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PHARYNGEAL PACKING IN SINONASAL SURGERY: A SYSTEMATIC REVIEW AND META-ANALYSIS.

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Abstract

Background: Pharyngeal packs are used during nasal surgery to physically stop blood flow into the aerodigestive tract, which has strong emetic effects. Although it has been hypothesized that utilizing it decreases postoperative nausea and vomiting (PONV), this has not been verified.

Objectives: This study aimed to assess the effect of pharyngeal packing in sinonasal surgery regarding postoperative nausea, vomiting, and sore throat.

Methods: PubMed and EBSCO database information services were used for article selection. All articles relevant to our topic were included, and other articles were reviewed. Articles that were unrelated to this field were excluded. Additionally, data were extracted in a specific format that group members reviewed.

Results: Using a random-effects model, we performed a meta-analysis of case-control data on six studies regarding the incidence of nausea, vomiting, and pain, and we observed that pharyngeal packing had no significant influence on nausea, vomiting, or sore throat ($P > 0.05$); however, data for throat pain were few and heterogeneous.

Conclusion: All studies reported that pharyngeal packing had no advantages or disadvantages in sinonasal surgery. Despite being widely practiced, using various methods of pharyngeal packing or without packing has no significant impact on the incidence of PONV or throat pain. However, applying a pharyngeal pack does not worsen the patient's postoperative throat pain or have adverse effects.

Keywords: pharyngeal packing; sinonasal surgery; meta-analysis

1. Introduction

In most rhinological procedures performed in various countries, anesthetists and surgeons regularly apply a throat pack after tracheal intubation, which is considered to act as a physical barrier that prevents any bone or cartilage fragments, polyps, or blood from flowing into the nasopharynx and leaking beyond the tracheal tube cuff from being aspirated.[1] The possibility of postoperative nausea and vomiting (PONV) occurrence varies depending on the patient, the type of anesthesia used, and

the procedure performed.[2] According to numerous studies, the incidence of PONV following nasal surgery ranges from 34% to 65%.[2] Severe bleeding is possible during surgical procedures involving the nose and paranasal sinuses. Consequently, PONV is believed to occur more frequently after nasal surgery.[3] Additionally, pharyngeal packs are used during nasal surgery to physically stop blood flow into the aerodigestive tube, which causes strong emetic effects. Although it has been hypothesized that doing so decreases PONV, this has not been verified.[4] The effect of pharyngeal packing on PONV has been studied in numerous studies; however, none of the studies distinguished between different kinds of nasal surgery. Although the duration of anesthesia exposure and the possibility of bleeding occurring vary depending on the type of surgery, it might be significant in relation to PONV[5].

Pharyngeal pack use has some associated risks, which have been demonstrated in studies to exacerbate postoperative throat pain and cause aphthous stomatitis.[4-6] Furthermore, postoperative retention of the pharyngeal pack has led to airway blockage and deadly effects in rare cases.[6] This adverse effect may be due to the packing's irritating attributes (such as softness against pharyngeal mucosa) and the condition, whether it is dry or wet. A mouthwash solution of chlorhexidine gluconate 0.2% and benzydamine hydrochloride 0.15% (CGBH), which are recommended for sore throats, was used to treat PONV and throat discomfort, regardless of whether the packing was dry or wet.[7] Notably, chlorhexidine gluconate is an antibacterial agent that destroys or inhibits germ cell reproduction and has an antiseptic effect on the skin.[7] Benzydamine hydrochloride is a nonsteroidal anti-inflammatory drug that is applied topically to create a local anesthetic on the surface, in addition to treating pain and inflammation.[7] In Europe, the Middle East, and India, these drugs are frequently prescribed to treat mouth sores, the pain, and the inflammation that they produce, particularly those caused by radiation therapy.[7] Additionally, they typically reduce discomfort while delaying the progression of radiation-induced mucositis.[4,7]

Basha et al.[4] and Karbasforushan et al.[8] compared hypopharyngeal packing and without packing and revealed that hypopharyngeal packing is significantly more frequently associated with postoperative throat pain. However, some studies observed that pharyngeal packs had no effect on postoperative throat pain.[4,5,7-9] Furthermore, Nasal and nasopharyngeal sponges made of polyvinyl acetate (PVA), known as Merocel, are generally used to treat epistaxis and are utilized postoperatively for hemostasis or to prevent synechiae.[10] Additionally, they are used during nasal surgery to administer topical anesthetics or vasoconstrictor medicines. Studies found that inserting a 5-cm Merocel nasal sponge on each nasal side to prevent blood ingestion during sinus procedures performed under local anesthesia.[10, 11] Our research aimed to assess the effect of pharyngeal packing in sinonasal surgery regarding postoperative nausea, vomiting, and sore throat

2. Material and Methods

2.1 Study design

This study is a systematic review and meta-analysis.

2.2 Sample & study groups

Here, PubMed and EBSCO Information Services were selected as the search databases for the publications because they are high-quality sources. Topics concerning pharyngeal packing, nasal surgery, and other related articles were used in this study preparation. The titles and abstracts of the articles found were screened and reviewed by two reviewers.

We employed the PICO framework to guide our search strategy. The PICO elements (Population, Intervention, Comparator, and Outcome) were considered to ensure a systematic and comprehensive approach. The following details were incorporated into our methodology:

Population: Our search targeted studies that included populations undergoing sinonasal surgery. There were no specific demographic or clinical characteristics set as inclusion criteria for the population, as we aimed to encompass a broad range of patients undergoing sinonasal surgery.

Intervention: The main focus of our study was the use of pharyngeal packing in sinonasal surgery. We sought articles that discussed the implementation of pharyngeal packing as part of the surgical procedure or postoperative management.
Comparator: We examined studies that provided a comparison between groups, specifically those that compared outcomes related to pharyngeal packing versus non-pharyngeal packing interventions in sinonasal surgery.
Outcome: The outcomes of interest in our study included postoperative nausea and vomiting (PONV), throat pain, and nasal surgery-related outcomes. We sought studies that reported on these specific outcomes and their association with the use of pharyngeal packing in sinonasal surgery.

Inclusion criteria: Articles were selected based on their relevance to the project, which should include one of the following topics: pharyngeal packing, sinonasal surgery, PONV, throat pain, and nasal surgery. To ensure a comprehensive analysis of the existing evidence, we included a range of study designs in our search, such as randomized controlled trials (RCTs), cohort studies, case-control studies, and observational studies. The publication timeframe for our study spanned from 2010 to 2022, allowing us to capture the most relevant and up-to-date literature on pharyngeal packing in sinonasal surgery.

Exclusion criteria: Repeated studies, review studies, and articles that did not have one of the topics mentioned above as their primary purpose were excluded.

2.3 Statistical analysis

The data were extracted based on a specific form that included the following information: the title of the publication, author's name, objective, summary, results, and outcomes. A double revision of each member's outcomes was applied to ensure validity and minimize errors. Additionally, during article selection, studies were doubled-reviewed, and from their results, we ensured to enroll the studies related to the objective of our study and to avoid or minimize errors in the results. We used Review Manager 5.4 to conduct quantitative data synthesis. The I^2 test and funnel plot inspection were used to detect publication bias.

3. Results

Overall, 105 studies were identified for title screening after the search using the aforementioned databases, and 63 articles were included in the abstract screening, of which 32 articles were excluded. The full text of the remaining 31 publications was reviewed, which resulted in the exclusion of 23 studies, and 6 were enrolled for final data extraction **(Table 1).**

Meco et al. (2016) conducted a randomized prospective, double-blinded trial that involved 201 patients who were divided into four groups. Pharyngeal packing soaked with water, packing soaked with cannabidihexol (CGBH), or no packing was used in different groups. The surgeon evaluated their satisfaction level and the amount of bleeding after the procedure. The study concluded that using pharyngeal packing had no advantage or disadvantage, particularly concerning postoperative nausea and vomiting (POVN) and throat pain. It was noted that CGBH, a pain-relieving anti-inflammatory medication, showed no effect.[7]

Rizvi et al. (2015) conducted a randomized comparative study that included 40 patients randomly assigned to two groups. Group A had oropharyngeal packing, while Group B had nasopharyngeal packing. Subsequently, patients were interviewed to assess throat complications, including sore throats, swallowing problems, hoarse voices, and throat irritation. The results indicated that the oropharyngeal pack group had a slightly higher incidence of hoarseness and throat discomfort compared to the nasopharyngeal pack group. Patients in Group A experienced a higher rate of dysphagia than those in Group B. Additionally, there was no statistical difference between the groups in terms of hoarseness and throat irritation occurrence. This finding suggested that the pharyngeal packing site affects the frequency and intensity of postoperative sore throat (POST) and the frequency

of dysphagia following general anesthesia. However, using nasopharyngeal packing in individuals undergoing nasal operations may reduce those outcomes.[12]

Korkut et al. reported that at two, four, eight, and 24 h, there was no significant difference in the incidence of PONV between the two groups ($P = 0.41$, $P = 0.54$, and $P = 0.51$) in 24 h, PONV was not observed. The septoplasty group that did not use pharyngeal packing experienced a significantly reduced incidence of PONV at 4 and 8 h compared with the septoplasty group ($P = 0.02$). This finding showed that pharyngeal packing in nasal surgery had no effect on PONV.[13]

Furthermore, **Alfiky et al.** reported that early postoperative throat pain was unaffected by throat pack placement. However, if throat packing is necessary, a safe alternative to the hypopharyngeal pack is the nasopharyngeal pack.[14] Additionally, **Piltcher et al.** reported that hypopharyngeal packing during nasal surgery does not prevent PONV.[5,18] **Green et al.** reported that at 4 h after surgery, there was no significant difference in the average amount of throat pain. Patients without pharyngeal packing felt more discomfort 24 h after surgery than those who had a throat pack in place (P 5 0.002). At 4 h (P 5 0.315) or 24 h (P 5 0.315) after surgery, there was no significant change in the intensity of nausea (P 5 0.315).[15]

3.1 Quantitative data synthesis

As presented in Figure 2, a random-effects model was used to conduct a meta-analysis of case-control data regarding the incidence of nausea, vomiting, and pain. Generally, pharyngeal packing had no significant effect on nausea, vomiting, or sore throat ($P > 0.05$), though the data for throat pain were scanty and heterogeneous. Figure 3 shows the symmetrical distribution of plotted data for throat pain, nausea, and vomiting.

Table 1: Author, year of publication, methodology, and results:

Study	Objective and Methodology	Results and Conclusion
Meco et al., 2016 [7]	A randomized prospective, double-blinded trial included 201 patients who were categorized into one of four groups to have dry pharyngeal packing soaked with water, packing soaked with CGBH, or no packing. After the procedure, the surgeon scored their satisfaction level (1; very terrible, 2; bad, 3; moderate, 4; good, and 5; very good) and the amount of bleeding (1; excessive, 2; a lot, 3; moderate, 4; minimal, and 5; none).	Using pharyngeal packing has no advantage or disadvantage, mainly regarding POVN and throat pain, since cannabidihexol (CDBH), which is a pain-relieving anti-inflammatory medication, showed no effect.
Rizvi et al., 2015 [12]	A randomized comparative, involved 40 patients categorized randomly into two groups comprising 20 each. The oropharynx was packed in group A, and the nasopharynx was packed in group B. Subsequently, patients were interviewed for any throat complications, including sore throats, swallowing problems, hoarse voices, and throat irritation.	The oropharyngeal pack group had a slightly higher incidence of hoarseness and throat discomfort than the nasopharyngeal pack group.
Korkut et al., 2010 [13]	The study included 100 adult patients who had regular nasal surgery who were evaluable individuals (group 1, n=50; group 2, n=50). During nasal surgery, patients were randomly assigned to one of two groups as follows: patients who received a pharyngeal pack (group 1) or those who did not (group 2). None of the patients received any preoperative prescriptions for analgesics or sedatives. Kortilla's scale was used to determine the severity of PONV as follows: No PONV— absence of any emetic episode and nausea Mild PONV— patients experienced one emetic episode or short-lasting nausea. Moderate POVN— the patient experienced one to two emetic episodes Severe PONV— the patient experienced more than two emetic episodes	Bleeding during nasal surgery had no effect on PONV, and pharyngeal packing did not significantly reduce the risk of ingesting bleeding. However, pharyngeal packs actually prevented this from happening, as the packs removed after surgery were red.
Alfiky et al., 2018 [14]	A prospective randomized controlled trial included participating patients who were randomly allocated into one	There were no statistically significant variations in the evaluated pharyngeal physical

	of two groups: Group A: hypopharyngeal packing or Group B: nasopharyngeal packing. The blinded patients from both groups were evaluated at two hours, 24 hours, and one week after surgery by a blinded assessor. Throat pain was assessed using the standardized numeric rating scale for pain (range, 0–10).	indicators at all assessment periods.
Piltcher et al., 2007 [5]	A randomized clinical trial was conducted on 144 patients. The intervention group was subjected to hypopharyngeal packing after orotracheal tube placement, and the control group underwent no hypopharyngeal packing. During the recuperation period, the occurrence of nausea, vomiting, antiemetic medicine use, and throat pain were all assessed blindly.	Both groups experienced postoperative throat pain on an equal basis, and when results were stratified by the kind of operation, they remained consistent.
Green et al., 2017 [15]	Forty-six patients who were scheduled to undergo standard endoscopic sinus surgery were enrolled. Prior to surgery, the patients were randomly assigned to receive pharyngeal packing or not. Patients with chronic rhinosinusitis, either with or without polyposis, who were 18 years of age or older and receiving FESS, were eligible for inclusion. Postoperatively, throat pain and nausea/vomiting scores were recorded by study coordinators who were blinded to the randomization both in the postanesthesia care unit and 24 h after the operation.	There was no significant effect of using a pharyngeal pack; therefore, it was not recommended to use it in functional endoscopic sinus surgery.

4. Discussion

Using a random-effects model, we conducted a meta-analysis of case-control data related to the incidence of nausea, vomiting, and pain. Generally, pharyngeal packing had no significant influence on nausea, vomiting, or sore throat; however, data for throat pain were few and heterogeneous. Pharyngeal packing is a regularly utilized technique for reducing the risk of blood aspiration and ingestion, which could cause PONV due to the strong emetic properties of blood in the gastrointestinal tract. This technique increases with sinonasal procedures,[5,9,19,] and these rhinological procedures can result in significant bleeding. However, pharyngeal packing that surrounds the endotracheal tube and extends from the oropharynx level to the level of the hypopharynx could create a physical barrier to prevent blood from entering the trachea and esophagus. Although it is assumed that this procedure can prevent or minimize blood intake, there is currently no reliable scientific data to support its effectiveness, and there are reports that this method causes postoperative throat pain.[1,4,13] The use of volatile anesthetics or nitrous oxide, intraoperative or postoperative opioid administration, smoking habits, femininity, longer surgical length, and certain surgical techniques are all known risk factors for PONV in adults.[16]

In studies conducted by Basha et al.[4] and Piltcher et al.,[5] there was no difference in the incidence of PONV between patients regardless of whether or not a pharyngeal pack was utilized; however, not all operations for the various groups had the same potential for bleeding. Furthermore, as previously mentioned, the length of the procedure and the use of a nasal pack after the operation procedure were not considered in their investigations. Conway et al. observed a significant prevalence of sore throat following the insertion of a gauze pharyngeal pack moistened with water in a study involving 1480 participants. Notably, 19% of the patients experienced a severe sore throat, while 42% of them had a mild sore throat. However, whether pharyngeal pack position affects the frequency and intensity of sore throats was not assessed in this study.[17]

In a study by Tay et al.[18] on the effects of a pharyngeal pack on the incidence of POST following standard oral surgery, patients with pharyngeal packs and patients without any packs were evaluated in two groups. The study found that the total incidence of sore throat was 76% immediately after recovery and 53% after 24 h. No significant difference was observed between the groups immediately after the surgery and 24 h later. They concluded that pharyngeal pack insertion had no effect on the frequency or severity of POST.

Additionally, in a study of 25 patients, Fine et al.[19] observed that the incidence of sore throat was 80% in 15 patients with a throat pack placement and 0% in 10 patients with no pack placement. Korkut[13] and Fennessey[9] reported no change in pain after surgery, regardless of whether a throat pack was inserted or not. Notably, these two trials comprised relatively substantial numbers of participants, having 100 and 60 patients, respectively. As previously mentioned, these studies omitted some critical elements, including the timing of the operation, length of the anesthetic, and anticipated blood loss. Furthermore, various sinus procedures, not just endoscopic sinus procedures, were included in these studies, making it challenging to assess the importance of these findings regarding FESS in particular.\

5. Conclusion

All studies reported that pharyngeal packing had no advantages or disadvantages in sinonasal surgery. Despite being widely practiced, using various methods of pharyngeal packing or not packing has no significant impact on the incidence of PONV or throat pain. However, applying a pharyngeal pack does not worsen the patient's postoperative throat pain or have any adverse effects. Additionally, it should be highlighted that neither a significant benefit nor a drawback of utilizing CDBH as a pain-relieving anti-inflammatory drug could be demonstrated and that the placement of the throat pack had no effect on early postoperative pain in the throat. Finally, if throat packing is required during rhinological procedures, the nasopharyngeal pack is a safe alternative to hypopharyngeal packs. Based on our findings and identified limitations, future research should focus on conducting large-scale randomized controlled trials with standardized protocols to evaluate the effects of pharyngeal packing in sinonasal surgery. Comparative studies, patient-reported outcomes, long-term follow-up, subgroup analyses, and cost-effectiveness analyses are recommended to provide more robust evidence on the advantages, disadvantages, patient perspectives, long-term outcomes, and economic implications of different packing techniques or the decision to use no packing. These recommendations aim to enhance our understanding of pharyngeal packing in sinonasal surgery and inform evidence-based guidelines for its implementation in clinical practice.

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Declaration of interest

None.

Conflict of interest

The authors of this research paper declared that they have no conflicting financial or personal interests that could influence the result or interpretation of this study.

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Figure captions

Figure 1: The included studies had different study designs.

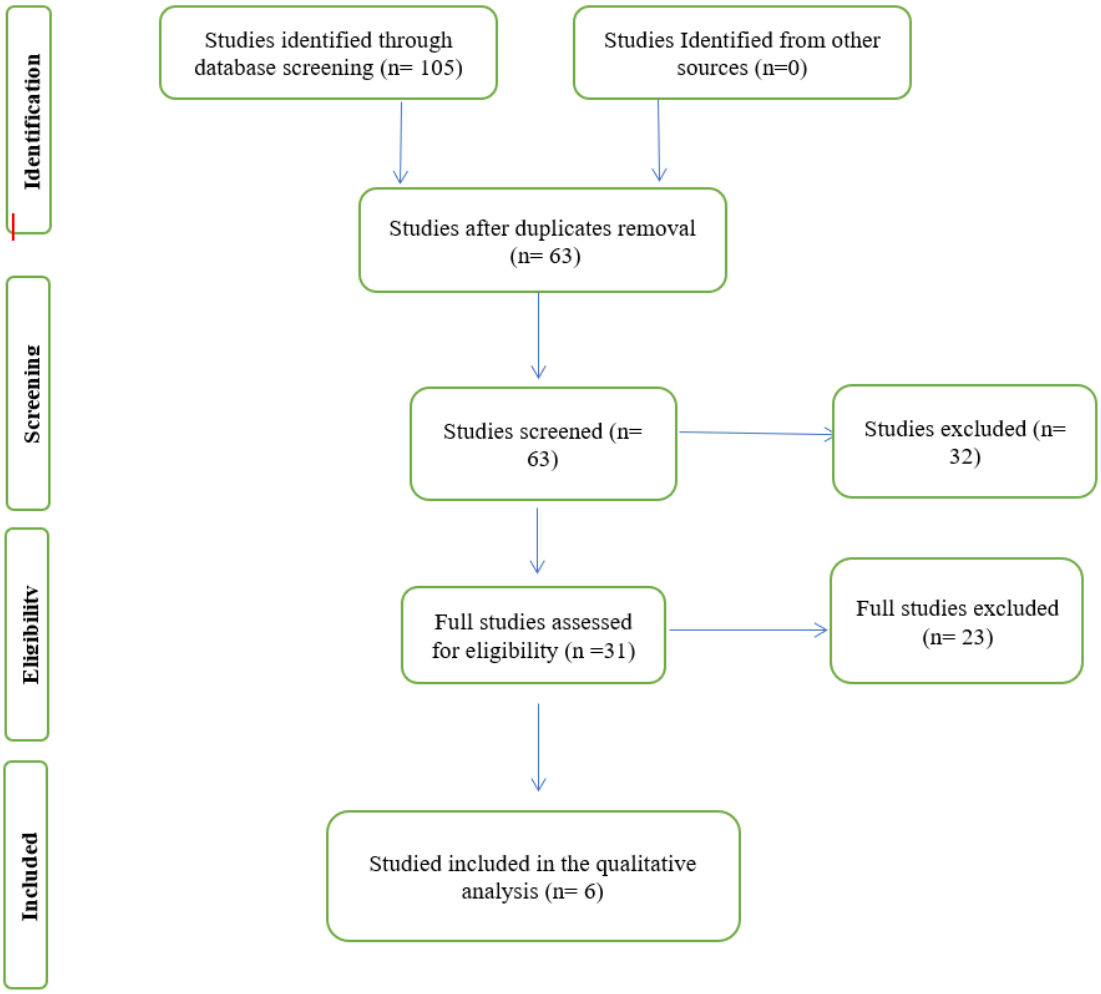

Figure 2: Forest plot of the effect of pharyngeal packing on nausea, vomiting and throat pain.

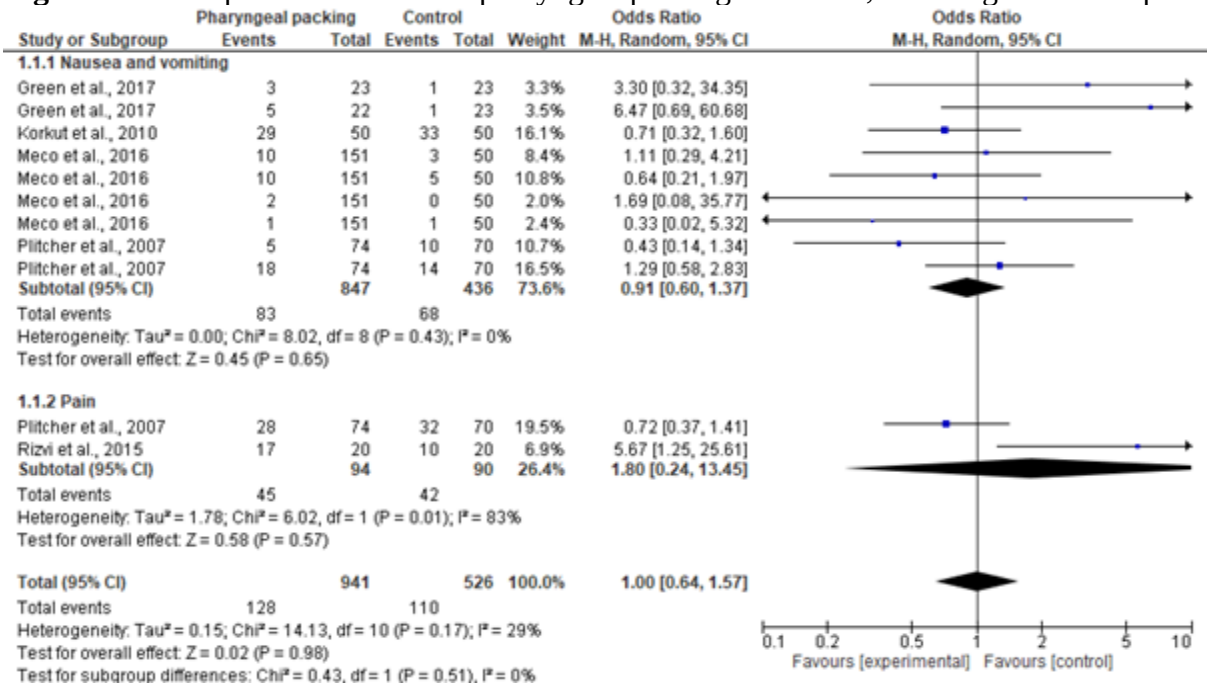

Figure 3: Funnel plot for the quantitative data.