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Research Article

Routine versus early nasogastric decompression in gastrointestinal surgeries: a randomized controlled trial

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ABSTRACT

Background: Traditionally nasogastric decompression is carried out in post operatively in patients undergoing gastrointestinal surgery. The purpose of the study is to assess the benefits of nasogastric decompression in the early postoperative period as compared to routine nasogastric decompression in patients undergoing gastrointestinal surgeries. Objectives: To assess the benefits of nasogastric decompression in the early postoperative period as compared to routine nasogastric decompression in patients undergoing gastrointestinal surgeries, to assess the complications associated with nasogastric tube insertion, and to assess the effect of early nasogastric tube removal on the patients' postoperative morbidity and comfort level.

Methods: This was a randomized control trial done in the Shree Sayajirao General Hospital, Vadodara. According to patient flow and previous study details the estimated sample size was 300 patients. Patient allotment was 150 patients in each group. Patients admitted on odd dates will be followed for routine nasogastric decompression, and patients admitted on even dates will be followed for early nasogastric decompression. Inclusion criteria for the study include laparotomies performed by any abdominal incisions on emergency as well as elective bases. Variables to be studied were patient comfort (according to patient's opinion), vomiting (episodes, type, amount, content, on which post-operative day), abdominal distension, appearance of normal bowel sounds, passage of flatus and/or stools (according to patient's history), incidence of aspiration pneumonia and total duration of the hospital stay with wound complications. Data will be processed and analyzed by chi square test and t-test.

Results: In the study total 300 patients were included. No significant difference between both the groups in case of postoperative vomiting with p- value of 0.6028 (i.e. $p > 0.05$) and abdominal distension with p- value of 0.5183 (i.e. $p > 0.05$). Significant difference seen in the appearance of the bowel sound in post-operative period with p- value of 0.0002 (i.e. $p < 0.05$) and passage of flatus or stool with p-value of <0.0001. In case of early decompression group mean postoperative day for the suture removal was 11.9 days and for routine decompression group it was 12.3 days, the difference was statistically significant with p- value of 0.0006 (i.e. $p < 0.05$). The mean for the total hospital stay for early decompressed group was 10.04 days and for routine decompression group it was 10.47 days which was highly statically significant with p- value of 0.0001 (i.e. $p < 0.05$). Post-operative wound complication which was statically significance with p-value of 0.0394 (i.e. $p < 0.05$) and respiratory complications was also significant with p-value of 0.0367 (i.e. $p < 0.05$). In case of early decompression post-operative nausea, vomiting and abdominal distention were higher but not significant statistically.

Conclusions: Early removal of Ryle's tube leads to less incidence of respiratory complications and wound complications ultimately early suture removal and less hospital stay. Early removal of Ryle's tube leads to early resolution of postoperative paralytic ileus indicated by early appearance of bowel sounds and early passage of flatus and stool.

Keywords: Routine nasogastric decompression, Early nasogastric decompression, Gastrointestinal surgeries

INTRODUCTION

Ileus is the functional inhibition of propulsive bowel activity, irrespective of pathogenic mechanisms. Post-Operative Ileus (POI) is transient cessation of coordinated bowel motility after surgical intervention, which prevents effective transit of intestinal contents and/or tolerance of oral intake. Paralytic ileus is the form of POI lasting >5 days after surgery. Risk Factors for POI are major surgery, particularly abdominal surgery; duration depends on surgical technique, extended opioid use, inhaled anesthesia and pre-existing gastrointestinal (GI) disease. Manifestations and consequences of Prolonged POI are delayed passage of flatus and stool, postoperative pain, abdominal distension, nausea, vomiting, and poor wound healing etc. Traditionally nasogastric decompression is carried out in post operatively in patients undergoing gastrointestinal surgery. The duration of this practice is largely determined by the existing protocols of the respective institute/department, as well as the patient's clinical status like appearance of bowel sounds, passage of flatus, passage of stools and decrease in nasogastric output. The rationale of this practice is to reduce the rate of postoperative complications such as vomiting, distension, wound dehiscence, anastomotic leak. The purpose of the study is to assess the benefits of nasogastric decompression in the early postoperative period as compared to routine nasogastric decompression in patients undergoing gastrointestinal surgeries. To assess the complications associated with nasogastric tube insertion. To assess the effect of early nasogastric tube removal on the patients' postoperative morbidity and comfort level.

METHODS

This was a randomized control trial done in the Shree Sayajirao General Hospital, Vadodara. According to patient flow and previous study details the estimated sample size was 300 patients. Length of the study is from 1st November 2013 to 30th November 2014(time bound study). As mentioned in Figure-1, Patient allotment is 150 patients in each group. Patients admitted on odd dates will be followed for routine nasogastric decompression, and patients admitted on even dates will be followed for early nasogastric decompression.

Routine nasogastric decompression is defined as decompression beginning preoperatively or intraoperatively and continuing until an unspecified point in patient's postoperative course i.e. return of bowel sounds, passage of flatus and/or stool, decrease in nasogastric output etc.[1] Early nasogastric decompression means Intraoperative and postoperative decompression which is discontinued after 24 hours (rationale behind this is impaired gastric emptying for 24 hours postoperatively).

Inclusion criteria for the study include laparotomies performed by any abdominal incisions on emergency as well as elective bases. Patients giving negative consent for inclusion in study, patients without an attendant (unknown/alone patients), patients undergoing combined surgeries and patients in whom nasogastric tube has to be kept postoperatively for prolonged periods were excluded from the study.

Nasogastric tube (Ryle's tube) insertion done after taking proper consent, giving brief idea about the procedure and keeping patient in supine position with neck mildly flexed, lubricated Ryle's tube is started inserting through nasal orifice blindly, simultaneously asking the patient to swallow (if possible you can give sips of water for facilitation of the procedure). Insert Ryle's tube up to the pre-determined distance up to the stomach. Its position was confirmed by the aspirate the contents, inject 10-20 cc air and confirm by putting stethoscope over epigastrium and X-ray chest. As such there is no contraindication to Ryle's tube insertion other than corrhosive poisoning (after 24 hours). Variables to be studied were patient comfort (according to patient's opinion), vomiting (episodes, type, amount, and content, on which post-operative day), abdominal distension, appearance of normal bowel sounds, and passage of flatus and/or stools (according to patient's history).

Incidence of aspiration pneumonia (occult/evident) as evidenced by history, postoperative chest radiograph, respiratory sounds, routine investigations, fever and other complaints of upper respiratory tract were evaluated. Day of suture removal (after 10 days and according to condition of the wound), wound complications (stitch abscess, purulent discharge from the wound, wound gap, wound dehiscence), total hospital stay and day of discharge (with or without suture removal) were observed in the study.

In this study, the patients of primary suturing and omentopexy of perforated peptic perforation, primary suturing of intestinal perforations, resection and anastomosis of intestine, ileostomy, colostomy and closure of the stomas, open cholecystectomy, obstructed inguinal hernias, abdominoperineal resection, anterior resection, adhesiolysis, etc. Patients were followed on daily basis for these variables postoperatively

In case of early decompression group, if patient develops >4 episodes of vomiting subsequently in spite of giving antiemetic and antacids, patient develops abdominal distension of >4 cm in terms of abdominal girth as compared to base line post-operative abdominal girth or suspicion of leak from either wound or drain sites in such conditions nasogastric tube will be reinserted. Data will be processed and analyzed by chi square test and t-test.

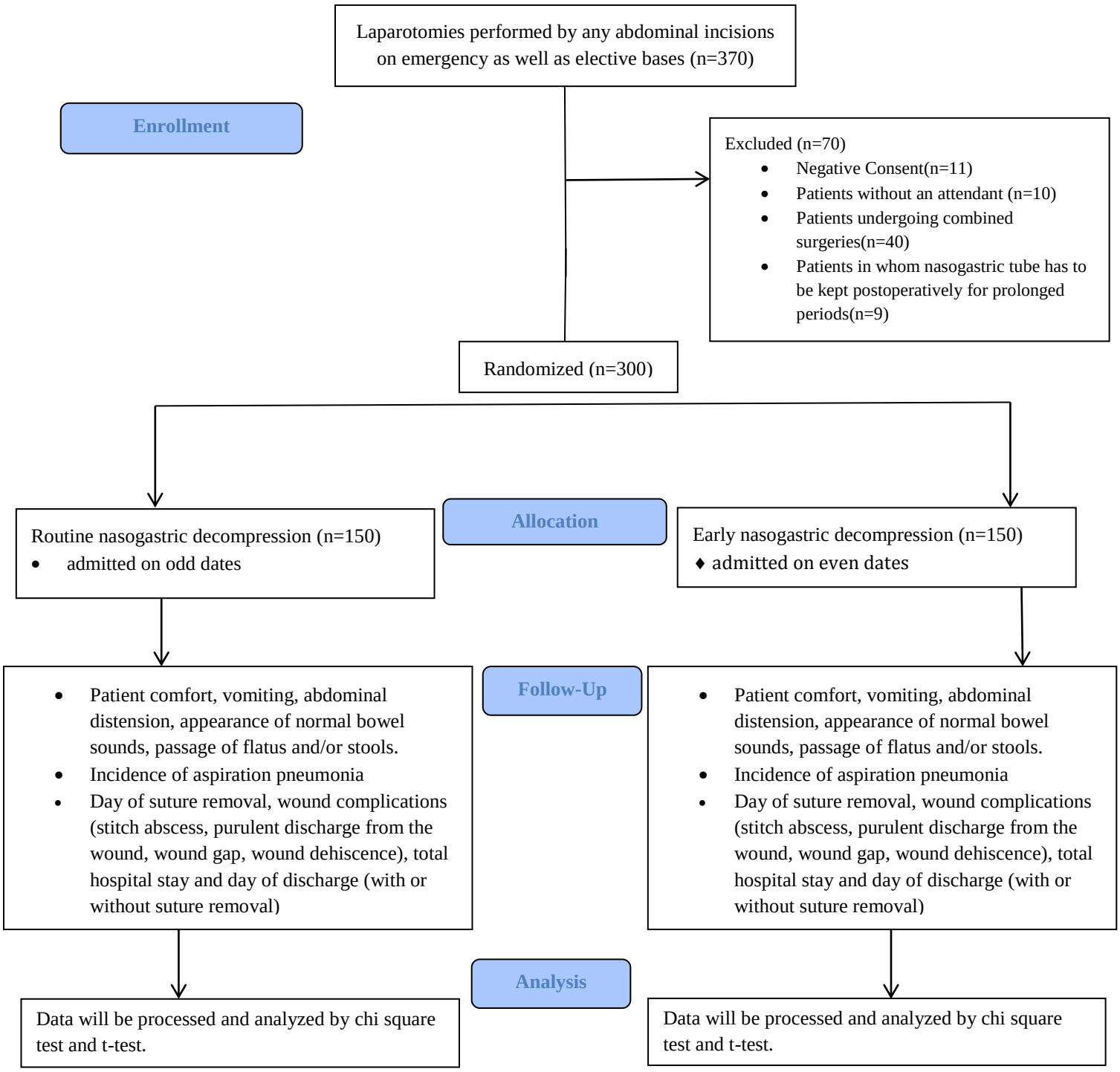

Figure 1: Flow Chart showing methodology of study.

RESULTS

In the study total 300 patients were included. In early decompression group 116 were male and 34 were female and in routine decompression group 110 were male and 40 were female. Mean age for the early decompression was 50.2 ± 18.1 years and for the routine decompression were 52.8 ± 17.2 years.

In early decompression group there was 30 patients and in routine decompression group 25 patients developed vomiting postoperatively. After analyzing data, it was found that there was no significant difference between

both the groups in case of postoperative vomiting with the help of chi-square test with p- value of 0.6028 (i.e. p > 0.05).

In the study all the patients were followed postoperatively for abdominal distension in terms of increase in abdominal girth in centimeters by measuring it with measure tape daily 12 hourly. More than 4 cm was considered significant. But on the other hand presence of nasogastric tube itself promotes aerophagia which in turn leads to abdominal distension and also promotes paralytic ileus. 25 patients in the early decompression group and 20 patients in the routine decompression group developed abdominal decompression. No statistical significance was seen in both the groups with p- value of 0.5183 (i.e. p > 0.05).

In the study the patients were checked postoperatively for appearance of normal bowel sounds 12 hourly with the stethoscope [Table -1]. In routine decompression group it was found at 4.39 days (mean) and in case of early decompression group at 3.98 days (mean). After analyzing data it was found that, there was early return of normal bowel sounds in early decompressed patients. With the help of unpaired t- test it can be said that the difference was statistically highly significant with p- value of 0.0002 (i.e. p < 0.05).

Table 1: Table showing days of appearance of normal bowel sounds.

Post-Operative Days	Early Decompression	Routine Decompression
0 to 2 days	51	38
3 to 4 days	74	42
5 to 6 days	25	70

Table 2: Table showing days of appearance of Passage of Flatus/Stool.

Post-Operative Days	Early Decompression	Routine Decompression
0 to 2 days	48	35
3 to 4 days	76	45
5 to 6 days	26	70

Passage of flatus and stool by asking the patients about it was noted. Table -2 showing days of appearance of passage of flatus/stool. It was found that in early decompressed patients mean postoperative day of passage of flatus and stool was 3.98 and for routine decompressed patients it was 5.24, the difference is statistically significant with p-value of <0.0001.

Table 3: Surgeries performed in routine decompression group and in early decompression group.

Surgery	Routine decompression	Early decompression
Primary suturing and omentopexy	35	36
Ileostomy closure	15	10
Splenectomy	5	4
Hemicolectomy	5	4
Open cholecystectomy	3	5
Colostomy closure	9	8
Adhesinolysis and ileostomy/ colostomy	20	19
Resection and anastomosis	26	26
Primary suturing of intestinal perforation	18	22
Abdominal perineal resection	1	-
Cystogastrostomy	1	-
Appendectomy by paramedian incision	4	3
Large incisional hernia repair	3	2
Excision of Gastrointestinal stromal tumour	-	1
Drainage of rupture liver abscess	-	2

In the study, all the patients were examined for wound of laprotomy post operatively while dressing in the wards daily. When wound was clean after 10th postoperative day they were tried for the suture removal. In case of early decompression group mean postoperative day for the suture removal was 11.9 days and for routine decompression group it was 12.3 days. From above mentioned information it can be said that the difference was statistically significant with the help of unpaired t-test with p- value of 0.0006 (i.e. p < 0.05).

In our study all the patients were followed for total duration of stay in hospital. In both the groups those patients who were having prolonged stay because of stoma site issues were excluded. The patients who developed medical problems after admission were excluded. The patients who required interventions for wound dehiscence had prolong stay and they were also excluded. The mean for the total hospital stay for early decompressed group was 10.04 days and for routine decompression group it was 10.47 days which was highly statically significant with p- value of 0.0001 (i.e. p < 0.05).

In the study all the patients were followed for laprotomy wound complications like stitch abscess, purulent

soakage from wound persistently for 3-4 days, wound gap, wound dehiscence. Total 26 patients in routine decompression group and 15 in early decompression group develop wound complication which was statically significance with p-value of 0.0394 (i.e. $p < 0.05$).

In case of early decompression out of 15 patients, 7 patients developed stitch abscess, 4 patients developed pus discharge from wound, 2 patients developed wound gap and 2 patients wound dehiscence. In case of routine decompression out of 26 patients, 12 patients developed stitch abscess, 8 patients developed pus discharge from wound, 3 patients developed wound gap and 3 patients wound dehiscence.

Respiratory complications like sinusitis, pharyngitis, laryngitis, and fresh changes of consolidation or pleural effusion on post-operative chest x-rays. In routine decompression group 18 patients and in early decompression group 7 patients developed respiratory complications. The difference is significant by using chi-square with p-value of 0.0367 (i.e. $p < 0.05$).

In routine decompression group and in early decompression group the following surgeries were performed as mentioned in Table-3.

DISCUSSION

Ileus is the functional inhibition of propulsive bowel activity, irrespective of pathogenic mechanisms.[2] Post-Operative Ileus (POI) is transient cessation of coordinated bowel motility after surgical intervention, which prevents effective transit of intestinal contents and/or tolerance of oral intake.[2] Primary POI occurs in the absence of any precipitating complication.(2) Secondary POI occurs in the presence of a precipitating complication.[2] Paralytic ileus is the form of POI lasting >5 days after surgery.[2] Risk Factors for POI are major surgery, particularly abdominal surgery, duration depends on surgical technique, extended opioid use, inhaled anesthesia and pre-existing gastrointestinal (GI) disease. Manifestations and consequences of Prolonged POI are delayed passage of flatus and stool, postoperative pain, abdominal distension, nausea, vomiting, poor wound healing, delay in postoperative mobilization, pulmonary complications. Nasogastric tube placement, early postoperative feeding, early ambulation, use of laparoscopic technique, epidural analgesia, prokinetic agents like metoclopramide and opioid antagonists can be used for the prevention and therapeutic management of the POI.[2,3]

Post-operative paralytic ileus affects all segments of the bowel and probably is the consequence of further inhibition of the local intrinsic contractile system. Accordingly, a panel of responses may be observed, related to the duration and type of surgery and the degree of injury to the gut mucosa.

Since the introduction of the nasogastric tube by Levin in 1921, its use has remained relatively unchallenged. In 1926, McIver demonstrated that postoperative distension is a result of swallowed air and could be prevented by the nasogastric tube.[4] Since the 1930s routine use of the nasogastric tube to achieve postoperative gastric decompression has enjoyed widespread acceptance, and for decades patients' complaints were not taken into consideration by anesthesiologists and surgeons.[5]

About 9 liters of fluid pass through the gastrointestinal system each day, and only about 2 liters are ingested , the rest represent secretions from the system itself ,about half 3.5 liters is secreted from the exocrine glands (salivary glands ,the pancreas and the liver).[6] In the absence of gastric decompression there is a moderate increase in vomiting. However, it is important to note that routine nasogastric decompression does not prevent vomiting in 10% of patients, and it does not preclude the need for tube replacement once it has been removed.[7] In the meta-analysis of all 26 clinical trials, 8.2% of selectively decompressed and 8.3% of routinely decompressed patients developed abdominal distension, whereas 10.1% of selectively decompressed and 8.5% of routinely decompressed patients developed vomiting.[8]

Routine nasogastric decompression is defined as decompression beginning preoperatively or intraoperatively and continuing until an unspecified point in patient's postoperative course i.e. return of bowel sounds, passage of flatus and/or stool, decrease in nasogastric output etc.[9] Paralytic ileus is a normal physiologic response to operative trauma and frequently persists for 48-72 hours. Early nasogastric decompression means intraoperative and postoperative decompression which is discontinued after 24 hours (rationale behind this is impaired gastric emptying for 24 hours postoperatively).

In accordance with the related studies nasogastric decompression in early post-operative period is effective in surgeries performed on esophagus[10] (e.g. esophagectomy and pull through procedures), stomach[11,12] (e.g. gastrectomy), intestines[8,9] (e.g. Resection and anastomosis), gyneco-oncologic procedures[13], urosurgeries[14] (e.g. cystectomy with urinary diversion) and colorectal surgeries.[15] Routine use of nasogastric decompression after laparotomy is not supported by the literature.

Postoperative nausea and vomiting are routinely observed after abdominal surgeries. According to the Michael et al study group 1 (p-value 0.11) and Joel bauer et al study (p-value 0.20) no statistical significant difference in the postoperative nausea and vomiting seen in routinely decompressed and selectively decompressed patients. This finding was consistence with our study data (p-value 0.60). In Michael et al group 1 study (p-value 0.36), Joel Bauer et al study (p-value 0.26), Abdul Ghani soomoro et al study (p-value 0.45) data does not show significant

difference in abdominal distension between these two groups which was concordance with our study (p-value 0.5183).

In Michael et al group 1 study (p-value 0.029), Joel Bauer et al study (p-value 0.0035), Abdul ghani soomoro et al study (p-value 0.0065) data shows significant difference in wound complications which was consistence with our study data (p=0.039). In our study, that wound complications were higher in routine decompression. It may be because of prolonging paralytic ileus in case of routine nasogastric decompression group which may lead to increase in wound complications. Theoretically insertion and prolong presence of Ryle's tube may cause upper respiratory tract infections. In Michael et al study group 1 (p-value 0.00025), Joel bauer study (p-value 0.0035) and Abdul ghani soomoro et al study (p-value 0.0045) significantly developed the respiratory complications. In our study all the patients were followed postoperatively for development of any respiratory complications. In routine decompression group 18 and in early decompression group 7 patients developed respiratory complications. The difference was significant by using chi-square (p-value 0.0367). It may be because of trauma occurred while insertion of nasogastric tube which will be the site of infection /inflammation postoperatively. It may be because of most of the laprotomy patients are operated under general anesthesia which may cause respiratory tract infections evident on post-operative period.

In Michael et al study group1 (p-value 0.22) and Wolff et al study (p-value 0.66) duration for the hospital stay for the early decompression was significantly less. In our study also highly significance was observed (p-value 0.0001). In accordance with the comparison our study findings were not matched with the rest. Thus, it was early resolution of paralytic ileus which in turn leads to less complications and early discharge from the hospital. Discomfort is subjective feeling; no assessment scale is available for it. Many of the variables studied were dependent on history and clinical examination which may be subjective. Complications which were faced during study may be directly or indirectly related to other illness. These were the weakness of the study.

CONCLUSION

In case of early decompression post-operative nausea, vomiting and abdominal distention were higher but not significant statistically. Early removal of Ryle's tube leads to less incidence of respiratory complications and wound complications ultimately early suture removal and less hospital stay. Early removal of Ryle's tube leads to early resolution of postoperative paralytic ileus indicated by early appearance of bowel sounds and early passage of flatus and stool. Keeping Ryle's tube in situ for prolong periods is definitely not comfortable to every patient. As such there were no complications associated with insertion of nasogastric tube. Routine nasogastric decompression was not necessary after laprotomy emergency as well as elective.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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