

Short Term Deflation of Stomach during Laparoscopic Surgery: Nasal versus Oral Route - Quasi-Experimental Study

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ABSTRACT

Objectives: To compare the efficacy and complications of orogastric tubes (OGT) versus nasogastric tubes (NGT) for intraoperative gastric decompression in laparoscopic surgeries.

Study Design: Quasi-experimental study.

Place and Duration of Study: Department of Anesthesiology, Combined Military Hospital, Gujranwala Pakistan, from Jan to Dec 23.

Methodology: Patients undergoing laparoscopic cholecystectomy in CMH Gujranwala were included and segregated into two equal groups of 50 each on basis of method used for intra-operative gastric decompression (Orogastric and Nasogastric). The efficacy of method and associated complications of both methods were observed and compared between both groups.

Results: The sampled population included 38.0% males and 62.0% females. ASA-I patients constituted 46.0% of the sample size whereas 54.0% belonged to ASA-II. The OG intubation via second ETT was significantly a better method for intraoperative gastric deflation when compared by attempts to pass the tube ($p<0.001$). The rate of nasal complications was significantly more in Group-B as compared to Group-A ($p<0.001$). A non-significant relationship was seen in terms of mean discharge time ($p=0.68$).

Conclusion: Orogastric tube via second ETT is a safe and more effective method for reducing intraoperative gastric distension during laparoscopic surgery as compared to Nasogastric method.

Keywords: Gastric Decompression, Intraoperative Deflation, Laparoscopic Surgery, Nasogastric Decompression, NG Tube, Orogastric Decompression.

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INTRODUCTION

For the past 200 years, tubes have been used for evacuating liquid or gas from stomach by inserting via nose or mouth. Tube insertion is either therapeutic or prophylactic for gastric decompression during abdominal surgery especially Laparoscopic.¹ Laparoscopic surgery, minimally invasive surgery has revolutionized medical field offering advantages over traditional open surgery i.e. minimal incision, reduced blood loss, less post-operative complications, early recovery and better cosmetic outcome.² Intraoperative gastric distension is a common occurrence in laparoscopic surgery, which can lead to raised abdominal pressure and reduced surgical field visualization.³ Gastric distension increases pre-operative risk of regurgitation, aspiration pneumonia, perforation and also increases the postoperative risk of aspiration, dyspepsia and complications like nausea, vomiting, abdominal discomfort and ileus.⁴ For gastric decompression in operating rooms during

laparoscopic surgeries nasogastric tube (NGT) or Orogastric tube (OGT) is inserted assisted or unassisted by forceps or laryngoscope. A novel technique employed for the purpose is via a 2nd endotracheal tube (ETT).⁵

Commonly and conventionally, nasogastric tubes are being used for gastric deflation in operating rooms during laparoscopic surgeries to reduce intra-op and post-op complications like pulmonary aspiration and also to allow maximum view of operating field for operating surgeon.⁶ As NGT insertion in intubated patients is associated with risk and complications including more number of attempts, risk of nasal trauma, use of laryngoscope or McGill forceps increasing risk of hemodynamic instability or oral trauma.⁷ Also, nasogastric tube is related to major respiratory complications leading to prolonged recovery, antibiotic use and longer hospital stay.⁸ Other method, insertion of OGT via 2nd ETT is blind method, somehow, relatively easier, safer and first-pass success approach especially in intubated patients in operating rooms.⁹ Also orogastric tube via ETT in anesthetized patients facilitates in easy approach for

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tube insertion and gastric deflation, therefore, constitutes a beneficial and preferable route for gastric decompression especially during intra-abdominal surgical procedures.¹⁰

The rationale for conducting this study was to assess and compare the therapeutic effects of intraoperative gastric decompression by inserting orogastric tube via second ETT and nasogastric tube through nasal route using McGill forceps during laparoscopic surgery.

METHODOLOGY

This Quasi-Experimental study was conducted in the Department of Anesthesiology, Combined Military Hospital (CMH), Gujranwala Pakistan, from January 2023 to December 2023 over a period of 12 months following approval from Institutional Ethical Committee (ERB#05-2022/dated 15-09-2022). An informed written consent was taken from patients admitted in CMH Gujranwala during study period for elective laparoscopic cholecystectomy under general anesthesia. Sample size was calculated using WHO Sample size calculator by using the reported complication rate of Laparoscopy (4.65%) versus open technique (20%) for biliary tract surgery¹¹ and it came out to be 95 with confidence level of 95%, margin of error 5% and power of study at 90%:

Total 242 patients with cholelithiasis presented to anesthesia department for pre-op assessment during study period out of which 126 were planned for laparoscopic cholecystectomy. The patients were scrutinized and 100 patients fulfilling inclusion criteria were included in the trial after informed, written consent.

Inclusion Criteria: Patients of either gender with age 20-60 years, undergoing elective laparoscopic surgery under general anesthesia (GA) with American Society of Anesthesiologist (ASA) class I and II were included in the study

Exclusion Criteria: All patients of age less than 20 or more 60 years, BMI >30, ASA class III or IV, positive history of gastric surgery, pregnancy, gastro-esophageal reflux disease (GERD), Nasal Turbinate Hypertrophy, Deviated Nasal Septum (DNS) or any contraindication to orogastric or nasogastric tube placement were excluded.

All patients underwent pre-anesthesia assessment. All patients were admitted and kept nil per oral (NPO) after midnight as per standard operating guidelines. A total of 100 patients

undergoing laparoscopic surgery were segregated into two equal groups of 50 each by Lottery method. In Group-A, gastric decompression was done by OGT via 2nd ETT and in Group-B, NGT was used for decompression. In the Group-A (OGT group), a NG tube with an internal diameter of 14-French was inserted blindly via the second endotracheal tube (ETT) port after endotracheal intubation. In the Group-B (NGT group), a 14-French NG tube was inserted via nose after the induction of anesthesia. Intraoperative, the gastric volume was measured through a catheter connected to the gastric tube.

Patients were extubated and NG tube was removed after surgical intervention, and study outcomes for nasogastric intubation or orogastric placement were recorded. Patients were observed in recovery room till complete weaning off from effects of general anesthesia with neuro-muscular recovery. All patients were shifted to ward and followed up for post-op gastric complications in both group after removal of NG tube.

Primary objective was to compare the efficacy and associated complication of either of the methods and secondary observed outcome was to compare the operating time and time to discharge from the hospital between the two groups.

Variables like patient's age, gender, BMI, ASA class, NG tube attempts, operating time, post-op complications and time to discharge from the hospital were noted in all patients for analysis. Categorical data were presented as numbers and percentages whereas continuous variables as Mean±SD. Data were analyzed using Statistical Package for Social Sciences version 25 (SPSS v25). Normality of data was tested by Kolmogorov-Smirnov test. The qualitative variables were compared using Pearson Chi square test and quantitative variables measures by t-test.

RESULTS

A total of 100 patients were included in the final analysis, 50 patients in either of the groups. The sampled population included 38% males and 62% females. ASA-I patients constituted 46% of the sample size whereas 54% belonged to ASA-II. Kolmogorov-Smirnov test showed that parametric tests could be applied to the data ($p=0.200$ for age and $p=0.154$ for BMI). The patients included in the Group-A (Orogastric method) had a mean age of 41.68 ± 11.48 years ($p=0.811$). The BMI of this group was 27.78 ± 4.27 kg/m² ($p=1.00$). In this group, 40% ($n=20$) belonged to ASA-I while 60% ($n=30$) belonged to ASA-II. The

mean number of attempts made for placement of the tube were 1 ± 0 times. The mean operating time was 63.60 ± 18.27 minutes and time to discharge was 43.68 ± 5.81 hours (Table-I). The patients included in the Group-B (NG method) had a mean age of 42.20 ± 10.15 years ($p=0.811$). The BMI of this group was 27.78 ± 4.27 kg/m² ($p=1.00$). In this group, 51% ($n=26$) belonged to ASA-I while 48% ($n=24$) belonged to ASA-II. The mean number of attempts made for placement of the tube were 1.80 ± 0.80 times. The mean operating time was 72.64 ± 22.04 minutes and time to discharge was 43.20 ± 5.93 hours (Table-I).

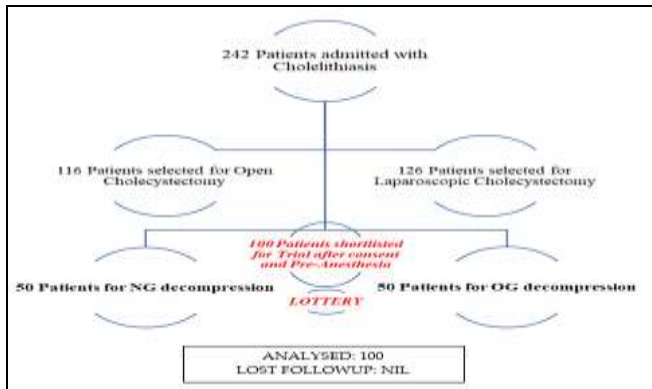


Figure: Patient Flow Diagram

The comparison of attempts made at successful gastric intubation between the two groups showed that the OG intubation via second ETT was significantly a better method for intraoperative gastric deflation ($p<0.001$) (Figure). The incidence of complications was significantly more in Group-B as compared to Group-A ($p<0.001$) (Table-II).

Table-I: Comparison of Baseline Characteristics among Groups (n=100)

Baseline Characteristics		Orogastric Group (n=50)	Nasogastric Group (n=50)	p-value
Age (Mean±SD)		41.68±11.48	42.20±10.15	0.654
Body Mass Index (Mean±SD)		27.78±4.27	27.78±4.27	1.000
ASA Group	ASA-I	20(40.0%)	26(51.0%)	0.182
	ASA-II	30(60.0%)	24(48.0%)	
Operating Time (Mean±SD)		63.60±18.27	72.64±22.04	0.028
Discharge Time (Mean±SD)		43.20±5.93	43.20±5.93	0.681

*ASA: American Society of Anesthesiologist

Table-II: Comparison of Complications between Orogastric and Nasogastric intubation (n=100)

Complication	Orogastric Group (n=50)	Nasogastric Group (n=50)	p-value
Nasal Discomfort, n(%)	0	17(34.0%)	<0.001
Retching, n(%)	6(12.0%)	5(10.0%)	
Tube Misplacement, n(%)	6(12.0%)	0	
Aspiration, n(%)	0	3(6.0%)	
Nil, n(%)	38(76.0%)	22(44.0%)	

The operating time, a steep slope was observed in the middle of the curve, indicating that a lesser operating time was needed for surgery in the OG group (Table-III).

Table-III: Comparison of Gastric Intubation Attempts Nasogastric vs Orogastric (n=100)

Number of Attempts made at successful Gastric Intubation	Nasogastric technique (n=50)	Orogastric technique (n=50)	p-value
First, n(%)	22(44.0%)	50(100.0%)	<0.0001
Second, n(%)	16(32.0%)	0	
Third, n(%)	12(24.0%)	0	

The mean operating time between the two groups showed a significant relationship ($p=0.028$) (Table-IV). The comparison of mean time to discharge from the hospital between the two groups showed a non-significant relationship ($p=0.68$).

Table-IV: Comparison of Operating Time Among Groups (n=100)

Study Group	Mean Operating Time (Minutes±SD)	p-value
Nasogastric (n=50)	72.64±22.04	0.028
Orogastric (n=50)	63.6±18.27	

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DISCUSSION

The finding of this study showed that OG intubation via second ETT was significantly a better method for intraoperative gastric deflation in terms of fewer attempts as well as minimum complications as compared to nasogastric method ($p<0.001$). It is essential for intra-abdominal laparoscopic surgical procedures that gastric decompression may be acquired via orogastric or nasogastric tube to avoid risk of abdominal organ injury during surgery and to enhance view and field of operation. It also important to avoid intra-op complications like gastric contents regurgitation, pulmonary aspiration, and post-op complications i.e. retching, nausea, vomiting.¹² Our study analyzed two methods of gastric deflation during laparoscopic cholecystectomy according to ease and minimal complications. It has been observed in this study that, the mean number of attempts made for gastric decompression via NG tube were 1.80 ± 0.80 times as compared to orogastric tube which was blindly passed through 2nd ETT in first attempt.

In this study, while comparing two methods it was noted, that the OG insertion via second ETT was significantly a better method for intraoperative gastric deflation ($p=<0.001$) with lesser rate of complications ($p=<0.001$). Jong *et al.*, also explained that gastric decompression tube (GDT) usually required for intra-

abdominal laparoscopic procedure and NG tube must be inserted in order to prevent complication and enhance operating view for surgeons.¹³ Other studies in literature report that there was higher incidence of post-op delayed gastric emptying (DGE) in patients undergoing intra-abdominal surgeries with per-op gastric decompression via NG tube, as explained by Lee *et al.*¹⁴ Zhang *et al.*, concluded that fasting protocol and gastric tube provide an equilibrium between minimizing risk of gastric contents aspiration and keeping normal physiological functions per-op and post-op period in patients undergoing abdominal surgery.¹⁵

It was observed in this study that orogastric tube insertion was not associated with complications like nasal bleed, nasopharyngeal trauma, aspiration and hemodynamic variations. Alongside other complications associated with NG tube, Torsy et al documented that NG tube sometimes could be misplaced and tip remained at lower esophageal sphincter (LES) needing re-adjustment as compared to orogastric tube which rarely needs re-adjustment after insertion.¹⁶ Bloom and Seckel et al also concluded that misplaced NG tube was linked with higher incidence of respiratory complications and could leads to severe pulmonary infection prolonging recovery and hospital stay.¹⁷

It was seen in our study that, there was no statistically significant difference in terms of post-op recovery and hospital stay in both methods of per-op gastric decompression. Similarly, Gao et al concluded in a study that there was no difference in terms of recovery time or hospital stay in patients having routine gastric decompression via either orogastric or nasogastric tube.¹⁸ Pearl *et al.*, compared nasogastric tube and orogastric tube in a randomized control trail and observed that NG tube group had longer time to pass first flatus after surgery as compared to orogastric group. However, both groups were similar in terms of recovery, oral diet tolerance and hospital stay.¹⁹

The primary objective was to assess efficacy and associated complications that were noted to be reduced in orogastric group except cost effectiveness that was higher in OG tube group because of utilization of additional ETT for insertion. As per secondary outcome of study, OG tube method was better in terms of post-op care complications and lesser operating time whereas equal hospital stay in both methods was seen. It was observed in another study that success rate of guided orogastric tube as

compared to blind and nasogastric tube insertion ($p=0.0012$, 95% CI for difference 23-67%).²⁰

CONCLUSION

Orogastric tube via second ETT is a safe and more effective method for reducing intraoperative gastric distension during laparoscopic surgery as compared to Nasogastric method in terms of easier approach with fewer attempts and lesser complications Therefore, it can be recommended as an effective alternative to nasogastric tube in managing gastric distension during laparoscopic surgery.

LIMITATION OF STUDY

Only patients undergoing Laparoscopic cholecystectomy were studied and no other intra-abdominal surgeries were included which is also important for authentic results.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

II & HA: Data acquisition, data analysis, critical review, approval of the final version to be published.

AS & HAI: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

MS & A: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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