Does Nasogastric Tube Use During Cardiac Surgery Affect Postoperative Outcomes? A Narrative Review

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Abstract

Nasogastric tube (NGT) use has been common in the immediate postoperative period in surgical patients for decades. Potential advantages include the decompression of gastric contents and the early administration of time-sensitive medications. However, its routine use after cardiac surgery has not been established as a gold standard yet. The NGT use for prevention of post-operative nausea and vomiting has been a matter of debate in literature. Also, NGT use has also been associated with the incidence of some respiratory and gastrointestinal complications and it may be a source of significant pain and discomfort to patients. In this article, we review the current available literature regarding the use of NGT during and immediately after cardiac surgery, with particular emphasis on its potential role in enhanced postoperative recovery.

Introduction

The nasogastric tube (NGT) has been widely accepted for routine perioperative use in surgical patients for decades. NGTs are used to decompress the gastric contents or to administer feeds and or medications for patients unable to tolerate oral intake [1,2]. In cardiac surgery particularly, NGTs have been used for post-operative nausea and vomiting (PONV) which occurs very commonly, however the role of NGTs in reducing this complication has been controversial in the literature [3]. The capability of early delivering medications, such as aspirin after coronary artery bypass grafting, adds more utility to NGT use in the immediate postoperative period [4,5]. There are ongoing debates regarding the efficacy of NGTs, whether they are necessary, and the complications NGT may cause. While some authors consider that postoperative NGT insertion should be the standard of care to minimize the incidence of PONV, alleviate gastric distension, and reduce risk of pulmonary complications [6], some argue that NGTs are ineffective for the prophylactic purposes suggested and can even exacerbate negative outcomes in postoperative patients.

In this paper, we review the current evidence regarding the safety and efficacy of NGT use following cardiac surgery with particular emphasis on its potential role in enhancing recovery in this group of patients.

Study design and search strategy

A database search was conducted using Embase, Cochrane Library, and Medline to identify relevant studies in October 2021 (Table 1). The following keywords and subject headings were used: “heart surgery” OR “CABG” OR “surgery” AND “clinical outcomes” OR “patient-reported outcomes” OR “adverse outcomes” OR “complications” OR “postoperative complications” OR “intraoperative” AND “nasogastric tube” AND “nausea” OR “postoperative nausea” OR “nausea and vomiting” OR “postoperative nausea and vomiting” OR “pneumonia” OR “anesthesia” OR “feeding” OR “feeding apparatus” OR “decompression” in Embase, “cardiac surgery” OR “heart surgery” OR “CABG” OR “surgery” AND “outcomes” OR “complications” OR “postoperative” OR “intraoperative” AND “nasogastric tube” AND “nausea” OR “vomiting” OR “pneumonia” OR “anesthesia” OR “feeding” OR “decompression” in Cochrane Library, and [(“Thoracic surgery” OR “Coronary Artery Bypass” OR “General surgery” OR “Outcome Assessment, Health Care” OR “postoperative

complications" OR "intraoperative complications") AND ("nausea" OR "postoperative nausea and vomiting" OR "pneumonia" OR "anesthesia" OR "decompression")] AND ("nasogastric tube" OR "intubation, Gastrointestinal") in Medline.

<Table 1>

Data Extraction, and Quality Assessment

A study characteristics table was created to summarize the selected sources (Table 2). Study design, sample size, inclusion and exclusion criteria, baseline patient demographics, and outcomes were all studied. Due to significant variability between the format of reported results, a standardized data summary table was not created. Instead, the relevant reported results are discussed in their respective sections. Instead, the relevant reported results are discussed in their respective sections. Selected articles were narratively reviewed in compliance with the Scale for the Assessment of Narrative Review Articles (SANRA) narrative review checklist [7].

<Table 2>

The impact of using NGT on PONV after cardiac surgery

The incidence of PONV after cardiac surgery can be as high as 42-71% [8,9,10,11,12,13]. Many pharmacological and non-pharmacological therapies have been applied in the treatment of PONV. However, patients that have undergone cardiac surgery are more susceptible to developing hypotension, oversedation, and cardiac arrhythmias with the use of traditional antiemetics [14,15]. Additionally, severe PONV can result in significant complications such as electrolyte disturbance, dehydration, aspiration, and myocardial ischemia due to increased myocardial oxygen consumption [16,17,18]. Similarly, gastric distention caused by increased swallowing post-operatively increases intragastric pressure which may make patients more susceptible to PONV [19]. This is further exacerbated if the gas mixture in the stomach contains elements of volatile anesthetics introduced into the stomach during manual ventilation [20]. Currently, there is conflicting evidence regarding the utility of using routine NGT in to relieve gastric distention and to reduce PONV.

In patients undergoing other general surgical procedures, it was found that gastric decompression, which NGT use is intended for, did not reduce PONV [21,22]. Furthermore, another large comparative study including patients who underwent a wide variety of non-cardiac surgical procedures found that there was no significant difference in PONV incidence in groups with or without NGT [23]. Due to the several conflicting reported results, the current consensus guidelines do not recommend the routine use of NGT to prevent PONV [24].

In a recent randomized controlled trial of 202 postoperative cardiac patients, it was found that the incidence of postoperative vomiting after cardiac surgery was higher in the control group (24%) than in the NGT group (10%, p=0.007). However, NGT use was not found to significantly impact nausea. The significant reduction in vomiting was observed within 8 hours post cardiac surgery, and there was no difference with respect to the use of antiemetics between the 2 groups. In this study, the NGT was inserted after induction of anesthesia and maintained on gravity suction until removal with extubation [3].

In their randomized cohort study of 104 patients, Burlacu et al. (2005) found that continuous gastric decompression using a NGT during coronary revascularization surgery until tracheal extubation did not reduce the incidence and severity of nausea or the incidence of vomiting or retching in these patients (Table 3) [16]. The severity of these parameters was measured for the first 24 hours postoperatively. However, Burlacu et al. (2005) reported that since the incidence of PONV after cardiac surgery was less than what is reported in the literature, this study was effectively underpowered to detect a difference in PONV despite the prospective power calculation that was done. Additionally, another study with 114 patients undergoing cardiac surgery with cardiopulmonary bypass were randomized to receive NGT after the induction of anesthesia or not, and PONV was recorded for the first 24 hours postoperatively (Table 3) [25]. It was reported that the use of NGT did not impact the incidence of PONV or requirements for antiemetics after cardiac surgery.

<Table 3>

In their interesting case report, Papoulidis et al. (2014) reported a patient who developed significant hemodynamic instability after coronary artery bypass surgery due to a distended massive hiatus hernia that posed a tamponade effect. Once a NGT was placed to decompress the stomach and aspirate gastric content, there was an astonishing improvement in the patient's status. This suggests that the presence of large hiatal hernias may be a reasonable indication for NGT after cardiac surgery [26].

Early administration of medications

It is well established that early administration of some medications, such as aspirin, in the postoperative period may play an important role in improving outcomes after cardiac surgery. According to the 2011 ACCF/AHA guidelines for CABG, if aspirin was not initiated preoperatively, this should be done within 6 hours postoperatively and continued permanently to prevent saphenous vein graft (SVG) closure and adverse cardiovascular events [27]. Similarly, the 2008 European association for cardio-thoracic surgery (EACTS) guidelines recommend that all patients without contraindications should be given aspirin postoperatively within 24 hours of a CABG [28]. Early aspirin administration was associated with better graft patency and overall survival and significant reductions in stroke, myocardial infarction, renal failure and bowel infarction incidence [29,30,31].

NGT has proved to be an effective method for delivering mediations post-operatively. Zafar et al. (2009) compared the administration of tablets orally or via NGT and found that NGT was associated with earlier peak concentrations and an overall greater absorption and bioavailability [4]. Shennib et al. (2003) investigated the feasibility of delivering combined clopidogrel and aspirin regimen early after CABG orally or via NGTs. Both routes were found to be safe and were associated with better graft patency [5].

Interference with imaging

The possible interference between the nasogastric tube and the transesophageal ultrasound probe could be a reason to avoid the nasogastric tube in modern cardiac surgery. Some authors recommend the removal of the nasogastric tube to prevent interference with imaging and reduce the possible injury to the oesophagus [32,33,34].

Postoperative complications associated with NGT use

These potential complications become of more significance when considering the intubation times of patients and the extended periods of NGT use. Typically, patients are extubated within a few hours after cardiac surgery. In their study, Kotfis and colleagues reported an average intubation time of 14.93 hours [35]. However, those more complex patients who require prolonged periods of intubation, are at higher risk of developing adverse effects related to the NGT use such as respiratory complications, gastrointestinal complications, and postoperative pain and discomfort [35,36,37,38,39].

Respiratory complications

Pneumonia is one of the most common infections following cardiac surgeries with a cohort study reporting its cumulative incidence as 2.4% [40]. The prolonged use of NG tubes has been widely reported to be associated with an increased incidence of pneumonia [40,41]. The reported prevalence of pneumonia following NGT use was shown to vary ranging from 4 to 95% with associated mortality rates of 17-62% [38,40,42]. One study reported that NG tube use was the strongest risk factor for developing nosocomial pneumonia indicated by having the highest odds ratio (6.48, 95% confidence intervals = 2.11 to 19.82) in a sample of 203 patients [43]. NG tubes affect the proper functioning of the gastroesophageal sphincter which then leaves patients more susceptible to maxillary sinusitis, oropharyngeal colonization, and bacterial migration providing a possible explanation of the strong association found between NG tube use and pneumonia occurrences following cardiac surgery [41]. Furthermore, it is postulated that the presence of the NGT can promote aspiration leading to aspiration pneumonia. The mechanism by which aspiration may be promoted

includes the loss of anatomical integrity of the esophageal sphincters, increased frequency of lower esophageal sphincter relaxation, and the desensitization of the pharyngoglottal adduction reflex [38].

Gastrointestinal complications

Despite it is suggested that NGT use may result in gastric decompression and alleviation of postoperative ileus, in their study, Tanguy and colleagues have shown that NGT use was ineffective and may even promote ileus [19]. Furthermore, NGT use was associated with irritation to the patient, which in turn may promote air swallowing and worsening of gastric distension [22,44]. Although there is a lack of understanding of whether these effects are selectively seen in long-term patients, it is generally accepted that NG tubes are not suitable for ileus resolution in all patients [45]. A meta-analysis found that for every one patient that requires NGT use to resolve distention, 20 patients can be managed without NGTs, ultimately concluding that routine NGT decompression is not recommended [46].

Pain and Discomfort

The most commonly reported complications after NGT insertion are pain and discomfort. In a patient survey conducted in hospitals, both patients and physicians rated 12 different procedures on a 100-mm visual analog scale (VAS) for pain caused [47]. Patients reported a VAS of 46.0 for NGT insertion while physicians reported a VAS of 49.9 which were the highest VAS scores reported for each group. This indicates that NGT insertion was the most painful procedure in this study compared to some of the most commonly performed surgical and bedside procedures [47].

Another complication of NGT use is that NGT insertion can cause nasopharyngeal discomfort and gagging [48]. Also, knotting of the NGT can occur as the tube can become coiled in the patient's stomach, which may lead to knotting when it is pulled out [49]. This has been shown to create extreme pain in the nasopharynx once the NGT is removed [49]. Other complications due to NGT misplacement include mucosal trauma [50,51], bronchial injury or perforation [51], and irritative rhinitis and pharyngitis [22,48].

Enhanced recovery after cardiac surgery

Enhanced recovery after surgery (ERAS) is a multidisciplinary model that applies a bundle of evidence-based best practices to improve recovery rates for patients undergoing surgical procedures [52]. Despite the multiple potential benefits of NGT use, it was not considered as a part of the ERAS protocols probably due to the lack of conclusive evidence that support the effectiveness of NGT.

Conclusions

Based on our findings, there is currently not enough evidence to support the routine use NGT during cardiac surgery. Further research is warranted to establish the role of NGT in this group of patients.

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TABLES

Table 1. Search Strategy

Date of Search	Database	Strategy
22/10/21	Embase	"heart surgery" OR "CABG" OR "surgery" AND "clinical outcomes" OR "patient-repor
22/10/21	Cochrane library	"cardiac surgery" OR "heart surgery" OR "CABG" OR "surgery" AND "outcomes" OR

Date of Search	Database	Strategy
22/10/21	Medline	[("Thoracic surgery" OR "Coronary Artery Bypass" OR "General surgery" OR "Outcom

Table 2. Inclusion and Exclusion Criteria for Studies Included

	Inclusion Criteria	Exclusion Criteria
Participant's age in study	Adults [?] 18 years of age	Individuals [?] 18 years of age
Publication type	Peer reviewed journal	Not peer reviewed journal
Date	Any date	
Language	English	Non-English
Other	Full text available	Full text not available

Table 3. Use of NGT to reduce PONV

Study	**NGT gp**	**Non NGT gp**	**P value**	**Observations**
Lavi et al. 2011 (202 patients)	Vomiting: 10%	Vomiting: 24%	p = 0.007	NG tube use during cardiac surgery may reduce the incidence of postoperative vomiting.
Hirasaki et al. 2005 (114 patients)	Nausea: 32%, Vomiting: 15%	Nausea: 34% Vomiting: 19%	NS (assigned as p < 0.05)	The placement of NGT did not impact PONV incidence or antiemetic requirements after cardiac surgery.
Burlacu et al. 2005 (104 patients)	Nausea 25.0% Retching 11.5%	Nausea 32.7% Retching 13.4%	Nausea P = 0.6 Retching P = 0.7	NGT during coronary revascularization surgery, until tracheal extubation, did not reduce the incidence and severity of nausea or the incidence of vomiting or retching in these patients.