UTTAR PRADESH JOURNAL OF ZOOLOGY

41(23): 146-151, 2020
ISSN: 0256-971X (P)

USE OF NASOGASTRIC TUBE DECOMPRESSION IN GASTROINTESTINAL TRACT SURGERY

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. Authors RGN and BDS designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Authors CZP, AMS and RMY managed the analyses of the study. Author UBC managed the literature searches. All authors read and approved the final manuscript.

Article Information

Editor(s):
(1) Dr. Belisario Dominguez-Mancera, University Veracruz, Mexico.
Reviewers:
(1) Nurhanna bt Batar, Universiti Malaysia Terengganu, Malaysia.
(2) Ike Njere, University Hospitals NHS Foundation Trust, UK.

Received: 02 November 2020
Accepted: 08 January 2021
Published: 19 January 2021

Short Communication

ABSTRACT

This prospective study of 315 patients done at Krishna institute of medical science Karad over a period of 18 months and includes both elective and emergency gastrointestinal tract surgery, The aim of the study was to find out whether nasogastric tube decompression in all patients undergoing abdominal operation is of any significant importance post-operatively. The working hypothesis was that most patients undergoing elective or emergency abdominal surgery do not need prophylactic nasogastric tube decompression post-operatively. Routine nasogastric tube (NGT) decompression in patients undergoing abdominal operations has been the main mode of treatment worldwide and continues to be so in developing countries. The procedure is considered unnecessary with significant discomfort in some patients without any added advantage.

Keywords: Nasogastric tube; gastrointestinal tract surgery; intubation; stomach.

1. INTRODUCTION

A nasogastric tube (NGT) is a hollow cylindrical tube of soft rubber or plastic, inserted through a nostril, down the oesophagus into the stomach, for instilling liquid foods or other substances or for withdrawing air or gastric contents [1]. A normal adult secretes approximately 8000 ml of fluid daily into the digestive tract. This is made up of saliva, gastric juice, bile, pancreatic secretions and succuss entericus. In the presence of obstruction or distension, the volume may be significantly increased as demonstrated by Landor [2]. However, Gerber et al have shown that the volume of aspirate obtained by nasogastric tube in patients with paralytic ileus ranges from 500 to 1000 ml [3]. This is usually replaced by 1,000 ml of

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parenteral solution. If this premise is correct, the intestinal tract should also be able to absorb the remaining fraction of total secretions besides that removed by the nasogastric tube [3,4]. Peristalsis is important in propagation of intestinal contents, but ceases or becomes markedly diminished in the presence of peritonitis or following extensive intestinal manipulation in major abdominal surgery. This phenomenon that may also occur in other non-surgical conditions is known as paralytic ileus, and is easily recognized by the clinician by abdominal distension, constipation and absence of bowel sounds on auscultation. Paralytic ileus assumes added importance when accompanied by abdominal distension. The treatment of this condition in the past included enterostomy, use of parasympathomimetic drugs, enemas, oxygen inhalation and spinal anaesthesia [3]. The most universally accepted treatment of paralytic ileus is gastrointestinal suction.

Paralytic ileus may be looked upon as a diagnostic aid and a therapeutic tool rather than a disease; diagnostically a quiet abdomen is of value as are rigidity and tenderness in signifying the presence of pus, gastric juice or other irritating fluids in the peritoneal cavity; or that something has gone wrong following an abdominal operation. Therapeutically, the cessation of intestinal motility demonstrate another, of the many body defense mechanisms against bowel perforations, as peristalsis slows, it allows the leaking intestinal contents to be walled off. This is preferable to having the intestine slither about the abdomen normally, spreading pus and substituting a generalized peritonitis for localized abscess [5]. Following an operation in which a segment of the intestine has been resected, the abdomen becomes quiet. Paralytic ileus allows fibrin to seal the anastomosis while the intestine is at rest. It would be less satisfactory if peristaltic waves continued to grind through the fresh anastomosis and jeopardize the result by increasing the possibility of leakage. Abdominal distension in postoperative patients may be due to one of several causes, including peritonitis, gastrointestinal obstruction and acute gastric distension. A similar type of distension may occur if a patient is fed before there is satisfactory gastrointestinal motility or before a gastrointestinal anastomosis has become functional [6,7]. Gerber and his associates have suggested that air that is swallowed only with deglutition or talking is very minimal to cause gross abdominal distension. Nasogastric tubes therefore are chiefly concerned with the removal of swallowed air from the stomach. Hence, maintaining patients on parenteral fluids post-operatively and administering nothing orally prevents gaseous distension. If oral intake is withheld until a patient is hungry or passing flatus and peristalsis is audible, a nasogastric tube decompression would not be necessary. The mere prophylactic presence of a tube in the gastrointestinal tract has never been shown to promote peristalsis and there is no logical reasons why it should. Moreover a nasogastric tube decompresses the stomach only and not the small bowel [8]. Therapeutic suction can serve the purpose of relieving gastric distension, by aspirating fluid and gas from the stomach. The advantages of treating postoperative patients without using nasogastric tubes are numerous. Such patients will require less house staff and nursing care, will need less fluid intravenously per day and may have fewer pulmonary complications. Several studies have revealed comparable results for either use or non-use of a nasogastric tube [9-11]. In 1958 a study by Gerber et al raised doubt about the routine use of nasogastric tube after surgery. They studied 300 consecutive cases with paralytic ileus in which suction was withheld, and compared them with 300 similar cases in which some form of intestinal suction was used. The results in both groups were similar [3]. There were 36 deaths (12%) in intubated patients and 23 deaths (7.6%) in non-intubated patients moreover the cause of deaths in both was not related to the presence or absence of the tube. In 1980 a study in United States of America of 150 patients who underwent elective abdominal operations to see the incidence of postoperative pneumonia, showed twenty three patients (15%) with nasogastric tube developed pneumonia; compared to 2(1.5%) without nasogastric tube. Thus the incidence of pneumonia was ten times greater in patients with nasogastric tube than in those without it. Another review in 1985 of 200 patients to study the role of nasogastric tube aspiration versus administration of cimetidine, the results showed that, in patients who were intubated there was significant longer time to passage of flatus, bowel movement and discontinuation of intravenous fluid administration ($P<0.05$) [12]. In addition the duration of postoperative stay increased from 11.4 to 14.1 days in the intubated patients.

2. AIM AND OBJECTIVES

Aim: To study the practices of use of nasogastric decompression in gastrointestinal tract surgeries in our tertiary care centre.

Objectives: The objective of this research is to study the practices of use of nasogastric decompression in gastrointestinal tract surgeries in our tertiary care centre and to study the complications of nasogastric tube.

3. REVIEW OF LITERATURE

The alimentary canal (gastrointestinal tract) is a muscular tube about 9 metres (30 feet) long, which passes through the body's ventral cavity. The wall consists of four distinct layers, mucous membrane (mucosa), submucosa (consisting of blood vessels, lymphatics, and nerves), muscular layer (with inner circular and outer longitudinal muscles responsible for movement of the tube) and serous layer (serosa), which is an outer covering composed of the visceral peritoneum, formed of epithelium on the outside and connective tissue beneath (except the oesophagus, the rectum and the anal canal). Cells of the serosa secrete serous fluid that keeps the bowel outer surface moist [13].

A normal adult secretes approximately 8,000 milliliters of fluid daily into the digestive tract, made up of saliva (1500 ml), gastric juice (1500- 2000 ml), bile (500-1000 ml), pancreatic secretions (1500 ml-2000 ml) and succus entericus (2500-3000 ml).n The secretions vary and are affected by nervous and hormonal factors. Observers have differed regarding the volume of postoperative intestinal secretions, but apparently this varies little from normal. Gerber et al.[3] has shown that 500 to 1,000 ml fluid are obtained by nasogastric suction from patients with paralytic ileus. This is only a quarter or half of the amount contributed by the salivary gland (1000-1500 ml) and the gastric juice (1500-2000 ml); one may then ask what has happened to the remaining digestive tract secretions. The stomach is small and flaccid when empty, and its intraluminal pressure is the same as intra-abdominal pressure in this state. The stomach of a fasting human being contains a volume of fluid of approximately 50ml or less. Ingestion of food or fluid increases the volume of the stomach without comparable increase in intragastric pressure. Increase in gastric contents stimulates the chemoreceptors and mechanoreceptors hence stimulating gastric motility [12].

Peristalsis may be defined as a sequence of events in which a wave of contraction, often preceded by a wave of relaxation, passes down the intestine in an oral to anal direction [14]. The wave of relaxation is not always present. The peristaltic wave starts at a point distended with chyme and passes along the intestines at l-5 $cmsec^{-1}$ for few centimeters before the wave dies out. It has the function of moving the intestinal contents slowly towards the ileocaecal valve. Stimulus to the peristaltic wave is distension by a bolus of intestinal contents. This activates stretch receptors in the wall of the intestines whose cell bodies are in the submucosa plexus. Impulses are relayed to the myenteric plexus where the axon terminal of these neurones are thought to release substance p at an interneurons which in turn activates a final neurone by 5-hydroxytryptamine release to cause contraction of both the circular muscle behind the bolus and the longitudinal muscle in front of it. The alimentary canal is likely to be affected by many pathologies that leads to the affection of the bowel activity and then presents with features of intestinal obstruction (i.e. abdominal pain, vomiting, abdominal distension and absolute or relative constipation). It is seen that peristalsis may be inhibited during and after any abdominal operation ("silent" period) and that this inhibition is caused by reflex sympathetic over activity, which recovers in 6-12 hours. But in case of poor correction of factors which affect alimentary canal motility, this physiological inhibition changes into actual ileus, in which progressive distension of the bowel is of course the dominant morbid factor. Some individuals are air suckers by disposition and will swallow air both before operation (through anxiety) and after it (through discomfort). Such nervous patients are also liable to sympathetic overflow and form a fertile soil for neurogenic ileus and also for postoperative retention of urine. Once air gets into the stomach, it moves very rapidly down the small gut and if it can into the colon. In normal people ingested air can be passed as flatus in 24 minutes [15]. It should be noted that during the 'silent' period the failure to eliminate gas as flatus is an additional cause of its accumulation.

4. MATERIALS AND METHODS

The study design is an observational prospective one, conducted in the Department of Surgery of Krishna hospital and Medical Sciences Karad. Over a period of 18 months between August 2014 and May 2016, a total of 314 cases of both sexes admitted to surgical wards and underwent emergency or elective abdominal operations were collected. Inclusion criteria included all gastrointestinal tract surgeries. During the period of this study, all patients in the study were evaluated, counselled with regard to their disease, and finally participated in their management in the form of surgery and follow-up in the wards. In both groups patients were followed-up once every 24 hours and a record kept of complaints and complications related to the use or non-use of nasogastric tube. These included pneumonia, anastomotic leak, atelectasis, dyspepsia (retrosternal pain), sore throat and ulcer over nostril. Patients discomfort level has been assessed in the form of grade of intolerance to nasogastric tube. The nasogastric tube used was a gauge 14-18 Ryle's tube depending on the age of the patient. Single lumen (Ryle's tube) which was placed to gravity drainage and removed based on the following post-operative parameters of recovery:- passage of flatus, presence of active bowel sounds on auscultation, volume of

aspiration; Patient discharge thereafter was considered and recorded under the days of hospital stay per patient in both groups.

5. OBSERVATION AND RESULTS

Of 200 cases with nasogastric decompression used (Group 1), majority of cases had their age between 50.0 - 69.0 years. Only 8 cases (2.0%) had their age less than 10.0 years. Of 114 cases with no nasogastric decompression used (Group 2), majority of cases had their age between 10.0 - 29.0 years. None had their age less than 10.0 years. The mean ± standard deviation of age of Group 1 cases is 47.9 ± 19.9 years and for Group 2 it is 34.8 ± 15.9 years. The mean ± standard deviation of age of the entire group of cases studied is 43.1 ± 19.6 years. (According to Table 1).

Of 200 cases with nasogastric decompression used (Group 1), 138 cases (69.0%) were males and 62 cases (31.0%) were females. Of 114 cases with no nasogastric decompression used (Group 2), 64 cases (59.1%) were males and 50 cases (43.9%) were females. Of 314 cases studied, 202 cases (64.3%) were males, 112 cases (35.7%) were females. In the entire study group the male to female sex ratio was 1.80: 1.00. (According to Table 2)

As seen in Table 3, of 200 cases with nasogastric decompression used (Group 1), 9 cases (4.5%) had other complications (such as 6 cases with anastomotic leak and 3 cases with ulcer over right nostril) related to NG tube. Of 114 cases with no nasogastric decompression used (Group 2), none had other complications related to NG tube. The distribution of incidence of other complication related to NG tube differs significantly across two study groups (P-value<0.05).

6. DISCUSSION

Total 314 patients were studied in this study, patients were distributed in group 1 and group 2 as patient with nasogastric tube and without nasogastric tube respectively. Of 314 cases studied, nasogastric decompression was used in 200 cases (63.7%) and in 114 cases (36.3%) it was not used. The mean ± standard deviation of age of Group 1 cases is 47.9 ± 19.9 years and for Group 2 it is 34.8 ± 15.9 years. The mean ± standard deviation of age of the entire group of cases studied is 43.1 ± 19.6 years, this is comparable to those in series reported by William et al. [16], as well as Dinsmore et al. [11]. There were slightly higher mean ages and age ranges in this study which is similar to studies reported by Reissman et al. and Ibrahim et al. [17,18].

Table 1. The age distribution of the cases studied (n=314)

Age Group (years)	Group 1 (n=200)		Group 2 (n=114)	
	No. of cases	% of cases	No. of cases	% of cases
<10.0	8	4.0	0	0.0
10.0 – 29.0	34	17.0	52	45.6
30.0 – 49.0	43	21.5	40	35.1
50.0 – 69.0	89	44.5	18	15.8
70.0 – 89.0	26	13.0	4	3.5
Total	200	100.0	114	100.0

Values are n (% of cases)

Table 2. The sex distribution of the cases studied (n=314)

Sex	Group 1 (n=200)		Group 2 (n=114)	
	No. of cases	% of cases	No. of cases	% of cases
Male	138	69.0	64	59.1
Female	62	31.0	50	43.9
Total	200	100.0	114	100.0

Values are n (% of cases)

Table 3. The distribution of postoperative incidence of any other complication related to NG tube between two study groups (n=314)

Any other	Group 1 (n=200)		Group 2 (n=114)	
Complication	No. of cases	% of cases	No. of cases	% of cases
No	**191**	**95.5**	**114**	**100.0**
Yes	**9**	**4.5**	**0**	**0.0**
Total	**200**	**100.0**	**114**	**100.0**

Values are n (% of cases). Chi-Square value = 5.281, P-value = 0.029 (Significant)*

Of 314 cases studied, 202 cases (64.3%) were males, 112 cases (35.7%) were females. In the entire study group the male to female sex ratio was 1.80: 1.00. Of 200 cases with nasogastric decompression used (Group 1), 138 cases (69.0%) were males and 62 cases (31.0%) were females. Of 114 cases with no nasogastric decompression used (Group 2), 64 cases (59.1%) were males and 50 cases (43.9%) were females, a finding similar to that reported by Reissman et al. and Ibrahim et al. [17,18]. There were also more males operated in both groups in this study, compared to females, a finding similar to that reported by Reissman et al. and Ibrahim et al. [17,18]. Although the male preponderance in this and other series is difficult to explain it could be attributed to the fact that more males were operated for obstructed hernia and abdominal trauma with visceral injuries and peritonitis than females in both groups reported in other studies [8,16,19,20].

Gerber et al. [3] in their series had 34 patients treated for simple obstructed hernia, 11 patients treated for intestinal obstruction, 8 patients treated for perforated peptic ulcer disease, 21 patients had peritonitis, and 27 patients had abdominal trauma with viscerae injuries. In his series all these patients were treated without nasogastric tube, which is almost similar to this study. Bauer [19], reported 87 patients who underwent large bowel operation and treated without nasogastric tube. His study had only patients who underwent large bowel operations but no other abdominal conditions.

7. CONCLUSION

This study was conducted with the aim of determining the role of prophylactic nasogastric tube decompression in patients undergoing abdominal surgery. Three hundred and fourteen patients (200 patients with tube [group I]) and 114 patients without tube [group II] who presented for emergency or elective surgical intra-abdominal conditions at Krishna Hospital and Medical research centre, Karad were studied. Routine nasogastric tube (NGT) decompression in patients undergoing abdominal operations has been the main mode of treatment worldwide and continues to be so in developing countries. The procedure is considered unnecessary with significant discomfort in some patients without any added advantage. Routine use of nasogastric tube decompression to all patients undergoing abdominal surgery increases patients hospital stay with additional discomfort to patient related to nasogastric tube. Additionally the incidence of complications like pneumonia increases significantly when nasogastric tube is kept for longer period. The findings in this study show that routine use of nasogastric tubes is unnecessary.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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