

## **Comparative Study of Laparoscopic vs Conventional Duodenal Ulcer Perforation Surgery**

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**Type of Publication:** Original Research Article

**Conflicts of Interest:** Nil

### **Abstract**

**Introduction:** Duodenal perforation is a common complication of duodenal ulcer. Duodenal ulcers are part of a broader disease state categorized as peptic ulcer disease. Peptic ulcer disease refers to the clinical presentation and disease state that occurs when there is a disruption in the mucosal surface at the level of the stomach or first part of the small intestine, the duodenum. The present study was conducted to determine whether the minimal access approach by laparoscopy was equally feasible as the open method.

**Aims and Objectives:** To compare between laparoscopic and conventional repair of perforated duodenal ulcer in term of post-operative pain

complication, hospital stay, operative time resuming normal activity.

### **Material and Methods**

**Study Design:** This study was designed as a randomized comparative study to compare laparoscopic and conventional repair of perforated duodenal ulcer in terms of operative time, postoperative pain, complications, hospital stay, and time to resume normal activities.

**Study Site:** The study was conducted at a tertiary care centre over 18 months.

**Study Population:** The study population consisted of patients over the age of 18 who underwent surgery for perforated duodenal ulcer, either by laparoscopic or conventional methods.

**Sampling Method and Sample Size:** Patients were selected using simple random sampling. All patients with perforated duodenal ulcers presenting during the study period and meeting the inclusion criteria were included.

**Result:** In this study total patients were 60. For Laparoscopic Group, the highest proportion 30.0% was for 40-50 years and the lowest proportion 6.7% was for 60-70 years. Similarly, for Conventional Group, the highest proportion 36.7% was for 40-50 years and the lowest proportion 10.0% was for 30-40 years & 60-70 years.

**Discussion:** Duodenal perforation is one of the commonest causes of acute abdominal pain requiring urgent surgical management. The Laparoscopic management of perforated duodenal ulcer is feasible, effective and decreases morbidity and overall treatment time and cost if performed in properly selected patients.

**Keywords:** Duodenal Perforation, Hospital Stay, Highest Proportion, Mortality Rate, Postoperative Pain

### **Introduction**

Duodenal perforation represents a rare but potentially life threatening condition. The mortality rate ranges from 8% to 25% in published studies. The first description of a perforated duodenal ulcer was made in 1688 by Muralto and reported by Lenepneau. In 1894, Dean reported the first successful surgical closure of a perforated duodenal ulcer. Surgery is still the mainstay of treatment for duodenal perforation.

The first laparoscopic repair for a perforated duodenal ulcer was reported in 1990. Currently, management of perforated duodenal ulcer is most commonly performed via a laparoscopic approach. This has not been associated with any increase in the risk of postoperative complications (intra-abdominal or pulmonary), and it reduces postoperative pain and analgesic requirements.

### **Aims and Objectives**

To compare between laparoscopic and conventional repair of perforated duodenal ulcer in terms of postoperative pain complication, hospital stay, operative time resuming normal activity.

### **Material and Method**

**Study Design:** This study was designed as a randomized comparative study to compare laparoscopic and conventional repair of perforated duodenal ulcer in terms of operative time, postoperative pain, complications, hospital stay, and time to resume normal activities.

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**Sampling Method and Sample Size:** Patients were selected using simple random sampling. All patients with perforated duodenal ulcers presenting during the study period and meeting the inclusion criteria were included.

**Results**

Table 1: The Association between Study Group and Age Group

Age group		Group		Total
		Laparoscopic	Conventional	
20-30 Years	Count	6	5	11
	%	20.0%	16.7%	18.3%
30-40 Years	Count	8	3	11
	%	26.7%	10.0%	18.3%
40-50 Years	Count	9	11	20
	%	30.0%	36.7%	33.3%
50-60 Years	Count	5	8	13
	%	16.7%	26.7%	21.7%
60-70 Years	Count	2	3	5
	%	6.7%	10.0%	8.3%
Total	Count	30	30	60
	%	100.0%	100.0%	100.0%
Pearson Chi-Square	Value	df	P Value	Result
	3.456a	4	0.485	Non sig

Chi square test for association between two variables was applied, which shows that there was non-significant association between Study Group and Age Group ( $P>0.05$ ). For Laparoscopic Group, the highest proportion 30.0% was for 40-50 years and the lowest

proportion 6.7% was for 60-70 years. Similarly, for Conventional Group, the highest proportion 36.7% was for 40-50 years and the lowest proportion 10.0% was for 30-40 years & 60-70 years.

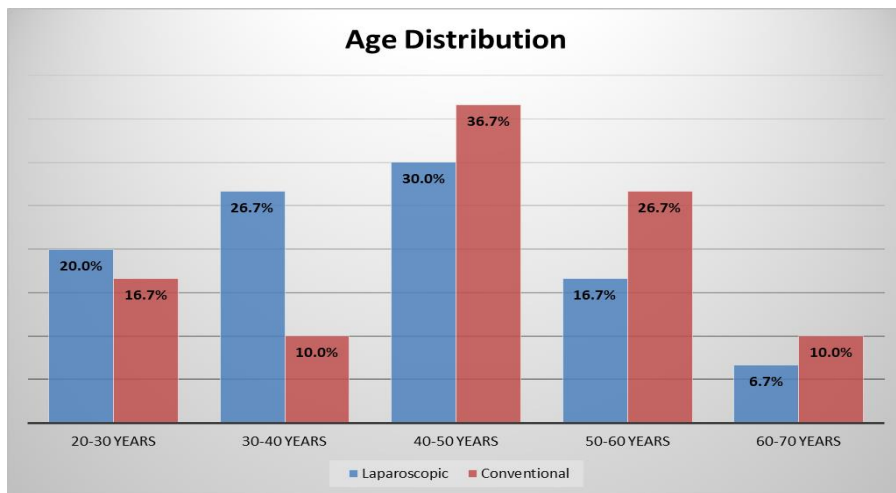


Table 2: The Association between Study Group and Sex Group

Sex		Group		Total	
		Laparoscopic	Conventional		
Female	Count	11	14	25	
	%	36.7%	46.7%	41.7%	
Male	Count	19	16	35	
	%	63.3%	53.3%	58.3%	
		Count	30	30	60
		%	100.0%	100.0%	100.0%
Pearson Chi-Square	Value	df	P Value	Result	
	0.617	1	0.432	Non sig	

Chi square test for association between two variables was applied, which shows that there was non-significant association between Study Group and Sex Group ( $P > 0.05$ ). For Laparoscopic Group, the highest proportion 63.3% was for Male and the lowest proportion 36.7% was for Female. Similarly for Conventional Group, the highest proportion 53.3% was

for Male and the lowest proportion 46.7% was for Female.

Graph 2:

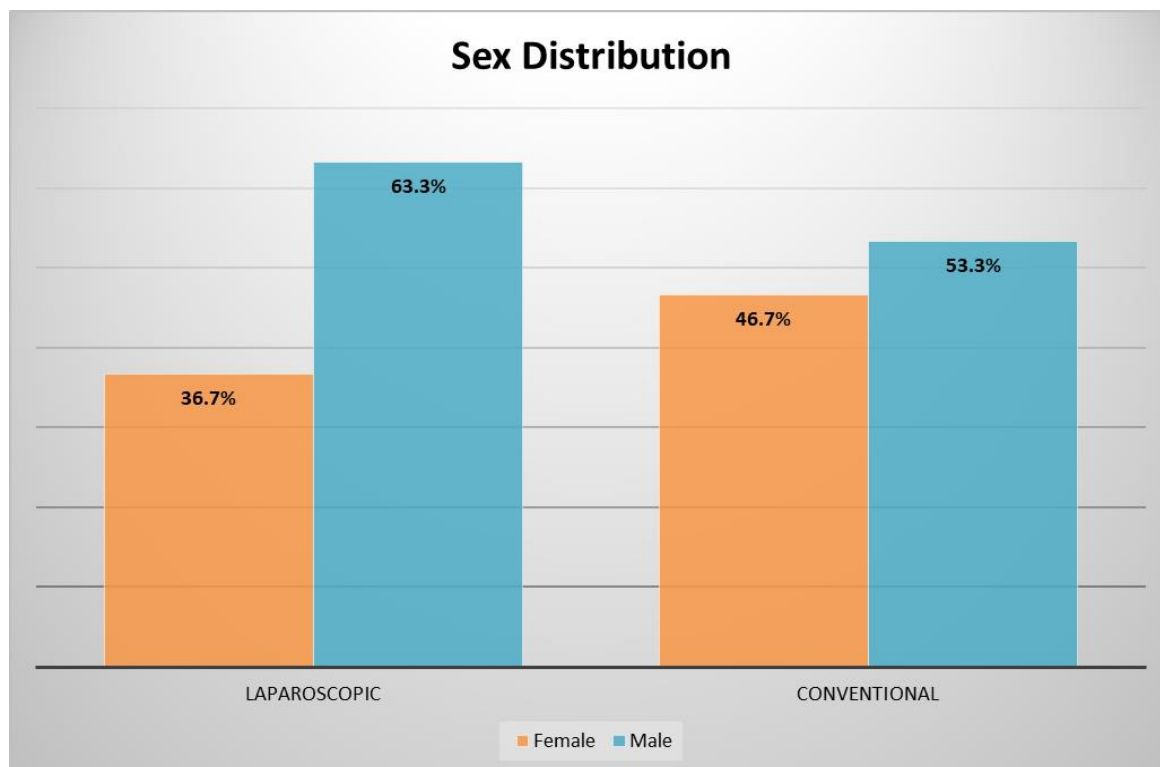


Table 3: The Association Between Study Group and Infection Rate

Infection Rate		Group		Total
		Laparoscopic	Conventional	
Absent	Count	27	21	48
	%	90.0%	70.0%	80.0%
Present	Count	3	9	12
	%	10.0%	30.0%	20.0%
	Count	30	30	60
	%	100.0%	100.0%	100.0%
Pearson Chi-Square	Value	df	P Value	Result
	3.750a	1	0.053	Non sig

Chi square test for association between two variables was applied, which shows that there was non-significant association between Study Group and Infection Rate ( $P > 0.05$ ).

For Laparoscopic Group, the highest proportion 90.0% was for Absence of infection and the lowest proportion 10.0% was for Presence of infection.

Similarly for Conventional Group, the highest proportion 70.0% was for Absence of infection and the lowest proportion 30.0% was for Presence of infection.

Graph 3:

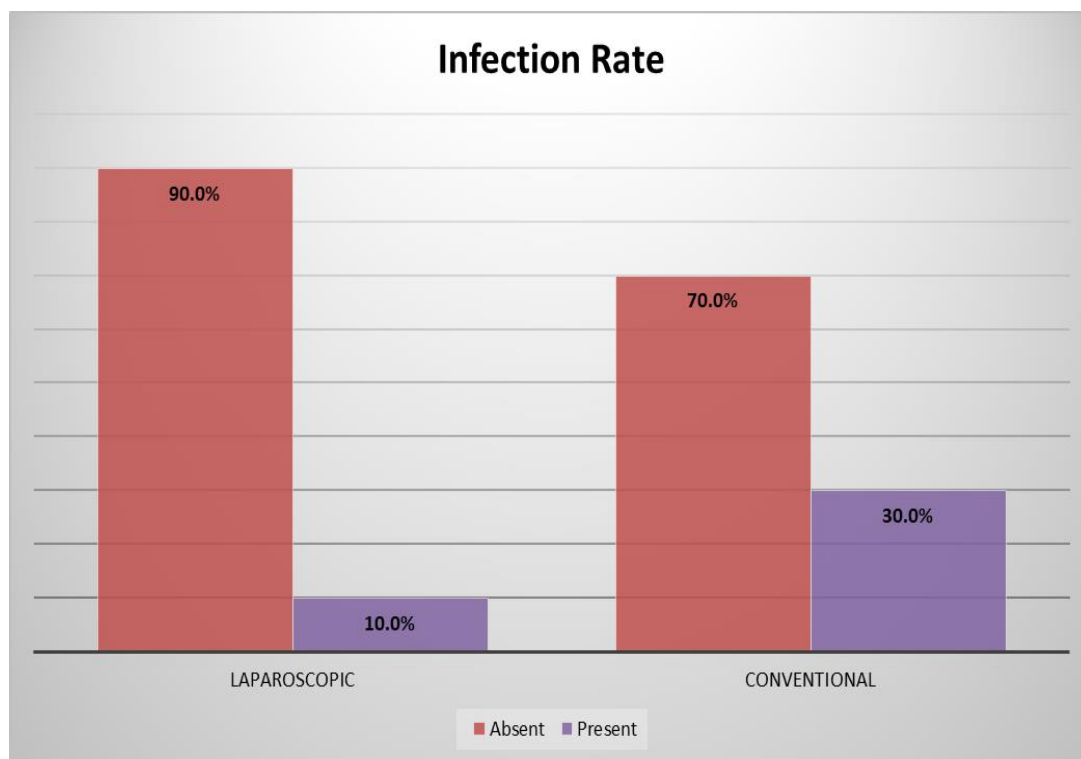


Table 4: The Association between Study Group and Fever Incidence

Fever Incidence		Group		Total
		Laparoscopic	Conventional	
Absent	Count	24	18	42
	%	80.0%	60.0%	70.0%
Present	Count	6	12	18
	%	20.0%	40.0%	30.0%
	Count	30	30	60
	%	100.0%	100.0%	100.0%
Pearson Chi-Square	Value	df	P Value	Result
	2.857a	1	0.091	Non sig

Chi square test for association between two variables was applied, which shows that there was non-significant association between Study Group and Fever Incidence ( $P > 0.05$ ). For Laparoscopic Group, the highest

proportion 80.0% was for Absence of fever and the lowest proportion 20.0% was for Presence of fever.

Similarly, for Conventional Group, the highest proportion 60.0% was for Absence of fever and the lowest proportion 40.0% was for Presence of fever.

Graph 4:

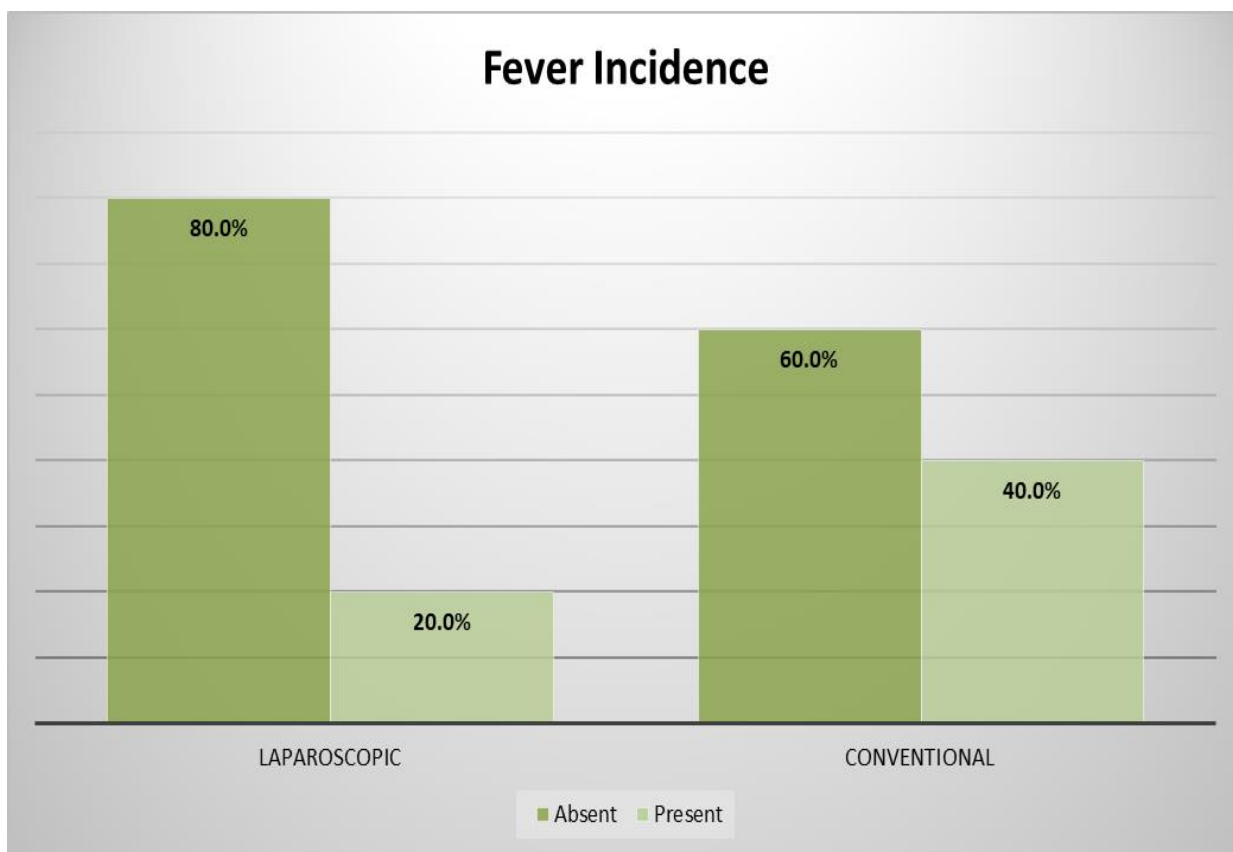


Table 5: The Association between Study Group and Fever Severity

Fever Severity		Group		Total
		Laparoscopic	Conventional	
None	Count	24	18	42
	%	80.0%	60.0%	70.0%
Mild	Count	6	0	6
	%	20.0%	0.0%	10.0%
Moderate	Count	0	12	12
	%	0.0%	40.0%	20.0%
	Count	30	30	60
	%	100.0%	100.0%	100.0%
Pearson Chi-Square	Value	df	P Value	Result
	18.857a	2	0.000	Sig

Chi square test for association between two variables was applied, which shows that there was significant association between Study Group and Fever Severity ( $P < 0.05$ ). In case Laparoscopic Group, the highest proportion 80.0% was for No Severity and 20.0%

proportion was for Mild Severity. Whereas, in Conventional Group, the highest proportion 60.0% was for No Severity and 40.0% proportion was for moderate Severity.

Graph 5:

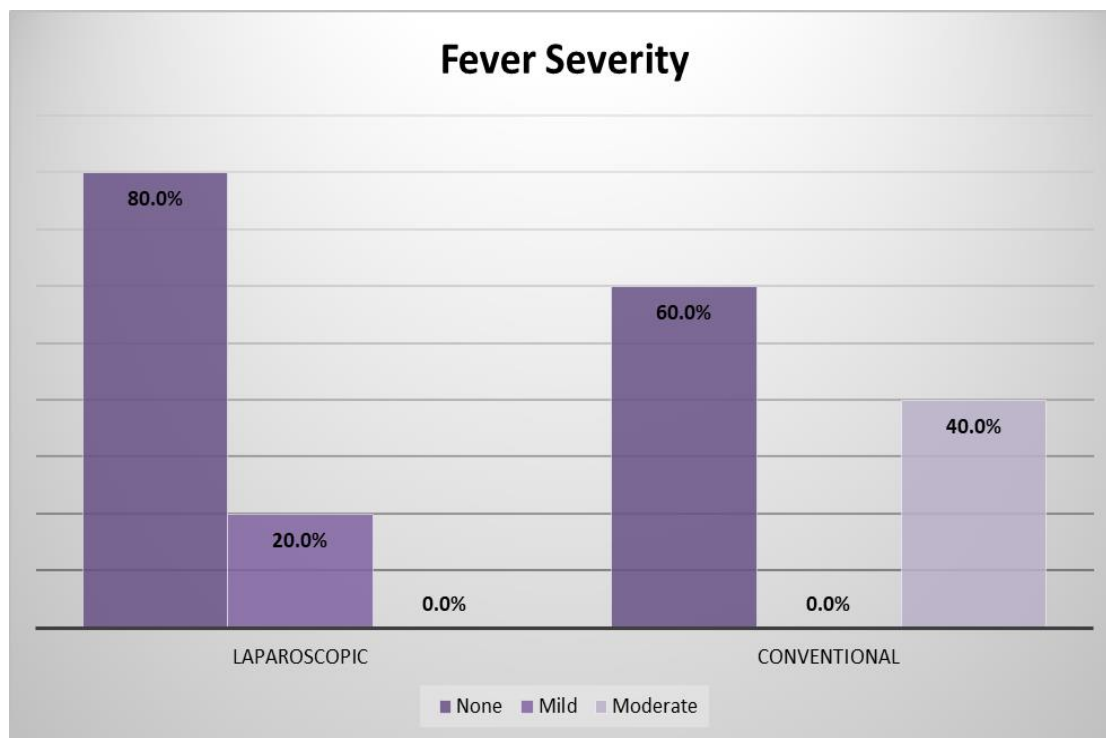


Table 6: The Association between Study Group and Pneumonia Incidence

Pneumonia Incidence		Group		Total
		Laparoscopic	Conventional	
Absent	Count	30	24	54
	%	100.0%	80.0%	90.0%
Present	Count	0	6	6
	%	0.0%	20.0%	10.0%
	Count	30	30	60
	%	100.0%	100.0%	100.0%
Pearson Chi-Square	Value	df	P Value	Result
	6.667a	1	0.010	Sig

Chi square test for association between two variables was applied, which shows that there was significant association between Study Group and Pneumonia Incidence ( $P < 0.05$ ). For Laparoscopic Group, the highest proportion 100.0% was for Absence of

Pneumonia and the lowest proportion 0.0% was for Presence of Pneumonia. Whereas, for Conventional Group, the highest proportion 80.0% was for Absence of Pneumonia and the lowest proportion 20.0% was for Presence of Pneumonia.

Graph 6:

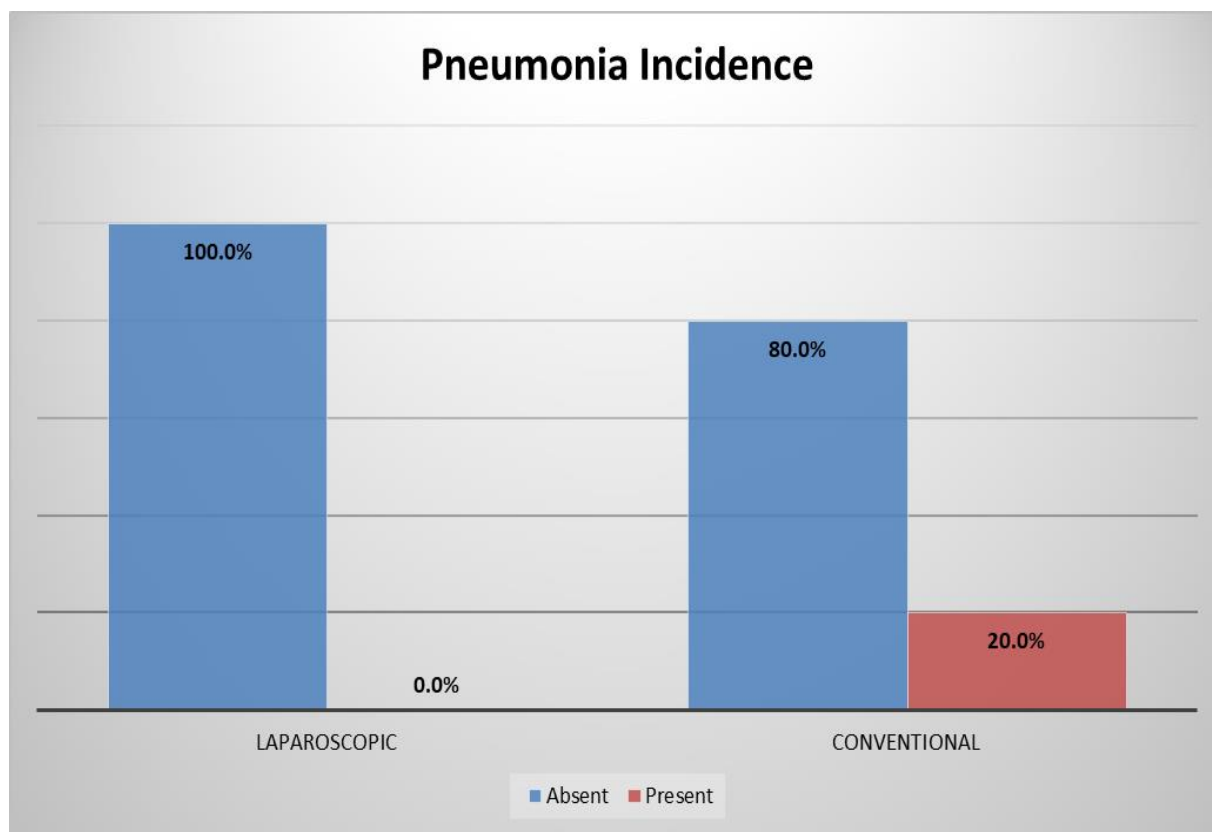




Table 7: The Association Between Study Group and Mortality Rate

Mortality Rate		Group		Total
		Laparoscopic	Conventional	
Alive	Count	30	27	57
	%	100.0%	90.0%	95.0%
Death	Count	0	3	3
	%	0.0%	10.0%	5.0%
	Count	30	30	60
	%	100.0%	100.0%	100.0%
Pearson Chi-Square	Value	df	P Value	Result
	3.158a	1	0.076	Non sig

Chi square test for association between two variables was applied, which shows that there was non-significant association between Study Group and Mortality Rate ( $P > 0.05$ ). For Laparoscopic Group, the highest proportion 100.0% was for Alive and the lowest proportion 0.0% was for Death.

Similarly, for Conventional Group, the highest proportion 90.0% was for Alive and the lowest proportion 10.0% was for Death.

Graph 7:

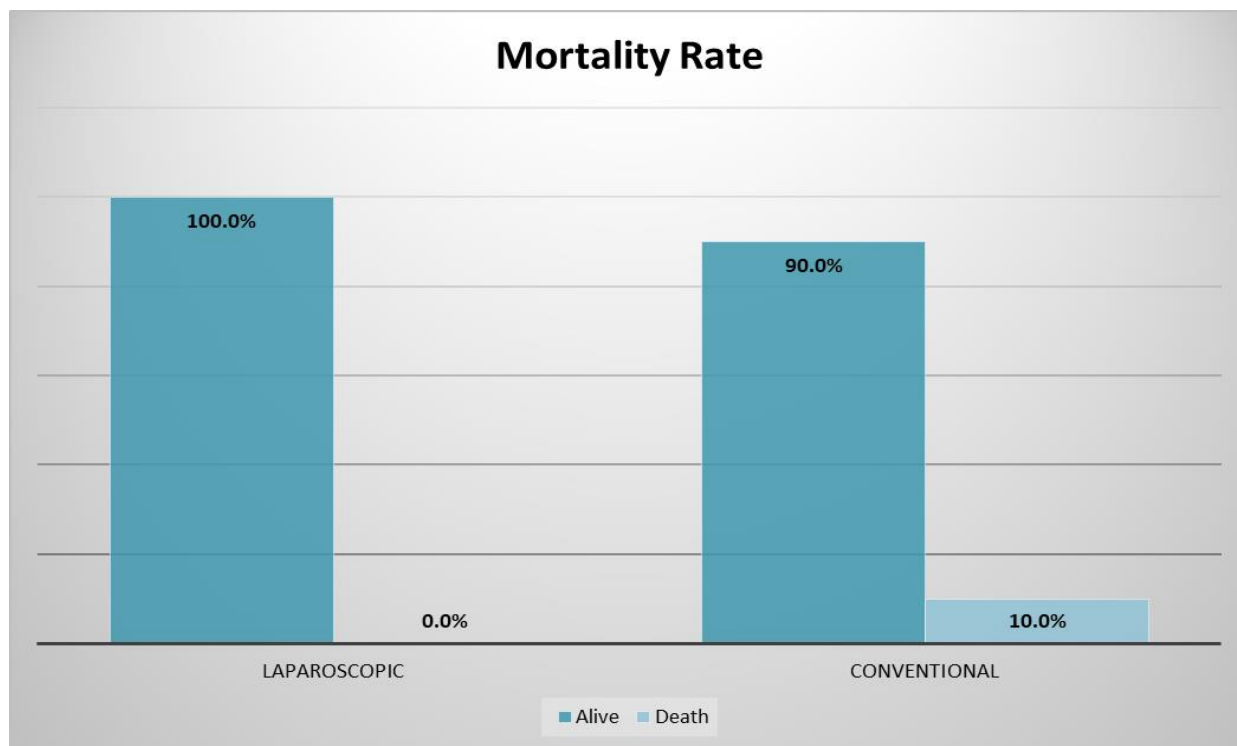


Table 8: Comparison of Mean Duration of Pain Among two study Groups

Variable	Group	N	Mean	Std. Dev	T Test	P Value	Result
Duration of Pain	Laparoscopic	30	2.00	0.788	-12.673	0.000	Sig
	Conventional	30	4.40	0.675			

Independent T-Test for two sample means was applied, which shows there was significant difference in the mean values of two study groups. (P>0.05)

The mean duration of pain was 2.00 days for Laparoscopic Group was found to be statistically significantly lower than the mean duration of pain of 4.40 days for Conventional Group.

Graph 8:

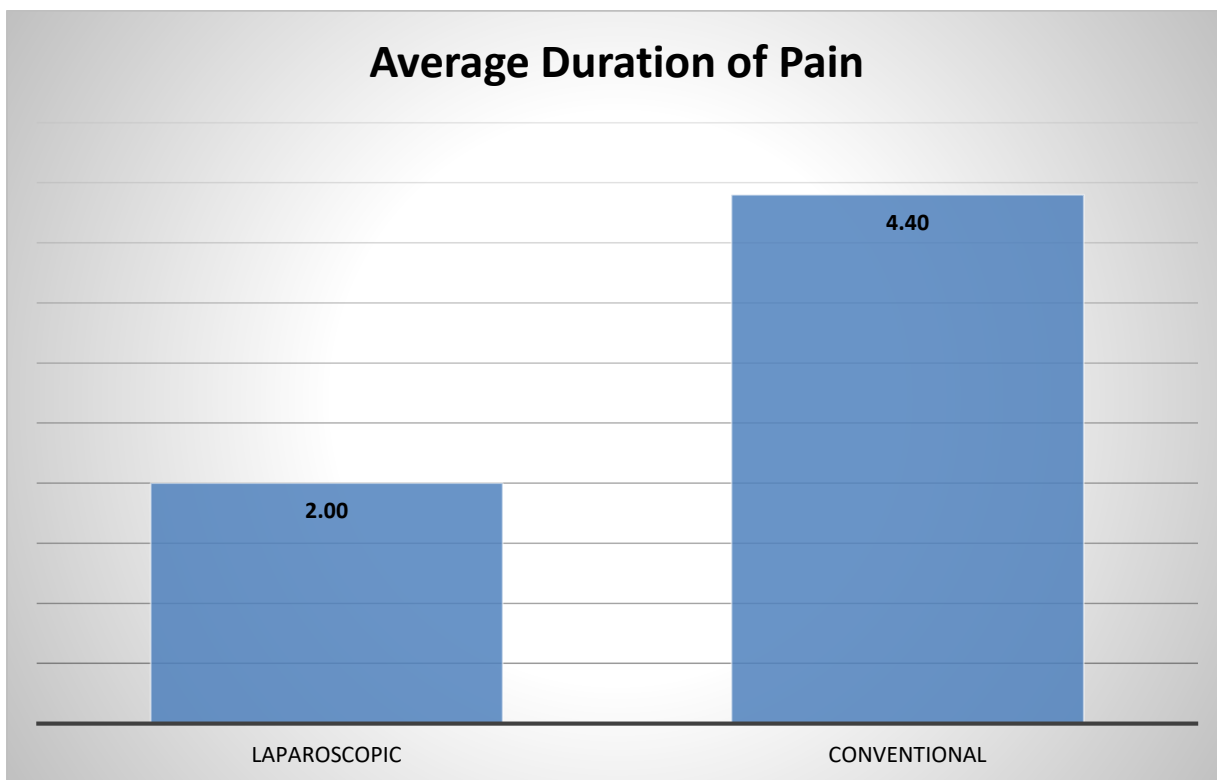


Table 9: Comparison of Mean Duration of Length of Stay among Two Study Groups

Variable	Group	N	Mean	Std. Dev	T Test	P Value	Result
Length of Stay	Laparoscopic	30	3.80	0.761	-10.115	0.000	Sig
	Conventional	30	5.90	0.845			

Independent T-Test for two sample means was applied, which shows there was significant difference in the mean values of two study groups. (P>0.05)

The mean length of stay was 3.80 days for Laparoscopic Group was found to be statistically significantly lower than the mean length of stay of 5.90 days for Conventional Group.

Graph 9:

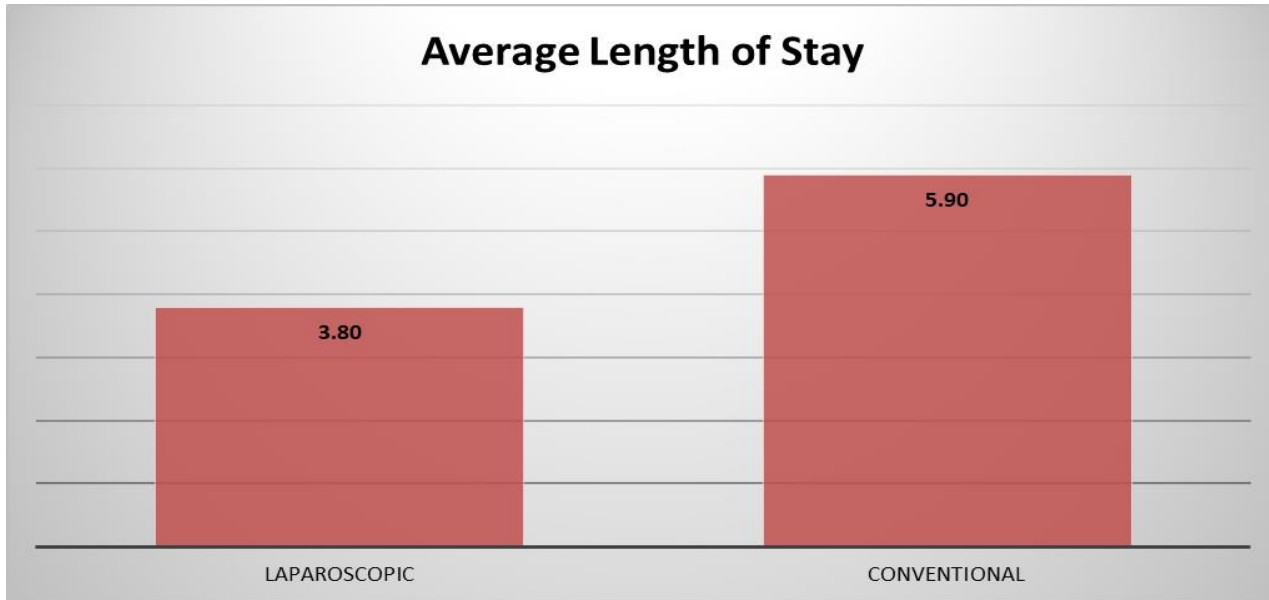


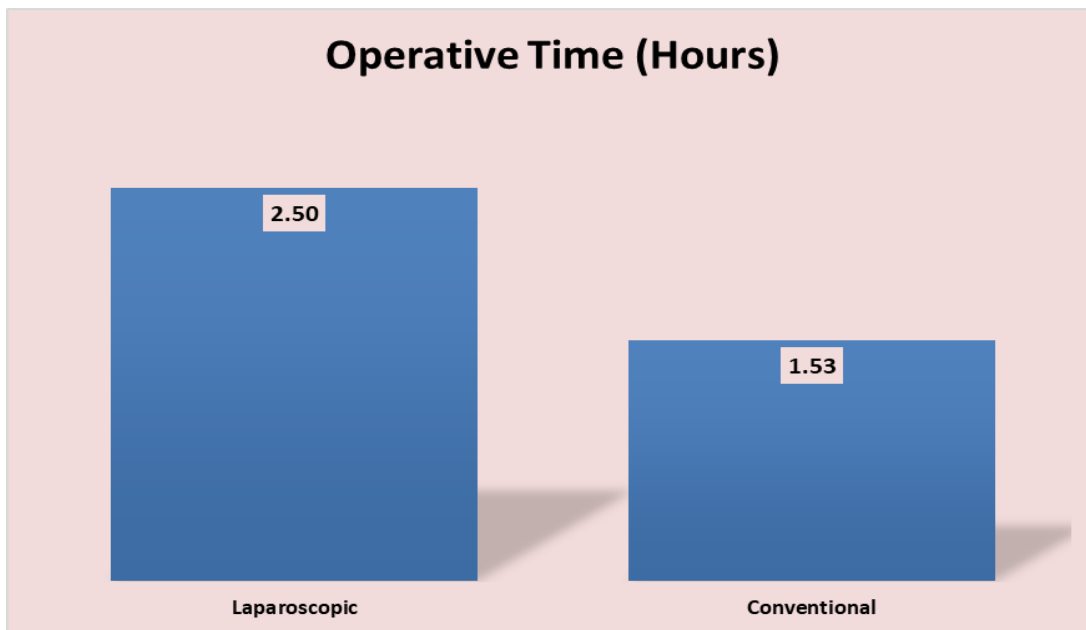
Table 10: Comparison of Mean Operative Time Among two study Groups

Variable	Group	N	Mean Time	Std. Dev	T Test	P Value	Result
Operative Time	Laparoscopic	30	2.50	0.510	7.370	0.000	Sig
	Conventional	30	1.53	0.507			

An independent T-Test for two sample means was applied, which shows there was significant difference in the mean values of two study groups. ( $P < 0.05$ ) The mean operative time for Laparoscopic Group was 2.50

Hours which was found to be statistically significantly higher than the mean operative time of 1.53 hours for Conventional Group.

Graph 10:



## Discussion

In this study total patients were 60. In our study for Laparoscopic Group, the highest proportion for 40-50 years of age was 30.0% and the lowest proportion for 60-70 years of age was 6.7%.

For Laparoscopic Group, the highest proportion for Male was 63.3% and the lowest proportion for Female was 36.7%. Similarly, for Conventional Group, the highest proportion for Male was 53.3% and the lowest proportion for Female was 46.7% for both group majority of patients were males.

The highest proportion for Moderate Pain Severity was 60.0% and the lowest proportion for mild severity was 40.0%.

The highest proportion for Absence of Pneumonia was 100.0% and the lowest proportion for Present was 0.0%.

Whereas, for Conventional Group, the highest proportion for Absence of Pneumonia was 80.0% and the lowest proportion for Presence of Pneumonia was 20.0%.

Operative times between laparoscopic and open/conventional groups, with the laparoscopic approach requiring more time. the mean operative time was 141 minutes for the laparoscopic group versus 106 minutes for the open group ( $t = 4.3$ ,  $P < 0.001$ ), while in our study, the laparoscopic group had a mean time of 2.50 hours compared to 1.53 hours for the conventional group ( $t = 7.370$ ,  $P = 0.000$ ).

## Conclusion

Finally, age and sex did not influence the choice of surgical technique, clinical outcomes such as pain management, pneumonia incidence, and length of hospital stay significantly favored Laparoscopic surgery. These findings suggest that Laparoscopic techniques offer potential advantages in terms of postoperative

recovery and complication rates compared to Conventional surgery, despite similarities in mortality rates and infection/fever incidences.

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