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EFFICACY OF NASAL DECONGESTANTS IN NASAL SURGICAL AFTERCARE: A SYSTEMATIC REVIEW

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ABSTRACT

Nasal surgery is one of the most common same-day surgeries. Nasal decongestant use is often warranted post-nasal surgery, however, data on the efficacy of nasal decongestant use is scarce and scattered. To date, no reviews have been published on the efficacy of decongestants after nasal surgery. This study aims to review the efficacy of nasal decongestants after nasal surgery. We conducted a search using both keywords and MeSH terms through Medline, Embase, PubMed, and Cochrane databases up to November 1, 2022. We included randomized controlled trials (RCTs) that evaluated the efficacy of nasal decongestants after nasal surgery. Study selection, data extraction, and quality assessment were conducted independently by two expert reviewers. Out of 590 articles identified through the search process, seven studies met the inclusion criteria of the systematic review. Two studies reported the efficacy of decongestants in reducing nasal obstruction symptoms, and one study reported the benefit of minimizing pain. Using nasal decongestants in the very early postoperative phase helps reduce postoperative nasal crusting, bleeding symptoms, and nasal obstruction.

Keywords: Decongestant, Efficacy, Systematic review, Nasal surgery, Postoperative

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INTRODUCTION

Nasal surgery is one of the most prevalent operations performed in Otorhinolaryngology practice [1]. Over the past few years, the number of nasal surgeries has significantly increased, either to treat some conditions such as septal deviation or plastic surgery [2]. In the postoperative period, patients often experience some symptoms, such as mucosal swelling, pain, congestion, crusting, and nasal discharge, which can persist. They could last up to several weeks following the operation [3]. To control these problems, patients are advised to take various treatments [4], including nasal alkaline douches and nasal decongestants. Corticosteroids have also been considered a valuable option for symptom relief. [2]. However, the adverse effects and contraindications associated with corticosteroids may limit their widespread use compared to other options [5]. Decongestants function by inducing vasoconstriction within the nasal mucosa through α-adrenergic receptor activation; available over-the-counter medications are generally safe with few minimal side effects [6]. Nevertheless, these agents should not be used for longer than five days to avoid rebound congestion upon drug withdrawal [7, 8]. Despite their potential benefits, the number of studies on the efficacy of decongestants in the postoperative period remains limited [9], and no systematic review has been published. Therefore, this systematic review aims to evaluate the available randomized controlled trials [10] that investigate the efficacy of decongestants in reducing complications and achieving patients' satisfaction after nasal surgery

MATERIAL AND METHODS

Study Design

This systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The aim was to evaluate the efficacy of nasal decongestants in improving post-operative recovery following nasal surgery. The review included studies that assessed the effectiveness of nasal decongestants in managing post-surgical symptoms such as nasal congestion, pain, and other complications following nasal surgery.

Research Question

The research question guiding this systematic review was structured using the PICO framework as follows:

P (Population): Adults undergoing nasal surgery (including but not limited to septoplasty, rhinoplasty, and functional endoscopic sinus surgery).

I (Intervention): Nasal decongestants (e.g., intranasal decongestants, oral decongestants).

C (Comparison): Placebo, no decongestant treatment, or alternative treatments (e.g., saline sprays, nasal steroids).

O (Outcome): Improvement in post-surgical symptoms, specifically nasal congestion,

edema, post-operative pain, and overall recovery time.

Thus, the PICO question formulated for this systematic review was: In adult patients undergoing nasal surgery (P), how does the use of nasal decongestants (I) compare to placebo or no treatment (C) in reducing post-operative nasal congestion and improving recovery outcomes (O)?

Eligibility Criteria

Studies were eligible for inclusion if they:

- Evaluated the use of nasal decongestants in adult patients following nasal surgery.
- Reported at least one of the following outcomes: reduction in nasal congestion, reduction in post-operative pain, or time to recovery.
- They were randomized controlled trials (RCTs), cohort studies, or case-control studies published in peer-reviewed journals.

Studies were excluded if:

- The primary focus was not on nasal surgery or post-operative care.
- The intervention did not involve a nasal decongestant (oral or nasal).
- Full-text articles were unavailable.

Data sources

We conducted a search using both keywords and Medical Subject Heading terms (MeSH) through Medline, Embase, PubMed, and Cochrane databases up to November 1, 2022, for the studies that evaluated the efficacy of nasal decongestants after nasal surgery.

Search strategy and study selection

The following keywords were used in the search process: "Rhinoplasty OR Nasal decongestant OR Septoplasty OR Nasal drops OR Turbinoplasty OR Septorhinoplasty OR Normal saline''.

The Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines were performed during the search process [11]. Studies that looked at the efficacy of using a nasal decongestant after nasal surgery were included. The selection of the studies was assisted by two expert reviewers and was summarized using the PRISMA chart in (Figure 1).

Data Extraction

Data were extracted using a pre-designed form, which included information on study characteristics (e.g., author, year of publication, study design), patient characteristics (e.g., age, gender), type of nasal surgery, details of the intervention (type and dose of nasal decongestant), comparison group, and outcome measures. The primary outcomes of interest were post-operative nasal congestion, recovery time, and adverse effects.

Risk of Bias Assessment

The risk of bias in included studies was assessed using the Cochrane Risk of Bias tool for RCTs and the Newcastle-Ottawa Scale for non-randomized studies. Studies were evaluated across several domains, including randomization, blinding, completeness of outcome data, and selective reporting.

RESULTS

A

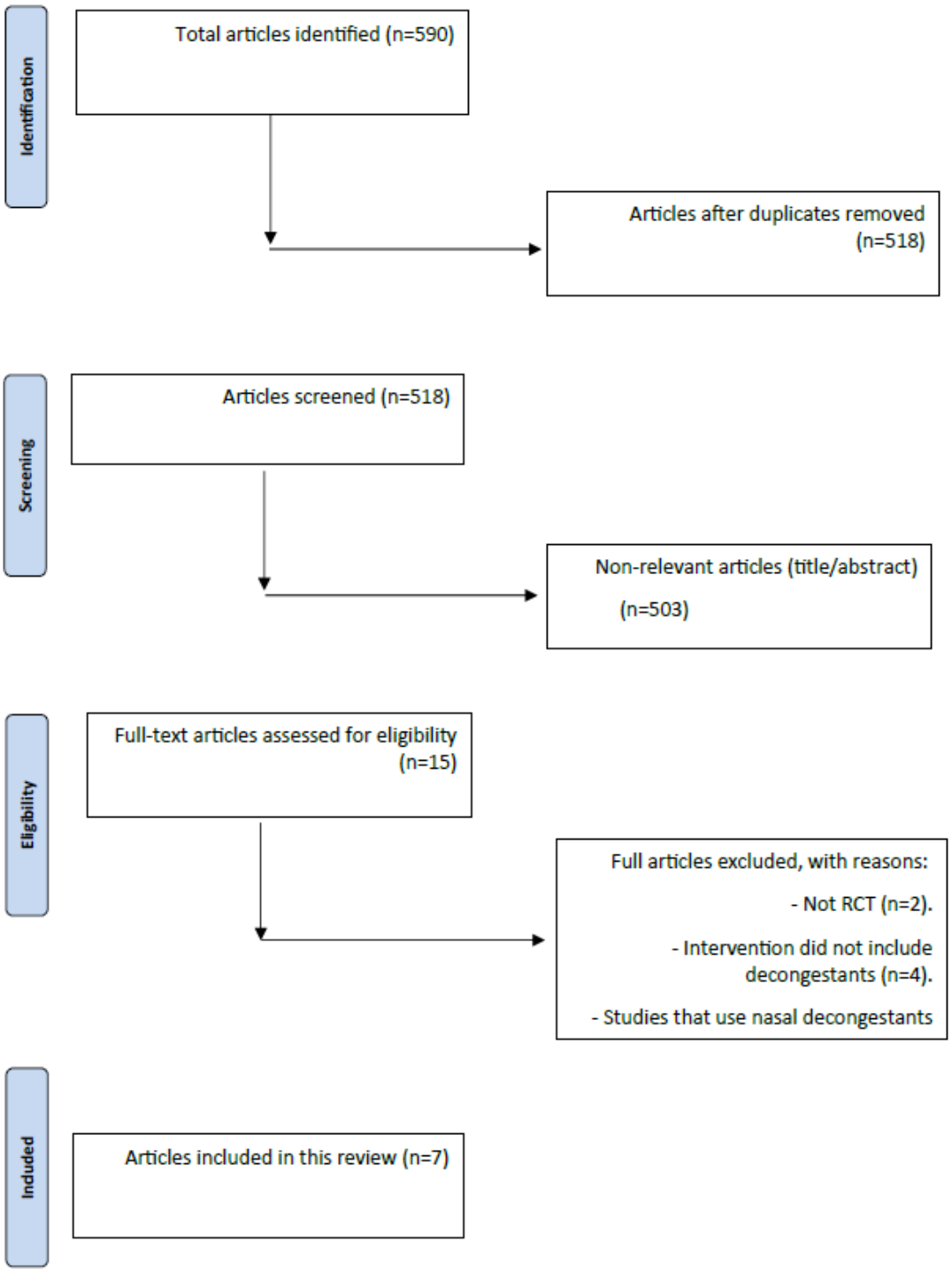

Figure 1: PRISMA chart

the search process. After removing duplicates, a total of 518 articles remained for the screening. Thereafter, the title and abstract of the remaining articles were screened, through which a total of 503 articles were considered irrelevant. The remaining 15 articles were assessed through the inclusion/exclusion criteria after reading the full text, and a total of eight articles did not meet the inclusion criteria (Figure 1). A total of seven studies were included in the final analysis, and the results were presented using narrative synthesis and tabulation of the data.

Description of studies

All the included articles were randomized controlled trials. A total of 552 patients were identified. The sample size in the included studies ranged between 28 to 120 patients. Out of seven articles, five studies explored the efficacy of decongestants in reducing pain and other nasal symptoms (crust, edema, nasal discharge, etc.), and two studies explored the efficacy in improving nasal obstruction and hemorrhage. The quality of the studies included was high, and the study objectives were mentioned in all studies. The inclusion and exclusion criteria were previously specified, and the intervention/control and outcome measures were clearly defined in all studies. Full details about the included studies are available in (Table 1).

Efficacy measures of decongestants

Bleeding:

Dagli et al. demonstrated that using saline plus oxymetazoline significantly lowered the symptoms of bleeding, measured via Visual Analog Scale (VAS), compared with using saline irrigation alone 5 days and 12 days post-surgery (p= 0.018 and 0.021, respectively) [12]. The second study by Humphreys et al. found that there is no clear evidence to support the use of xylometazoline hydrochloride 0.1% rather than simple physiological aerosolized saline at day 10 post-operatively, to control postoperative bleeding (median VAS score: 5 vs. 4, p= 0.86) [13].

Pain:

A study by Granier et al. observed that the application of intranasal 5% lidocaine plus naphazoline 0.2 mg ml^{-1} significantly reduced postoperative pain in the early postoperative period compared to intranasal saline (median VAS score up to 24h post-operatively: 0 vs. 30; p= 0.004) [14]. However, Da˘gli et al. found that mean VAS scores for pain were not statistically different on postoperative days 5 and 12 (p = 0.87 and p= 0.570, respectively) [12]. Another study by Prabhu et al. found no significant difference for using saline nasal douches compared to decongestant nasal drops in relieving postoperative pain (p= 0.932) [15].

Obstruction symptoms:

The study by Dagli et al. reported that nasal obstruction symptoms decreased with using saline plus oxymetazoline compared to the control group, which was measured via Nasal Obstruction Symptom Evaluation questionnaire (NOSE) and Total Nasal Resistance (TNR) scores. Nasal decongestant significantly improved the results of NOSE and TNR 5 days (mean 0.26 vs. 0.32, p <0.001, and median 3 vs. 5, p= 0.002,

Table 1: Details of the included studies.

Study details	Country	Study design	Sample size	Mean age years	Gender	Treatment Regimen	Definition of				Effect size
							pain	bleeding	Obstruction symptoms	other nasal symptoms	
Babak et al. 2011	Iran	Single-blind Randomized trial	74 patients	26 ± 5.4	30 males 44 females	Dexamethasone compared to decongestant (1-week pseudoephedrine) and (2-week pseudoephedrine)	N/A	N/A	N/A	The pre- and postoperative interlid distance comparisons were used to evaluate eyelid edema and divided into four grades (grade 0 = similar to preoperative, grade 1 = 0-33%, grade 2 = 33-66%, grade 3 = 66-100%). Ecchymosis was divided into five grades (grade 0 = no ecchymosis)	Using (ANOVA and chi-square test), eyelid edema in the dexamethasone group(P = 0.008) lower than the 1-week pseudoephedrine groups (P =0.007). ecchymosis in the dexamethasone group decrease only until the end of the first week (P< 0.001), in the 2-week pseudoephedrine group the reduction was significant at the end of the first week (P= 0.014) and (P= 0.015) in the 1-week pseudoephedrine group.
Vinod et al. 2011	India	Single-blind, Randomized, clinical pilot trial	40 patients	44.4 (range 21-68)	32 males 8 females	Alkaline nasal douches compared to decongestant nasal drops	Using (VAS) scoring, pain was recorded for the first 14 postoperative days (0 = no complaint, 10 = the worst experience)	N/A	Obstruction was measured using (VAS) rating, (0 = being no obstruction, 10 = representing total nasal obstruction), the scores were recorded for 14 days	The nasal cavities were checked by using a nasal endoscope to determine the amount of discharge, oedema, crusting, and the creation of scars or adhesions, by using Lund and Mackay staging system on a scale of 0–2, (oedema, scarring and crusting; 0 = absent, 1 = mild, 2 = severe)(Discharge; 0 = no discharge, 1 = thin discharge, 2 = thick discharge)	Over a 14-day period, there were no differences in nasal congestion relief between the two treatments (P = 0.3), no significant difference was found in relieving sneezing (P = 0.59) , facial pain (P = 0.932), nasal discharge (P = 0.098), loss smell (P = 0.208) in scarring, crusting, oedema there are no significant differences were noted on either side (left P = 0.695, right P = 0.412). Adverse events Throughout the course of the trial, there were no negative events among the patients in either group.
Da¨gli et al. 2018	Turkey	Prospective, randomized, double-blind study	73 patients	31.8 ± 10.3	40 males 33 females	Oxymetazoline spray + Physiological saline nasal irrigation for 7 days versus physiological saline nasal irrigation alone for 10 days	Pain was measured by using (VAS) scoring, (0 = no complaint, 10 = the worst possible complaint)	Bleeding was defined by a simple visual analog scale (VAS) scoring, (0 = no complaint, 10 = the worst possible complaint)	Using the Nasal Obstruction Symptom Evaluation (NOSE) survey to assess the following symptoms: swelling or fullness in the nose; nasal congestion; difficulty breathing through the nose; difficulty sleeping; and inability to breathe comfortably through the nose during exercise or effort.	Crusting in the nasal cavity was screen by the examiner and clogging of the cavity was scored (0 = no crusting, 10 = nasal cavity totally clogged)	Decreases in NOSE and TNR scores were significantly larger in the saline+oxymetazoline group ($p < 0.005$) VAS score for nasal crusting was significantly lower in the saline+oxymetazoline group when comparing postoperative days 5 ($p < 0.005$) and 12 ($p < 0.005$).
Granier et al. 2009	France	Randomized double-blind controlled trial	28 adult patients , 14 in each group.	Lidocaine group= 30 years. Control group= 34 years.	9/5 similar in both groups.	Topical intranasal saline 20 ml (control group) or intranasal 5% lidocaine plus naphazoline solution 0.2 mg ml−1 (lidocaine group).	Using VAS pain scores (range from 0 mm for no pain to 100 mm for the greatest imaginable pain) were recorded 30 minutes, 60 minutes, 90 minutes, and 120 minutes after arrival in the postanesthesia care unit ,6 and 12 hours after surgery by the nursing staff, and 24 hours after surgery by the physician. Patients in the lidocaine group had much less postoperative pain than those in the control group.	N/A	N/A	N/A	Patients in the lidocaine group had less postoperative pain than those in the control group [1 h after surgery: median visual analogue scale values: 0 (0-20) vs. 50 (30-80), respectively; P = 0.001], and they needed fewer doses of subcutaneous morphine. Topical intranasal lidocaine-naphazoline usage was linked to improved surgical circumstances and less perioperative hemorrhage.

Humphreys et al. 2008	Multi-national.	Randomized single-blind comparative clinical study.	120 patients	mean age of 43.1 (range 16-73)	77 males 43 females	The dose was 2 puffs 4 times daily to both nostrils (Xylometazoline group) , while the group receiving physiological saline the dose was 6 times daily.	On day 10 following surgery, symptom scores on the VAS were calculated for nasal blockage, rhinorrhea, discomfort, loss of smell, and bleeding. The Pain increased in patients receiving xylometazoline after surgery.	On day 10 following surgery, symptom scores on the VAS were calculated for nasal blockage, rhinorrhea, discomfort, loss of smell, and bleeding.	On day 10 following surgery, symptom scores on the VAS were calculated for nasal blockage, rhinorrhea, discomfort, loss of smell, and bleeding.	On day 10 following surgery, symptom scores on the VAS were calculated for nasal blockage, rhinorrhea, discomfort, loss of smell, and bleeding.	Between therapy groups, post-operative symptom scores were compared. The xylometazoline group had substantially higher median pain scores overall (p 14 0.03; chi-square test). When pain scores were broken down by technique, those who underwent septoplasty with xylometazoline had significantly higher median pain scores (p 14 0.019, chi-square test).
Paul et al 1995	United Kingdom	Prospective randomized study	97 patients	35.5	40 males 35 females	Comparing of Alkaline nasal douche,betamethasone sodium phosphate nose drops,0.5% Ephedrine hydrochloride nasal drops with control group.	N/A	N/A	N/A	By using a visual analogue scale (VAS),patients evaluated their nasal patency and any treatment related problems were noted.	The significant improvement in the sensation of nasal patency is achieved by use of 0.5% ephedrine hydrochloride nose drops,betamethasone sodium phosphate nose drops,alkaline nasal douches when compared with a control group in the early post-operative period.No significant complication recorded.
Karthikeyan et al. 2018	India	Hospital-based prospective randomized controlled study	120 patients	20 – 29	36 (60 %) males and 24 (40 %) females in Group I and 26 (43.3 %) males and 34 (56.7 %) females in Group II	Comparing Saline nasal douching versus. decongestant nasal drops (xylometazoline 0.1%)	Measuring facial pain by VAS score In day 5 , day 10 , and say 14 after surgery	N/A	N/A	Patients with VAS scores of 3 or less were defined as having mild symptoms. Those with scores of 7 or more were considered to have severe symptoms By using VAS score they assessed the symptoms of crust, edema,scarring, nasal discharge	There was significant difference between the two groups in term of crusts, edema, and scarring (p<0.001). But no significant difference was found for nasal discharge between the two groups.

respectively) and 12 days post-operatively (mean 0.15 vs. 0.24, p <0.001, and median 1 vs. 3, p <0.001, respectively [12].

Spraggs et al. reported that the use of 0.5% ephedrine hydrochloride nose drops improves obstruction symptoms. It shows the greatest benefit in the early postoperative period compared with Alkaline nasal douche and betamethasone drops (Glass rank biserial correlation coefficients between ephedrine and control group at 2 hours, 2 days, 7 days, 10 days: 0.02, 0.054, 0.057, 0.085 respectively) [16].

Other nasal symptoms:

Karthikeyan et al. reported that using xylometazoline 0.1 % nasal decongestant significantly reduced nasal edema compared to saline nasal douching 10 days post-surgery (p= 0.004). However, saline nasal douching was significantly better in reducing scaring and crusting (p <0.001 for both) [17]. Dagli et al. observed that saline plus oxymetazoline significantly reduced crust formation in the nasal cavity 5 and 12 days post-operatively (p < 0.005 for both) [12]. A clinical trial by Prabhu et al. reported that the use of nasal decongestant drops relieved congestion quicker when compared to saline douche. However, no significant difference was found in relieving itching (p= 0.59), impaired smell (p= 0.208), and nasal discharge (p= 0.098). Scarring, crusting, edema, or discharge were noticed in each nostril at the 2-week follow-up clinic and were scored using a modified Lund and Mackay system. Mean scores were calculated, and no significant difference was found between the two treatments [15].

DISCUSSION

This systematic review aimed to evaluate the efficacy of nasal decongestants in nasal surgical aftercare. Nasal obstruction, pain, and bleeding from postoperative inflammation are typical complications of nasal surgery [6]. Numerous local treatments have been described to encourage mucosal healing and reduce postoperative symptoms following nose surgeries [18]. In this systematic review, we found out that the nasal decongestant was effective in improving the majority of post-operative symptoms [19]. We noticed conflicting data about the superiority of nasal decongestants in reducing pain, crusting, and bleeding compared to other treatment options.

A study by Babak et al. showed that the improvement in nasal symptoms after surgery with pseudoephedrine can last for 1 month [5]. Another study found that xylometazoline hydrochloride 0.1% is less effective than saline irrigation in improving mucociliary function [20]. However, compared with oxymetazoline + saline, it improved the overall condition of patients, including minimizing nasal symptoms, than receiving physiological saline alone [21]. Saline nasal douching can be considered the best alternative to decongestant nasal drops in relieving nasal symptoms following nasal surgery [17].

One of the studies illustrated that nasal symptoms may result from post-surgery inflammation, swelling, and mucociliary dysfunction because of surgery and underlying mucosal pathology. There is a study done to compare the efficacy of nasal decongestants in comparison to corticosteroids, and the results showed that both of them produce a significant short-term effect on post-surgical edema [5]. The utilization of analgesics postnasal surgery may be diminished if a patient receives intranasal lidocaine plus naphazoline. It can be considered safe also as the toxic plasma concentration of lidocaine was not reached [14].

This review has highlighted many research gaps regarding the efficacy of decongestants after nasal surgeries [22]. The limitations of this review include the fact that some studies measured outcomes once during their protocol. Furthermore, VAS is a subjective evaluation of pain, obstruction, and bleeding, which may differ between protocols [23], and the data regarding patient medication compliance was not reported in the included studies.

CONCLUSION

Using nasal decongestants in the very early postoperative phase helps reduce postoperative nasal crusting, bleeding symptoms, and nasal obstruction during this edematous period. This review consolidates the evidence supporting the efficacy of nasal decongestants in nasal surgeries, which could guide providers in providing superior care to patients undergoing nasal surgeries. These agents are widely available in the market and easily accessible to patients. Although its adverse effects are limited to headache, drowsiness, and local nasal effects such as temporary discomfort such as burning, stinging, and sneezing. However, it is not recommended to use nasal decongestants for

more than five days to avoid drug withdrawal symptoms such as rebound congestion.

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