (100%) subjects in each procedural group, females were found to be higher as compared to males in both the groups is shown in [Table/Fig-2]. Chi-square test showed no statistically significant association with respect to gender ($\chi^2=0.236$; $p=0.627$).

Gender	Procedure n (%)		Total
	Three-port	Four-port	
Female	61 (67.8%)	64 (71.1%)	125 (69.4%)
Male	29 (32.2%)	26 (28.9%)	55 (30.6%)
Total	90 (100.0%)	90 (100.0%)	180 (100.0%)

[Table/Fig-2]: Gender-wise distribution of the subjects. Chi-square=0.236; p-value=0.627

Out of 55 subjects having right upper quadrant pain, 30 (33.3%) and 25 (27.8%) underwent three-port and four-port procedure, respectively. Fever was present in 11 (12.2%) and 12 (13.3%) of the study subjects belonging to groups of three-port and four-port,

respectively. Vomiting was seen in only one patient who underwent three-port procedure. Dyspepsia was present in 21 (23.3%) and 33 (36.7%) of the study subjects belonging to three-port and four-port group respectively. Previous history of pain was present in 83 (92.2%) and 80 (88.9%) of the study subjects who underwent three-port and four-port procedure respectively. History of previous abdominal surgeries was present in one patient in both the groups. Chi-square test showed no significant association between any of the symptoms present in the study subjects to that of group. ($p>0.05$) [Table/Fig-3].

Symptoms	Procedure n (%)		Total	Chi-square	p-value
	Three-port	Four-port			
Right upper quadrant pain	30 (33.3%)	25 (27.8%)	55 (30.6%)	0.655	0.418
Fever	11 (12.2%)	12 (13.3%)	23 (12.8%)	0.5	0.823
Vomiting	1 (1.1%)	0	1 (0.6%)	1.006	1
Dyspepsia	21 (23.3%)	33 (36.7%)	54 (30.0%)	3.81	0.051
Previous history of pain	83 (92.2%)	80 (88.9%)	163 (90.6%)	0.585	0.445
Previous abdominal surgeries	1 (1.1%)	1 (1.1%)	2 (1.1%)	0.001	1

[Table/Fig-3]: Distribution according to symptoms.

Out of 90 (100%) subjects in each group, Diabetes Mellitus (DM) was found in 4 (4.4%) and 5 (5.6%) subjects in three-port and four-port groups, respectively. Hypertension was found in 2 (2.2%) and 3 (3.3%) subjects in three-port and four-port groups, respectively. Hypertension with DM was found in 3 (3.3%) subjects in three-port group. About 79 subjects (87.8%) in three-port and 81 (90%) subjects in four-port group had no co-morbidities. Chi-square test was applied to associate co-morbidities with procedure. Chi-square test showed no statistically significant association with respect to co-morbidities ($\chi^2=1.34$; $p=0.96$).

Thickened GB wall on USG was seen among 70 subjects, out of which 33 (36.7%) were in three-port group and 37 (41.1%) in four-port group. Chi-square test showed no statistically significant association with respect to thickened GB wall ($\chi^2=0.374$; $p=0.54$).

Gall bladder was distended in 15 (16.7%) subjects each in both the groups (three-port and four-port). Chi-square test showed no statistically significant association with respect to distended gall bladder ($\chi^2=0.001$; $p=1.0$).

Distribution of the subjects based on adhesions. Chi-square test showed no statistically significant association with respect to adhesions ($\chi^2=0.583$; $p=0.74$) is shown in [Table/Fig-4].

Adhesions	Procedure n (%)		Total
	Three-port	Four-port	
Dense	5 (5.6%)	3 (3.3%)	8 (4.4%)
Moderate	6 (6.7%)	7 (7.8%)	13 (7.2%)
No	79 (87.8%)	80 (88.9%)	159 (88.3%)
Total	90 (100.0%)	90 (100.0%)	180 (100.0%)

[Table/Fig-4]: Distribution of the subjects based on adhesions. Chi-square=0.583; p-value=0.747

Out of 90 (100%) subjects in each group, 13 (14.4%) in three-port group and 11 (12.2%) in four-port group had bile spillage. Chi-square test was applied to associate bile spillage with procedure. Chi-square test showed no statistically significant association with respect to bile spillage ($\chi^2=0.192$; $p=0.661$).

Out of 90 (100%) subjects in each group, 12 (13.3%) in three-port group and 8 (8.9%) in four-port group had drain placed. Chi-square test showed no statistically significant association with respect to drain placement ($\chi^2=0.9$; $p=0.343$).

The mean duration of surgery in three-port and four-port group was 30.43 ± 15.964 and 36.81 ± 15.592 minutes. Unpaired t-test showed significant mean difference between the two groups in relation to duration of surgery ($p=0.007$) [Table/Fig-5].

Procedure	N	Duration (minutes)		Mean difference	p-value
		Mean	Std. Deviation		
Three-port	90	30.43	15.964	-6.378	0.007
Four-port	90	36.81	15.592		

[Table/Fig-5]: Comparison of duration of surgery in both the groups.

Out of 90 (100%) subjects in each group, 56 (62.2%) in three-port group had VAS score two and 66 (73.3%) in four-port group had VAS score three. Chi-square test was applied to associate VAS scores with procedure. Chi-square test showed statistically significant association with respect to VAS scores ($\chi^2=71.34$; $p=0.001$) [Table/Fig-6].

VAS scores	Procedure n (%)		Total
	Three-port	Four-port	
2	56 (62.2%)	2 (2.2%)	58 (32.2%)
3	27 (30.0%)	66 (73.3%)	93 (51.7%)
4	4 (4.4%)	16 (17.8%)	20 (11.1%)
5	0	3 (3.3%)	3 (1.7%)
6	2 (2.2%)	3 (3.3%)	5 (2.8%)
7	1 (1.1%)	0	1 (0.6%)
Total	90 (100.0%)	90 (100.0%)	180 (100.0%)

[Table/Fig-6]: Distribution of the subjects based on vas scores.

Chi-square=71.341; p-value=0.001*

Out of 90 (100%) subjects in each group, 43 (47.8%) in three-port group had three painful days and 55 (61.1%) in four-port group had four painful days. Chi-square test was applied to associate painful days with procedure. Chi-square test showed statistically significant association with respect to painful days ($\chi^2=34.35$; $p=0.001$) [Table/Fig-7].

Painful days	Procedure n (%)		Total
	Three-port	Four-port	
2	2 (2.2%)	0	2 (1.1%)
3	43 (47.8%)	14 (15.6%)	57 (31.7%)
4	41 (45.6%)	55 (61.1%)	96 (53.3%)
5	1 (1.1%)	17 (18.9%)	18 (10.0%)
7	2 (2.2%)	1 (1.1%)	3 (1.7%)
8	1 (1.1%)	3 (3.3%)	4 (2.2%)
Total	90 (100.0%)	90 (100.0%)	180 (100.0%)

[Table/Fig-7]: Distribution of the subjects based on painful days.

Chi-square=34.352; p-value=0.001*

Out of 90 (100%) subjects in each group, 69 (76.7%) in three-port group and 62 (68.9%) in four-port group had three days hospital stay. Chi-square test was applied to associate hospital stay with procedure. Chi-square test showed no statistically significant association with respect to hospital stay ($\chi^2=2.31$; $p=0.88$).

Out of 90 (100%) subjects in each group, Surgical Site Infection (SSI) was found in 1 (1.1%) and 2 (2.2%) subjects in three-port and four-port groups respectively. Chi-square test showed no statistically significant association with respect to postoperative complications ($\chi^2=0.339$; $p=1.00$).

Out of 90 (100%) subjects in each group, 82 (91.1%) in three-port group and 86 (95.6%) in four-port group had no conversion. Five (5.6%) and 3 (3.3%) had conversion to four-port procedure (C-4) and open surgery (C-O), respectively in the three-port group. 4 (4.4%) had conversion to open in the four-port group. Chi-square

test was applied to associate conversion with procedure. Chi-square test showed no statistically significant association with respect to conversion ($\chi^2=03.25$; $p=0.196$) [Table/Fig-8].

Conversion	Procedure n (%)		Total
	Three-Port	Four-Port	
C-4	5 (5.6%)	0	5 (2.8%)
C-O	3 (3.3%)	4 (4.4%)	7 (3.9%)
No conversion	82 (91.1%)	86 (95.6%)	168 (93.3%)
Total	90 (100.0%)	90 (100.0%)	180 (100.0%)

[Table/Fig-8]: Distribution according to conversion.

Chi-square=3.254; p-value=0.196

Among the 91 study subjects who had multiple calculi on USG, 1 (20%) and 4 (57.1%) had conversion to four-port and open, respectively. Among 89 (49.4%) of the study subjects who had single calculi, 4 (80%) and 3 (42.9%) had conversion to four-port and open respectively. Chi-square test showed no significant association found between the conversion rates and the number of calculi ($p=0.652$).

Among the 70 study subjects who had no thickened gall bladder wall on USG, 2 (40%) and 5 (71.4%) had conversion to four-port and open respectively. Among 70 (38.9%) of the study subjects who had thickened gall bladder, 3 (60%) and 2 (28.6%) had conversion to four-port and open respectively. Chi-square test showed no significant association found between the conversion rates and the gall bladder thickness ($p=0.86$) [Table/Fig-9].

USG findings		Conversion			Total	Chi-square	p-value
		C-4	C-O	No conversion			
No. of calculi	Multiple	1 (20.0%)	4 (57.1%)	86 (51.2%)	91 (50.6%)	0.854	0.652
	Solitary	4 (80.0%)	3 (42.9%)	82 (48.8%)	89 (49.4%)		
Thickened GB wall	No	2 (40.0%)	5 (71.4%)	103 (61.3%)	110 (61.1%)	0.29	0.86
	Yes	3 (60.0%)	2 (28.6%)	65 (38.7%)	70 (38.9%)		
Total		5 (100.0%)	7 (100.0%)	168 (100.0%)	180 (100.0%)		

[Table/Fig-9]: Cross tabulation of USG findings with conversion.

Of the study subjects who had conversion to four-port, 2 (40%) and 1 (20%) had dense and mild type of adhesions. Of the study subjects who had conversion to open surgery, 6 (85.7%) and 1 (14.3%) had dense and mild type of adhesions. There was significant association found between type of adhesions and conversion rate ($p=0.001$). Of the study subjects who had conversion to four-port and open procedure, 1 (20%) in four-port and 1 (14.3%) in open had thickened gall bladder respectively. Chi-square showed no significant association between gall bladder thickness and conversion rate ($p=0.867$). Of the study subjects who had conversion to four-port and open procedure, 3 (60%) in four-port and 7 (100%) in open had bile spillage, respectively. There was significant association found between bile spillage and conversion rate ($p=0.001$) [Table/Fig-10].

DISCUSSION

In the present study, age distribution, gender distribution, symptomatology distribution, co-morbidities distribution and ultrasonography distribution between three-port and four-port group were statistically similar. Intraoperative findings like adhesion, gall bladder distension, bile spillage and conversion rate among the two groups were similar without any statistically significant differences. Intraoperative adhesions and bile spillage were the predominant reasons for conversion and the results were similar to Kumar P and

Intraoperative findings		Conversion			Total	Chi-square	p-value
		C-4	C-O	No conversion			
Adhesions	Dense	2 (40.0%)	6 (85.7%)	0	8 (4.4%)	106.975	0.001
	Mild	1 (20.0%)	1 (14.3%)	11 (6.5%)	13 (7.2%)		
	Nil	2 (40.0%)	0	157 (93.5%)	159 (88.3%)		
Distended/ thickened gall bladder	No	4 (80.0%)	6 (85.7%)	140 (83.3%)	150 (83.3%)	0.285	0.867
	Yes	1 (20.0%)	1 (14.3%)	28 (16.7%)	30 (16.7%)		
Bile spillage	No	2 (40.0%)	0	154 (91.7%)	156 (86.7%)	47.341	0.001
	Yes	3 (60.0%)	7 (100.0%)	14 (8.3%)	24 (13.3%)		
Total		5 (100.0%)	7 (100.0%)	168 (100.0%)	180 (100.0%)		

[Table/Fig-10]: Cross tabulation of USG findings with conversion.

Rana AKS, [9]. A three-port laparoscopic cholecystectomy did not alter the rate of conversion as it was not statistically significant and it was in consistent with Singhal R et al., [11]. Majority of the complications seen in three-port and four-port were dealt without any form of conversion. No major complications like vascular or bile duct injuries were seen in both the groups signifying that three-port laparoscopic cholecystectomy does not alter the rates of complications, it's in agreement with Al-Azawi D et al., and Reshie TA et al., [8,12]. In the present study, three-port laparoscopic cholecystectomy took less time to finish the procedure than four-port laparoscopic cholecystectomy, probably this time difference may be attributed to the additional port insertion in four-port and it was in consistence with Harsha H et al., (44 mins for three-port and 47.6 minutes for four-port laparoscopic cholecystectomy) [13]. Out of 90(100%) subjects in each group, 56 (62.2%) in three-port group had VAS score two and 66 (73.3%) in four-port group had VAS score three in consistence with Reshie TA et al., and Kumar M et al., [12,14]. Out of 90 (100%) subjects in each group, 43 (47.8%) in three-port group had three painful days and 55 (61.1%) in four-port group had four painful days which was similar to Reshie TA et al., and Kumar M et al., [12,14]. Duration of analgesia required is less in three-port group when compared with four-port group with statistically significant differences. Three-port laparoscopic cholecystectomy did not change the duration of hospital stay and the rates of postoperative complications in contrast with Kumar P and Rana AKS [9].

Four studies show decrease operating time in three-port laparoscopic cholecystectomy when compared to four-port laparoscopic cholecystectomy which is consistent with the present study [Table/Fig-11]. All 7 studies, show decrease postoperative pain in three-port over four-port laparoscopic cholecystectomy [8,9,11-15]. Thus, findings of previous studies are consistent with those of the present study.

Based on the above studies, it may be recommended for surgeon to begin the procedure with the three-ports and the extra port can be added if needed. The surgeon performing three-port

Studies	Operating time (Mean duration)		Pain severity (VAS) score	
	Four-port	Three-port	Four-port	Three-port
Al-Azawi D et al., [8]	48.9 min	46.1 min	High score (54.3%)	Low score (60.7%)
Kumar M et al., [14]	60.8 min	47.3 min	2.91 (Mean)	2.19 (Mean)
Harsha H et al., [13]	47.6 min	44.0 min	Low score (76%)	Low score (84%)
Reshie TA et al., [12]	47.6 min	50.2 min	2.16 (Mean)	1.72 (Mean)
Singhal R et al., [11]	50.7 min	93.2 min	High	Low
Kumar P and Rana AKS [9]	42.1 min	46.0 min	6.6 (Mean)	5.7 (Mean)
Shivakumar S et al., [15]	75.8 min	54.3 min	5.0 (Mean)	4.4 (Mean)
Present study	36.8 min	30.4 min	3.0 (Mean)	2.2 (Mean)

[Table/Fig-11]: COMPARISON OF DIFFERENT STUDIES [8,9,11-15].

MIN-MINUTES

laparoscopic cholecystectomy should not hesitate to convert if the need arises and it should not be considered as failure of surgery. Patient's safety is of utmost importance while performing either of the procedures.

Limitation(s)

The yielding results in our study may be due to the expertise of the surgeons in both three and four-port techniques, while this result may not be obtained with surgeons who are only trained in four-port techniques. Probably, this maybe the cause of variable operative duration in previous studies when compared to our study. This limitation can be overcome with training.

CONCLUSION(S)

Based on the present study, it can be concluded that three-port laparoscopic cholecystectomy, was as safe as four-port laparoscopic cholecystectomy. Three-port laparoscopic cholecystectomy had lesser operating time and lesser analgesics requirement with similar intra and postoperative complication when compared to four-port laparoscopic cholecystectomy.

REFERENCES

- Tandon RK. Prevalence and type of biliary stones in India. *World Journal of Gastroenterology*. 2000;6(Suppl3):04-05.
- Rao KS, Meghavathu GN, Rao GS, Prasad T HR. Clinical study of gallstone disease and treatment options. *Journal of Evolution of Medical and Dental Sciences*. 2015;4(79):13841-48.
- Greaves N, Nicholson J. Single incision laparoscopic surgery in general surgery: a review. *Ann R Coll Surg Engl*. 2011;93(6):437-40.
- Khiangte E, Newme I, Patowary K, Kalita H. Single-port laparoscopic cholecystectomy using the innovative e. k. glove port: our experience. *Umezawa A, Agresta F, editors. ISRN Minimally Invasive Surgery*. 2012 Aug 8;2012:697946.
- Endo S, Souda S, Nezu R, Yoshikawa Y, Hashimoto J, Mori T, et al. A new method of laparoscopic cholecystectomy using three trocars combined with suture retraction of gallbladder. *J Laparoendosc Adv Surg Tech A*. 2001;11(2):85-88.
- Slim K, Pezet D, Stencl J Jr, Lechner C, Le Roux S, Lointier P, et al. Laparoscopic cholecystectomy: an original three-trocar technique. *World J Surg*. 1995;19(3):394-97.
- Gorini P, Capizzi FD. A three trocar approach to laparoscopic removal of the gallbladder (Letter). *J Surgical Laparoscopy Endoscopy*. 1997;7:180-81.
- Al-Azawi D, Houssein N, Rayis AB, McMahon D, Hehir DJ. Three-port versus four-port laparoscopic cholecystectomy in acute and chronic cholecystitis. *BMC Surgery*. 2007;7(1):8.
- Kumar P, Rana AKS. Three-port versus four-port laparoscopic cholecystectomy: a comparative study at a tertiary care centre in North India. *International Surgery Journal*. 2018;5(2):426-32.
- Klimek L, Bergmann K-C, Biedermann T, Bousquet J, Hellings P, Jung K, et al. Visual analogue scales (VAS): Measuring instruments for the documentation of symptoms and therapy monitoring in cases of allergic rhinitis in everyday health care. *Allergo J Int*. 2017;26(1):16-24.
- Singal R, Goyal P, Zaman M, Mishra RK. Comparison of three-port vs four-port laparoscopic cholecystectomy in a medical college in the Periphery. *World J Lap Surg*. 2017;10(1):12-16.
- Reshie TA, Rather ZM, Bhat MY, Ara NA, Ahmed MM. Three-port versus four-port Laparoscopic cholecystectomy-a comparative study. *Int J*. 2015;3(10):1040-44.
- Harsha H, Gunjanvi M, Singh CA, Moirangthem G. A study of three-port versus four-port laparoscopic cholecystectomy. *Journal of Medical Society. Wolters Kluwer Medknow Publications*. 2013;27:208-11.

- [14] Kumar M, Agrawal CS, Gupta RK. Three-port versus standard four-port laparoscopic cholecystectomy: a randomised controlled clinical trial in a community-based teaching hospital in eastern Nepal. JLS. 2007;11(3):358-62.
- [15] Shivakumar S, Arjun MV, Diwakar SR, Sah SK, Shenoy M. 3 Port vs 4 Port laparoscopic cholecystectomy in gall stones disease. Int J Surg Sci. 2020;4(1):375-79.

PARTICULARS OF CONTRIBUTORS:

1. Junior Resident, Department of General Surgery, Bangalore Medical College and Research Institute, Bangalore, Karnataka, India.
2. Assistant Professor, Department of General Surgery, Bangalore Medical College and Research Institute, Bangalore, Karnataka, India.
3. Junior Resident, Department of General Surgery, Bangalore Medical College and Research Institute, Bangalore, Karnataka, India.
4. Professor, Department of General Surgery, Bangalore Medical College and Research Institute, Bangalore, Karnataka, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Manikanta KS,
Assistant Professor, Department of General Surgery, Bangalore Medical College
and Research Institute Fort, K.R. Road Bangalore-560002, Karnataka, India.
E-mail: dr.manisurg@gmail.com

PLAGIARISM CHECKING METHODS: [\[Jain H et al.\]](#)

- Plagiarism X-checker: Nov 30, 2021
- Manual Googling: Jan 25, 2022
- iThenticate Software: Feb 11, 2022 (7%)

ETYMOLOGY: Author Origin**AUTHOR DECLARATION:**

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Nov 28, 2021**Date of Peer Review: **Jan 08, 2022**Date of Acceptance: **Jan 28, 2022**Date of Publishing: **Jul 01, 2022**