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Role of Nasogastric Tube in Gastric Surgery-A Comparative Study in a Tertiary Care Hospital of Bangladesh

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Abstract **Original Research Article**

Background: Nasogastric decompression in gastric surgery allows better surgical field and leads to reduction of postoperative complications. The placement of a NG tube can be uncomfortable for the patient, if the patient is not adequately prepared with anesthesia to the nasal passages. Some specific instructions need on how to cooperate with the operator during the procedure. Most surgeons traditionally continue to use nasogastric decompression, believing that its use facilitates a better surgical field and reduces complications such as nausea, vomiting, aspiration, and anastomotic leakage caused by postoperative ileus. ***Aim of the study:*** The aim of the study was to compare the postoperative outcome between the nasogastric tube Group (NG) and the non-nasogastric tube group (NNG). ***Methods:*** In this quasi-experimental study, we enrolled 60 patients as study population who had been surgically treated for malignant and benign diseases in the Department of General Surgery, Bangabandhu Sheikh Mujib Medical University, Bangladesh from April, 2017-March 2018. In total 30 patients (Group I) were randomized into the intubated group and the other 30 patients (Group II) were randomized into the tubeless group. All patients received epidural pain control. Preoperative serum albumin levels, postoperative complications, the passage of stools, mean time to first orally feeding, hospital stay, and cost of hospitalization were recorded. Statistical analysis of the results was done by SPSS version 22.0. **Results:** In this study, we found a significant correlation in time of the return of bowel sound, time of bowel movement, and time of oral resumption between the groups where the p values were 0.043, 0.004, and 0.045 respectively. The postoperative pulmonary complication was significantly higher in Group I than in Group II (33.3% versus 3.3%), but regarding the paralytic ileus, post-operative bleeding, anastomotic leakage, and wound dehiscence, no significant difference was observed between the groups. Because of the paralytic ileus, NG tube insertion was necessary, in 2(6.7%) patients in the NNG group, whereas reinsertion of NG tube was done in 3 (10.0%) patients in the NG group, who already had their tubes removed needed on the third to fifth postoperative day. In this study, it was observed that the duration of postoperative hospital stay was shorter in Group II than Group I with a p-value of 0.001. ***Conclusion:*** Time of return of bowel sound, time of bowel movement, and time of oral resumption were significantly earlier and postoperative hospital stay was significantly shorter in the NNG group as well as postoperative morbidity was comparatively least in the NNG group. The idea to use a nasogastric tube after gastric surgery has no clear scientific grounds.

Keywords: Postoperative outcome, Nasogastric tube group, Non-nasogastric tube group.

1. INTRODUCTION

Nasogastric intubation was initially introduced by Levin in 1921, and its use in the treatment of acute intestinal obstruction and postoperative ileus was popularized by Wangensteen and Paine, 1930 [1]. The use of nasogastric tube is either therapeutic as in patients with abdominal distension and vomiting from bowel obstruction; diagnostic as for upper gastrointestinal bleeding in peptic ulcer disease; or prophylactic as in patients having major abdominal surgery. Various studies have shown that routine postoperative nasogastric suction is associated with higher rates of postoperative complications, despite its importance in certain surgical abdominal conditions. Nasogastric decompression was routinely used in most major intra-abdominal operations, until relatively

recently. The prophylactic use of nasogastric tubes has become so prevalent that it has been variously described up to 2002 as `the standard of the care traditionally used by most surgeons common practice, unquestioned and routine [2]. In contrast to the use of nasogastric tubes in acute conditions, their continued use in elective abdominal surgery is no longer justified [3]. More surgeons traditionally continue to use (prophylactic) nasogastric decompression, believing that its use facilitates a better surgical field and reduces complications such as nausea, vomiting, abdominal distension, aspiration, and anastomotic leakage caused by post-operative ileus [4]. Nasogastric intubation was thought to decrease postoperative ileus, nausea, vomiting, and gastric distention, wound, and respiratory complications, and to reduce the incidence of anastomotic leakage after gastrointestinal surgery [5]. A nasogastric tube may cause sudden life-threatening bilateral vocal fold paralysis, possibly as a result of paresis of the posterior cricoarytenoid muscles, secondary to infection and ulceration over the posterior lamina of the cricoid. Diabetics who have undergone renal transplantation are, particularly at risk [6]. Many clinical studies have suggested that this practice does not provide any benefit but could increase patient discomfort and respiratory complications. Furthermore, meta-analyses have concluded that routine nasogastric decompression is no longer warranted after abdominal surgery [7].

2. OBJECTIVE

General Objective:

- To compare postoperative outcome between NG and NNG group.

Specific Objective

- To compare time, return of bowel activity between NG and NNG group.
- To compare postoperative complications between NG and NNG group.
- To compare duration of postoperative hospital stays between NG and NNG group.

3. METHODOLOGY AND MATERIALS

In this quasi-experimental study, we enrolled 60 patients who had been surgically treated for malignant and benign diseases in the Department of General Surgery, Bangabandhu Sheikh Mujib Medical University, Bangladesh from April, 2017-March 2018. In total 30 patients (Group I) were randomized into the intubated group and the other 30 patients (Group II) were randomized into the tubeless group. All patients received epidural pain control. Preoperative serum albumin levels, postoperative complications, preoperative serum albumin levels, the passage of stools, mean time to first orally feeding, hospital stay, and cost of hospitalization were recorded. The ethical clearance of this study was obtained from the IRB (Institutional Review Board) authority of BSMMU. Written informed consent was obtained from each subject who voluntarily provided consent to participate in the study. As per the inclusion criteria of this study, all adult patients who were undergone elective partial gastrectomy or bypass surgery for malignant or benign diseases of the stomach irrespective of gender were included as the study population. On the other hand, as per the exclusion criteria, patients who had undergone emergency gastric surgery and patients having a history of abdominal radiotherapy were excluded. Patients undergone elective partial gastrectomy or gastrojejunostomy for malignant or benign diseases were entered into this study at the end of operation either to a group with a nasogastric tube (NG group) or to a group without a tube (NNG group). In the tube group, the tube was left in situ for continuous drainage until the passage of flatus or stool postoperatively. In the no-tube group, if tube introduced preoperatively or per-operatively was removed at the end of the operation. Postoperative oral intake was restricted for all patients until the passage of flatus, in the absence of abdominal distention, nausea, or vomiting. Patients were allowed clear water to drink after resolution of the ileus and then they would progress to a liquid-solid diet. If the patients developed a clinical need for decompression, as determined in the postoperative period by the attending physician a nasogastric tube was introduced in patients in the NNG group or reintroduced in patients in the NG group. All patients were received short-term perioperative antibiotic prophylaxis according to hospital protocol. The basic characteristics of assessment were the type of surgery, the extent of surgery, amount of blood loss, and co-morbid conditions. Time of return of bowel sound (examined at 12,24,36,…144 hours postoperatively), time of first passage of flatus (From history), duration of NG decompression, time of first bowel movement, resumption of oral feeding, NG tube insertion or reinsertion, postoperative complications, postoperative fever, nausea, vomiting, abdominal distension, postoperative bleeding, anastomotic leakage, intra-abdominal sepsis, and pulmonary complications were considered as the variables in the postoperative course of each patient and were closely monitored. In this study, discomfort from NG tube and duration of postoperative hospital stays were defined as wound complications. Statistical analysis of the results was done by using computer-based software SPSS version 21.0. Statistical analysis was done by Student t-test for quantitative variables, Chi-square test(x2) test for qualitative variables. A probability value<0.05 was considered as a level of significance and a 95% confidence interval was taken.

4. RESULT

In this study, the patient's demography shown, age frequency with a mean age of 55.83 ± 12.12 in Group I and 58.03 ± 12.59 in Group II. The difference was statistically not significant. Sex distribution with males 19 (63.3%) and 17 (56.7%) were in Group I and Group II respectively. The preoperative diagnoses were

equally distributed. the difference was statistically not significant between the two groups; the difference was statistically not significant. As co-morbidity in Group I, diabetes, hypertension, ischemic heart disease, and bronchial asthma were found among 23.3%, 13.3%, 26.7%, and 16.7% of patients respectively. On the other hand, in Group II, those co-morbidities were found among 26.7%, 20.0%, 26.7%, and 10.0% patients respectively. It was observed that almost three-fourth (73.3%) patients had partial gastrectomy in Group I and 21(70.0%) in Group II 8(26.7%) patients had gastrojejunostomy in Group I and 9(30.0%) in Group II. The difference was statistically not significant (p>0.05) between the two groups. In this study, it was observed that almost three fourth (73.3%) patients had partial gastrectomy in Group I and 21(70.0%) in Group II 8(26.7%) patients had gastrojejunostomy in Group I and 9(30.0%) in Group II. The difference was statistically not significant (p>0.05) between the two groups. In analyzing the postoperative events among the participants, we found a significant correlation in time of the return of bowel sound, time of bowel movement (flatus/faeces), and time of oral resumption between the groups where the p values were 0.043, 0.004 and 0.045 respectively. The postoperative pulmonary complication was significantly higher in Group I than in Group II (33.3% versus 3.3%), but regarding the paralytic ileus, post-operative bleeding, anastomotic leakage and wound dehiscence, no significant difference was observed between the groups. Because of the paralytic ileus, NG tube insertion was necessary, in 2(6.7%) patients in the NNG group, whereas reinsertion of NG tube was done in 3 (10.0%) patients in the NG group (Group I), who already had their tubes removed needed on the third to fifth postoperative day. In this study, it was observed that the duration of postoperative hospital stay was shorter in Group II than Group I with a p-value of 0.001.

Table 1: Age distribution of the participants (N=60)

Age (in years)	**Group-I (n=30)**		**Group-II (n=30)**		***p*-Value**
	n	**%**	**n**	**%**	
<50 yrs.	5	16.7	8	26.7	
50-60 yrs.	16	53.3	12	40.0	
61-70 yrs.	6	20.0	9	30.0	
>70 yrs	3	10.0	1	3.3	
Mean ±SD	55.83±12.12		58.03±12.59		0.439
Range(min-max)	27-80		23-75		

p value reached from unpaired t-test

Table 1 showed age frequency with a mean age of 55.83±12.12 in Group I and 58.03±12.59 in Group II. The difference was statistically not significant between two groups.

Table 2: Comorbid condition (N=60)

Comorbid condition	**Group-I (n=30)**		**Group-II (n=30)**		**Chi square value**	**df**	***p*- Value**
	n	**%**	**n**	**%**			
Diabetes	7	23.3	8	26.7	0.089	1	0.765
Hypertension	4	13.3	6	20.0	0.480	1	0.486
Ischemic heart disease	8	26.7	8	26.7	0.000	1	1.000*
Bronchial asthma	5	16.7	3	10.0	0.577	1	0.446

**Fisher exact test was done*

Table 2 showed the comorbid among the patients. According to the comorbid, Ischemic heart disease was highest 8(26.7%) both Group-I and Group-II, followed by diabetes 7(23.3%) Group-I and 8(26.7%) Group-II.

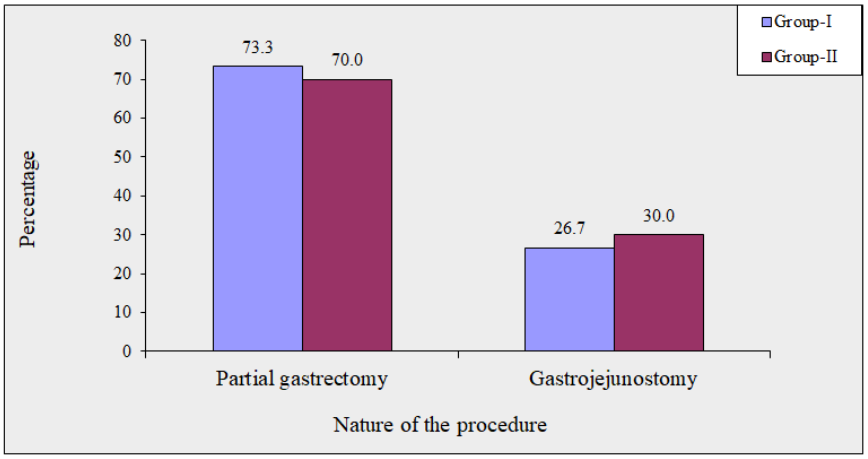

Figure I: Nature of the procedure among the participants (N=60)

Table 3: Postoperative events among the participants (N=60)

Postoperative events (In hours)	Group-I (n=30) Mean ± SD	Group-II (n=30) Mean ± SD	*p*- Value
Time of return of bowel sound	88.40 ± 21.30	76.80 ± 22.20	0.043[s]
Time of bowel movement	119.28 ± 23.81	95.07 ± 25.67	0.004[s]
Time of oral resumption	118 ± 24.27	105.52 ± 22.99	0.045[s]

[*] *p value reached from unpaired t-test*

Table 3 showed that, the time of return of bowel sound, time of bowel movement (flatus / faeces) and time of oral resumption were significantly earlier in Group II than Group I with *p* values 0.043, 0.004 and 0.045 respectively.

Table 4: Postoperative complications among the participants (N=60)

Postoperative complications	Group I n=30		Group II n=30		Chi-square value	df	*p* -Value
	n	%	n	%			
Paralytic ileus	3	10.0	2	6.7	0.218	1	0.639
Post-operative bleeding	2	6.7	3	10.0	0.218	1	0.639
Anastomotic leakage	2	6.7	2	6.7	0.000	1	1.000
Wound dehiscence	1	3.3	0	0.0	1.017	1	0.313
Pulmonary complications	10	33.3	1	3.3	9.017	1	0.002[s]

**Fisher exact test was done*

Table 4 showed that, the postoperative pulmonary complication was significantly higher in Group I than in Group II (33.3% versus 3.3%), but regarding the paralytic ileus, post-operative bleeding, anastomotic leakage and wound dehiscence, no significant difference was observed between the groups. Because of the paralytic ileus, NG tube insertion was necessary, in 2(6.7%) patients in the NNG group (Group II), whereas reinsertion of NG tube was done in 3(10.0%) patients in NG group (Group I), who already had their tubes removed needed on the third to fifth post-operative day

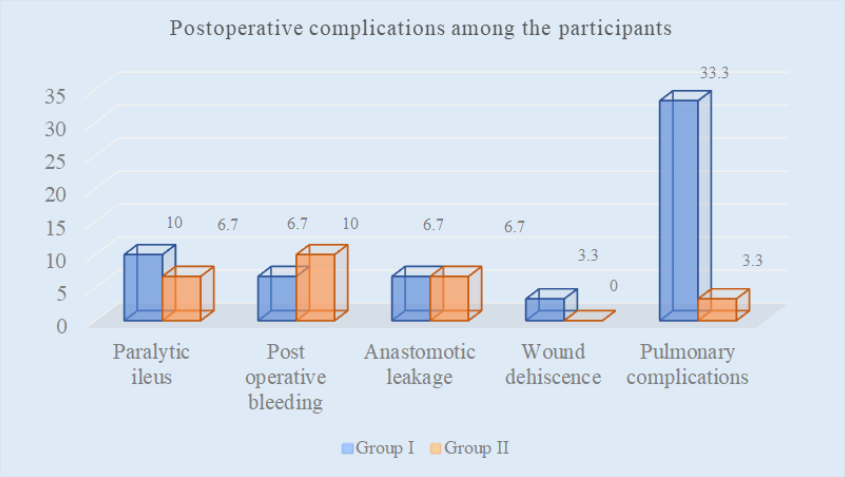

Figure II: Postoperative complications among the participants

Table 5: Duration of postoperative hospital stay of the participants (N=60)

Hospital stays (In days)	Group-I (n=30)		Group-II (n=30)		*p*- Value
	n	%	n	%	
5-8	17	56.7	23	76.7	
9-14	13	43.3	7	23.3	
Mean ± SD	9.55 ± 2.19		7.76 ± 1.98		0.001[s]
Range (min-max)	6-14		5-14		

[*] *p value reached from unpaired t-test*

In table 5, it was observed that duration of postoperative hospital stay was shorter in Group II than group I with *p* value 0.001.

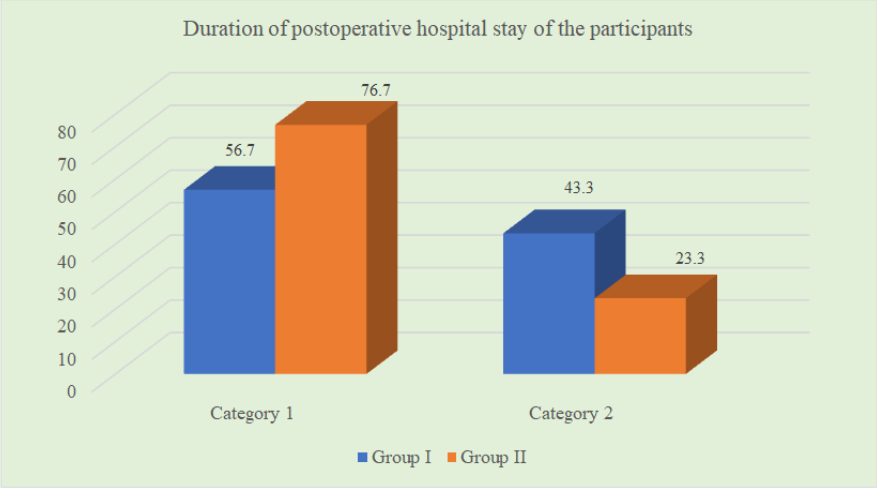

Figure III: Duration of postoperative hospital stay of the participants (N=60)

5. DISCUSSION

The aim of the present study was to compare the postoperative outcome between the nasogastric tube group (NG) and the non-nasogastric tube group (NNG). In this study in Group I, the NG tube was left in situ for continuous drainage until the passage of flatus or stool postoperatively. Patients are aged <18 years, emergency surgery, history of abdominal irradiation, and patients who did not give consent were excluded from the study. The present study findings were discussed and compared with previously published relevant studies. In this study, as regards the postoperative events, it was observed in this present study that the mean time of return of bowel sound was 88.40± 21.30 hours in Group I and 76.80 ± 22.20 hours in Group II. Correspondingly, the mean time for a bowel movement (flatus/faeces) was 119.28 ± 23.81 hours and 95.07±25.67 hours in group I and Group II respectively. In the same way, the mean time of oral resumption was 118.00 ± 24.27 hours in Group I and 105.52 ± 22.99 hours in Group II. postoperative events (Time of return of bowel sound, time of bowel movement (flatus/faeces), and time of

oral resumption were significantly earlier in Group II than Group I. Chen *et al*., (2015) [8] studies showed the mean time to first flatus was 68±12 postoperative hours, and time to complete oral intake was 103± 58 postoperative hours. There was no significant difference between the groups or between patients who received partial or total gastrectomies in the meantime to first flatus or complete oral intake. Baiocchi *et al*.,'s (2014) [9] study showed the time to passage of flatus was significantly shorter in the NG/NJT group than in the no-NG/NJT group, but only after RY reconstruction (80± 36 vs. 103±38 hours, p<0.05). Ocen and Sebbaale (2004) [10] observed in their study that there were more delays in the return of bowel sound, the passage of flatus & stool, and ambulation in Group I than Group II. The mean duration in days taken for the return of bowel sound was 2.5 days (60 hours) for Group I and 31 hours for Group II. These differences were statistically significant (p<0.001). Montgomery *et al*., (1996) [11] also found similar findings. The above findings are comparable with the current study. A nasogastric tube keeps the pharyngoesophageal junction open allowing air during inspiration to cause more distention and being a foreign material, NGT prolongs and increases the extent of post-surgical inflammation and abdominal distention with subsequent increase in the duration of the transient post-surgical paralytic ileus which delays the return of bowel activity [12]. In the current study, the postoperative pulmonary complications were significantly higher in group I than in Group II (33.3% versus 3.3%), but regarding the paralytic ileus, post-operative bleeding, anastomotic leakage, and wound dehiscence, no significant difference was observed between the groups. Due to the paralytic ileus, NG tube insertion was necessary for 2 patients in Group II, whereas reinsertion of NG tube was needed in 3 patients in group I on the third to fifth postoperative day who already had their NG tubes removed. Song *et al*., (2014) [8] observed the rates of postoperative morbidity after gastric cancer resection remains between 10.0% and 40.0%, and postoperative complications such as anastomotic leakage, pleuropulmonary disease, pancreatitis, digestive fistulas, internal bleeding, and bowel obstruction can result in prolonged hospital stays ranging from 8-20 days at high volume centers. There were no significant differences between the Billroth I and Billroth II Groups or between patients who received partial or total gastrectomy in the meantime to first flatus or complete oral intake Pacelli *et al*., 2017 [13]. In a study it was reported that the rates of complications were similar in the two groups (28.3 vs. 26.5%, p>0.05) and in the type of reconstruction (29.5 vs. 25.4 %, p=n in BII patients and 26.9 vs. 27.4%, p>0.05 in RY patients).9 In another study Doglietto *et al*., (2004) [14] had not reported any differences between the two groups, with or without nasojejunal postoperative decompression, concerning the mortality, morbidity, and postoperative course. Study 9 clearly demonstrated that routine use of NG/NJT did not decrease the rates of postoperative morbidity and mortality compared with the no-NG/NJT group after both BII and RY reconstruction, even if the type of reconstruction was not randomized. According to the report by Huerta *et al*., (2002) [15] had shown that routine postoperative nasogastric suction is associated with higher rates of postoperative pulmonary complications. These complications coupled with restrictions in mobility and psychological discomfort have raised doubts about the benefits of routine intubation [16]. Mobilization of the patient in the postoperative period is dependent on the presence of an NGT. The longer it is kept in place the longer was the duration of patients' restrictions in bed. Prolonged immobilization after surgery in fact enhances the risk of postoperative complications like DVT and delays recovery [17]. All these effects of NGT, therefore, act indirectly to prolong the patients' hospital stay. In this series, it was observed that the mean duration of postoperative hospital stay was 9.55±2.19 days varied from 6-14 days and 7.76±1.98 days varied from 5-14 days, which was significant (p<0.05) shorter in group II than group I. A study 8 showed the length of postoperative hospital stay and frequency of postoperative respiratory complications were more in Group-I as compared to group-II (p<0.05). Qian L, Chen X, (2005) [18] showed the postoperative hospital stay 8.1±4.4 days in Group I and 5.7±1.4 days in Group II, which are consistent with the current study. Similar observations regarding shorter hospital stay found in group II than group I were also observed by Ocen and Sebbaale (2004) [10]. Considering the early return of bowel activity, early oral resumption, reduced postoperative pulmonary complications, and shorter hospital stay as well as reduced requirements for nursing and pharmaceutical services, omission of a nasogastric tube is a cost-effective treatment for patients requiring gastric surgery.

6. LIMITATION OF THE STUDY

Though a single-centered study with a small sample, so the findings of this study may not reflect the exact scenario of the whole country.

7. CONCLUSION & RECOMMENDATION

In the study similar group of patients with almost similar types of surgical interventions were evaluated to see the postoperative outcome with or without an NG tube for nasogastric decompression. Time of return of bowel sound, time of bowel movement (flatus/faeces), and time of oral resumption were significantly earlier and postoperative hospital stay was significantly shorter in the NNG group as well as postoperative morbidity were comparatively least in the NNG group. The idea to use a nasogastric tube after gastric surgery has no clear scientific grounds.

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