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Effective Local Anesthetic Use in Nasal Surgery: A Systematic Review and Meta-analysis of Randomized Controlled Studies

Leonardo Alaniz, BBA*†
Cindy Vu, BS*
Jagmeet Arora, BS*
Avril Stulginski, BS*
Xiao Zhu, MD‡
Justin Cordero, BS§
Raj M. Vyas, MD†¶
Miles J. Pfaff, MD, MHS†¶

Background: Intraoperative nerve blocks have shown promise in managing pain after nasal surgery. The purpose of this systematic review and meta-analysis was to analyze existing level I and II evidence on intraoperative nerve blocks in nasal surgery to optimize postoperative recovery.

Methods: The primary outcome of this systematic review and meta-analysis was postoperative pain scores; secondary outcomes included perioperative opioid requirements, patient satisfaction scores, and time to first analgesic requirement. PubMed, Embase, and MEDLINE databases were searched, and two independent reviewers conducted article screening. Methodological quality assessment of studies utilized the Jadad instrument, and interrater reliability was assessed using Cohen kappa. An inverse-variance, fixed-effects model was used for meta-analysis with Cohen *d* used to normalize effect size between studies. I^2 and Q statistics were used to assess interstudy variability.

Results: Four studies were included for meta-analysis, totaling 265 randomized patients. The nerve blocks assessed included infraorbital nerve, sphenopalatine ganglion, external nasal nerve, central facial nerve blocks, and total nerve blocks. All demonstrated significantly reduced postoperative pain compared with controls, with a large effect size ($P < 0.001$). Opioid requirements were lower in the nerve block groups ($P < 0.001$), and patient satisfaction scores were higher ($P < 0.001$). Supplemental meta-analyses showed a longer time to first analgesic requirement for patients who received a nerve block ($P < 0.001$).

Conclusions: These findings support the efficacy of nerve blocks in providing postoperative pain relief and enhancing patient satisfaction with pain management. Perioperative nerve blocks, in combination with general anesthesia, should be considered for postoperative pain control. *(Plast Reconstr Surg Glob Open 2023; 11:e5151; doi: 10.1097/GOX.0000000000005151; Published online 1 August 2023.)*

INTRODUCTION

Nasal surgery is performed to restore or enhance both form and function of the nose. Despite nasal surgery being one of the most common procedures performed by plastic surgeons, little emphasis has been placed on pain management. Although intraoperative pain management can be achieved with great success, recovery following nasal surgery can prove to be challenging.[1,2] Therefore, managing pain postoperatively is crucial to improving patient outcomes and enhancing the quality of recovery.

Popular approaches for postoperative analgesia control after nasal surgery rely heavily on opiate-based oral medications. However, opiates can have undesirable side effects ranging from constipation and decreased alertness,

*From the *School of Medicine, University of California Irvine, Irvine, Calif.; †Department of Plastic Surgery, University of California Irvine Medical Center, Orange, Calif.; ‡Department of Plastic Surgery, University of Pittsburgh Medical Center, Pittsburgh, Pa.; §University of California Riverside, School of Medicine, Riverside, Calif.; and ¶Pediatric Plastic Surgery, Children's Hospital of California, Orange, Calif.*

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to more serious complications such as respiratory depression and hypoxia.[3–5] Targeted nerve blocks offer an alternative form of regional anesthesia for perioperative analgesia. To date, no consensus regarding the most effective approach has been established.

The present study aimed to systematically review and conduct a meta-analysis on the use of perioperative nerve blocks in nasal surgery. Randomized controlled trials [level of evidence (LOE) I and II] were reviewed to evaluate the efficacy of nerve blocks in several domains, including analgesia control, additional use of alternative pain medication, and patient satisfaction with pain management. The results of this study have the potential to improve current approaches to multimodal pain management and enhance postoperative recovery.

Takeaways

Question: Do intraoperative nerve blocks enhance quality of recovery after nasal surgery?

Findings: Four randomized controlled trials that assessed nerve blocks were included for meta-analysis. Results demonstrated significantly decreased postoperative pain with all nerve blocks versus placebo. Opioid requirements were lower in the nerve block groups and patient satisfaction scores were higher.

Meaning: Our systematic review and meta-analysis found that patients who received nerve blocks in addition to general anesthesia during nasal surgery displayed enhanced pain control, lower opioid requirements, and an increased overall satisfaction with pain management.

METHODS

This study was exempt from institutional review board review and was performed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses.[6] A literature search was systematically conducted for relevant trials in the following databases: PubMed, MEDLINE, and Embase. Medical Subject Headings terms and keywords were reviewed by a medical sciences research librarian and used in logical combinations, including (nasal surgery or rhinoplasty or septoplasty or nose surgery) and (nerve block or local anesthetic or local anesthesia or analgesia or pain management). Publication dates included ranged from inception to 2023 to ensure a comprehensive search, given the limited amount of research on this topic. Selected articles were imported into Covidence for further review.

Eligibility for inclusion in this systematic review and meta-analysis required that articles be randomized controlled trials (LOE I or II)[7] with a focus on local anesthetic pain management in nasal surgery. Nasal surgery was defined as procedures involving the external nasal tissue or septum. Only articles written in English were included. Excluded articles included pain management in sinus surgery, unavailable full-text articles, and any descriptive studies. Full-text articles that were included were then reviewed by the two independent reviewers. Methodologic quality was assessed for each study using the Jadad instrument.[8] Any disagreement between reviewers for article inclusion was resolved by an independent third party.

Data extraction was performed by two reviewers and included the following categories based on previous literature analyzing effects of intraoperative nerve blocks[9–11]: study type, LOE, sample sizes, intervention details (type of block, type of local anesthetic, adjuvants), use of general anesthesia, demographics, procedure type, pain scores, perioperative opioid requirements, time to first analgesic requirement, and patient pain management satisfaction scores. Primary outcomes included postoperative pain scores. Secondary outcomes included perioperative opioid requirements, patient satisfaction scores, and time to first analgesic requirement (**See table, Supplemental Digital Content 1,** which lists pain and patient satisfaction scales used. **http://links.lww.com/PRSGO/C690**). Studies using different scales (eg, pain and satisfaction scores) were compared via standardized effect sizes by dividing the difference between the means of treatment and control groups by the pooled standard deviation of both groups (ie, Cohen *d*).

An inverse-variance fixed-effect model was used for meta-analysis. The greatest reported pain score was used as data entry for meta-analysis for studies that recorded pain scores at multiple time points. In addition, a plot of pain scale effect size over intervals of time was created using available time points from each study. For studies that included more than two branches, the outcomes of the experimental treatment branches were grouped together using Cochrane formula[12] for meta-analysis. Secondary and tertiary meta-analyses involving studies with more than one experimental limb and for studies assessing pain scores at multiple time intervals were conducted for comprehensiveness. (**See figure 1, Supplemental Digital Content 2,** which show results of the expanded meta-analysis separating experimental branches and time intervals for pain scores, respectively. Legend: [a]total nasal block (TNB); [b]central facial block (CFB); [c]levobupivacaine; [d]levobupivacaine and tramadol. Modified meta-analysis, separating experimental branches. Nasal surgery pain scale scores (above), opioid requirements (upper middle), overall patient satisfaction (lower middle), and time to first analgesia (below) demonstrate a statistically significant benefit with nerve blocks. **http://links.lww.com/PRSGO/C691**.) (**See figure 2, Supplemental Digital Content 3,** which show results of the expanded meta-analysis separating experimental branches/time intervals and funnel plot. Legend: [a]total nasal block (TNB); [b]central facial block (CFB). Modified meta-analysis (top) and funnel plot (bottom), separating experimental branches and time intervals of pain scale scores. **http://links.lww.com/PRSGO/C692**.) Weights for effect size estimates were calculated for each included study using the inverse of the variance of the effect estimate, and Cohen *d* standardized effect sizes were used to compare outcomes between studies. Cochran Q was calculated to assess heterogeneity with a significant P value of less than 0.10 to account for its low power in testing meta-analyses with small study numbers.[13] I^2 was also calculated to further describe the percentage of interstudy variation due to heterogeneity. I^2 values of less than 30% were considered insignificant, 30%–50% were considered moderate, and over 50% were considered significant heterogeneity. Interrater reliability for methodologic quality assessment (Jadad) scores was assessed using Cohen kappa. All analyses were performed with IBM SPSS Statistics for Macintosh (version 29, IBM Corp., Armonk, N.Y.).

RESULTS

Four studies met inclusion criteria after the identification and screening processes, as illustrated in Figure 1. Assessment for quality using the Jadad instrument resulted in a median score of 3.5 for both reviewers, with a Cohen kappa of 0.875, indicating significant interrater agreement.

The characteristics of all included studies are summarized in Table 1. All four studies were randomized controlled trials (LOE I and II) with a total of 265 randomized patients: 150 nasal surgery patients treated with a nerve block to 115 patients in the control group. All studies had a focus on postoperative pain control.[14–17] Studies included comparisons between infraorbital nerve (ION) blocks with levobupivacaine with and without tramadol,[14] endoscopic sphenopalatine ganglion (SPG) blocks with bupivacaine,[15] external nasal nerve (ENN) blocks with lidocaine and epinephrine,[16] total nerve blocks (TNBs) with lidocaine and epinephrine,[17] and central facial nerve block (CFB) with lidocaine and epinephrine.[17] All identified studies concluded that nerve blocks allow for greater pain control as evidenced by lower pain scores, with a more pronounced effect when coupled with adjuvants. Moreover, the use of nerve blocks exhibited a decreased need for opioids and significantly increased patient satisfaction scores. Supplemental Digital Content 1 (**http://links.lww.com/PRSGO/C690**) provides a brief description of the different measurement scales used in the studies, including

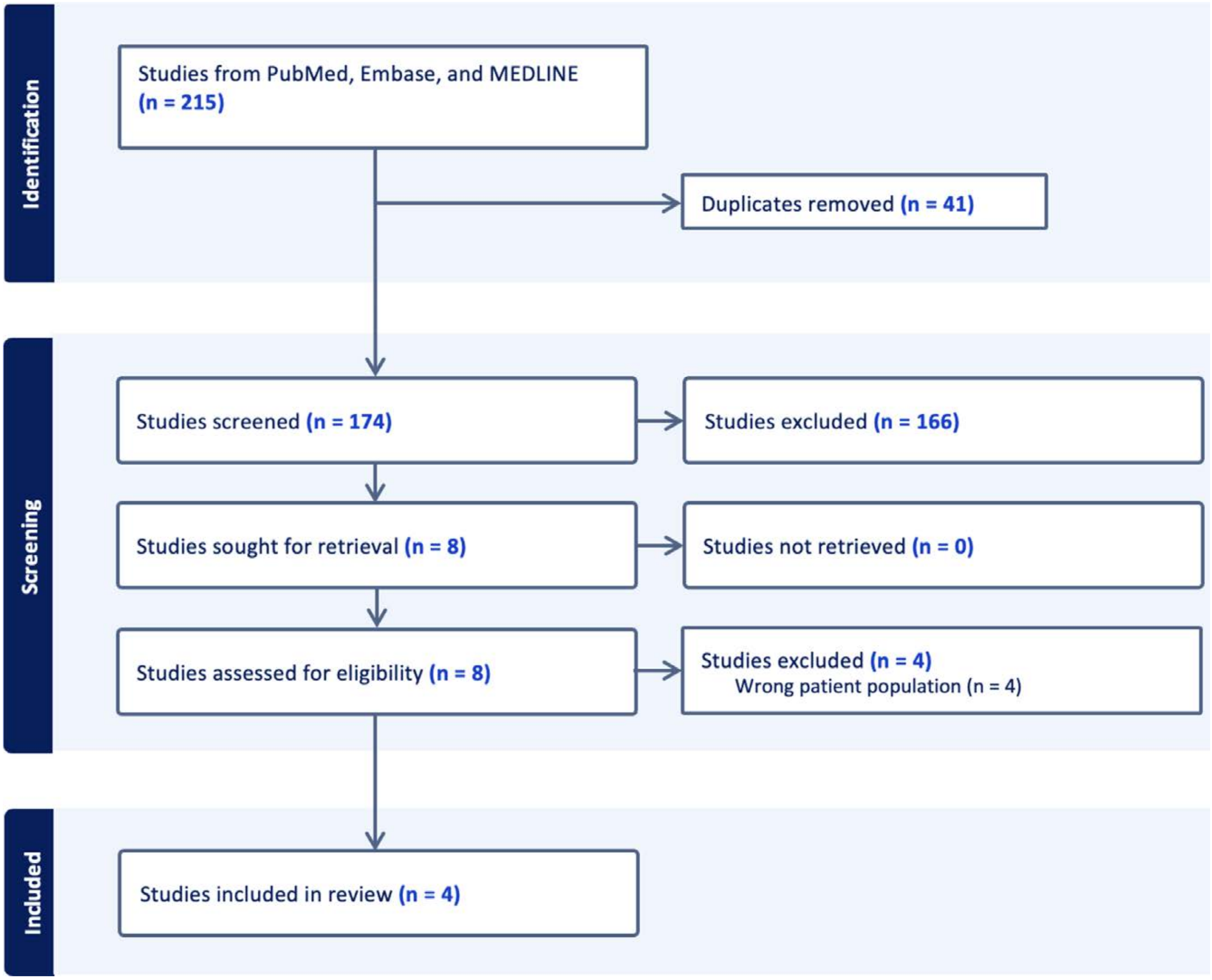

Fig. 1. Flowchart demonstrating the selection and eligibility, screening, and final inclusion processes for nasal surgery studies. Four studies were selected for qualitative and quantitative review.

Table 1. Included Nasal Surgery Studies

Reference	LOE	Study Objective	Patients per Group	Key Findings	Opioid-sparing Effect Observed?
Cekic et al, 2013[14]	II	To investigate the effect of ION block with levobupivacaine and a levobupivacaine and tramadol combination versus control on postoperative analgesia	Block 15; block and tramadol 15; control 15	Levobupivacaine and tramadol combination resulted in lower pain scores than those of control. Levobupivacaine alone and in combination with tramadol both resulted in longer effective analgesia times and decreased opioid requirements than control	Yes*
Ekici et al[15]	I	To evaluate the effect of bilateral endoscopic SPG block with 0.5% bupivacaine versus control for management of postoperative pain in patients undergoing septoplasty	Block 30; control 30	SPG block resulted in lower pain scores, lower analgesic requirements, and higher patient satisfaction with pain management than control group	—
Ibrahim et al[16]	I	To compare the effect of ENN block with 2% lidocaine and epinephrine versus control on pain intensity, drug consumption, incidence of postoperative emergence agitation, and quality of recovery	Block 50; control 50	External nasal nerve blocks resulted in decreased pain scores, decreased intra and postoperative opioid requirements, decreased incidence of emergence agitation, and higher patient satisfaction with quality of pain management than control group	Yes*
Sari et al[17]	II	To compare the effects of TNB and CFB with 2% lidocaine and epinephrine versus control on postoperative pain, edema, and ecchymosis	TNB 20; CFB 20; control 20	CFB >> TNB both resulted in lower pain, edema, and ecchymosis scores versus control	—

TNB includes nerve blocks to the bilateral supratrochlear areas, medial epicanthal areas, keystone areas, pyriform apertures, suspensory ligaments, and whole septal walls. CNB is achieved by adding a bilateral infraorbital nerve block to the TNB technique.
*Statistically significant opioid-sparing effect observed.

a pain visual analog scale,[15,17] a pain numeric rating scale,[14] a patient satisfaction scale,[14,15] and a quality of recovery questionnaire (QoR-40).[16]

All four studies were included for meta-analysis. The experimental groups were slightly younger than the control groups (29 versus 31, $P = 0.04$); however, the effect size was small (0.255). There were no statistically significant differences in sex or operating room time between cohorts (Table 2). Procedures evaluated included septoplasties, rhinoplasties, septorhinoplasties, and nasal bone fracture repair (**See table, Supplemental Digital Content 4,** which provides a more detailed summary of all demographics of included studies. **http://links.lww.com/PRSGO/C693**).

Table 2. Demographics of Included Nasal Surgery Studies

	Control Group	Experimental Group
Sample size	115	150
Age*		
Mean age (SD)	31.33 ± 8.75	29.01 ± 9.37
Age range (y)	18–65	18–65
Gender†, n (%)		
Masculine	47 (21.36)	63 (28.64)
Feminine	53 (24.09)	57 (25.91)
Procedures evaluated, n (%)		
Septoplasty	53 (46.09)	68 (45.33)
Rhinoplasty	27 (23.48)	29 (19.33)
Septorhinoplasty	20 (17.39)	40 (26.67)
Fracture nasal bone	15 (13.04)	13 (8.67)
OR time‡ (min)	50.13 ± 12.62	50.90 ± 12.11

*$P = 0.04$.
†Only three of the four included studies reported sex demographics, $P = 0.42$.
‡Only two of the four included studies reported OR time, $P = 0.69$.
OR, operating room.

Meta-analysis demonstrated significantly decreased postoperative pain with nerve blocks versus placebo for nasal surgery (Fig. 2). A large effect size (Cohen *d*, −2.13; 95% CI, −2.47 to −1.79; $P < 0.001$) was noted in pain scores with the use of nerve blocks. One study did not quantify pain scores and was therefore excluded from this subanalysis.[14] Opioid requirements were lower in the nerve block groups (Cohen *d*, −1.01; 95% CI, −1.36 to −0.66; $P < 0.001$) and patient satisfaction scores were higher (Cohen *d*, 1.21; 95% CI, 0.91 to 1.52; $P < 0.001$) (**See table, Supplemental Digital Content 5,** which provides a more detailed summary of outcome measures for each study. Legend: [a]total nasal block (TNB); [b]central facial block (CFB); [c]levobupivacaine; [d]levobupivacaine and tramadol. **http://links.lww.com/PRSGO/C694**). Funnel plots assessing publication bias for all meta-analyses are shown in Figure 3.

When supplemental meta-analyses were conducted on studies analyzing multiple experimental limbs, similar effect sizes were observed (**See figure, Supplemental Digital Content 6,** which show results of the expanded meta-analysis separating experimental branches and funnel plots, respectively. Legend: Funnel plots for modified meta-analysis, separating experimental branches. Nasal surgery pain scale scores (top left), opioid requirements (top right), overall patient satisfaction (bottom left), and time to first analgesia (bottom right). **http://links.lww.com/PRSGO/C695**). Time to first analgesic requirement was longer in the nerve block cohort (Cohen *d*, 1.64; 95% CI, 1.04–2.24; $P < 0.001$). Differences in pain modulation over time following nerve blocks were also explored (**See figure, Supplemental Digital Content 7,** which plots the pain scale score effect sizes

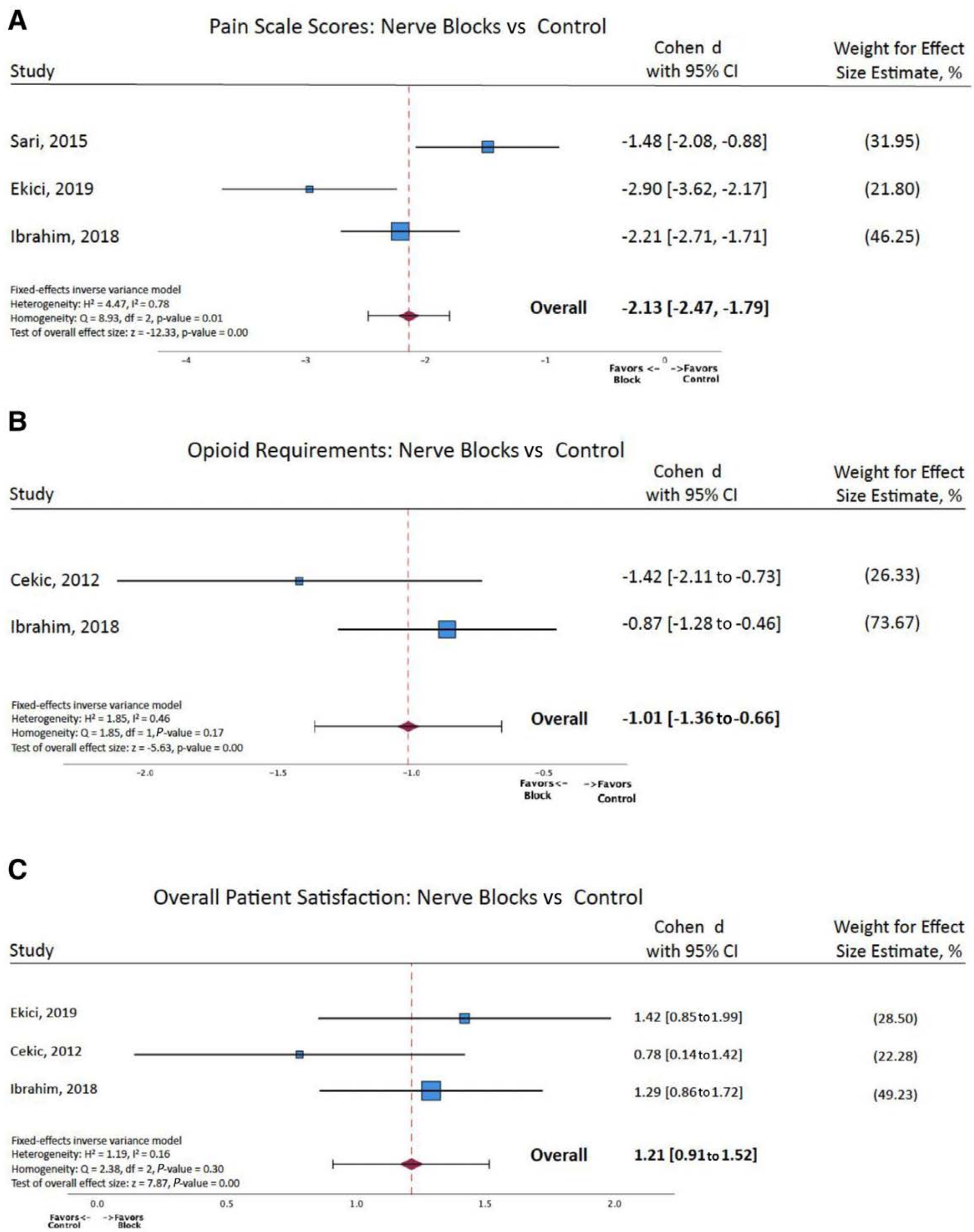

Fig. 2. Meta-analysis of pain scale scores, opioid requirements, and overall patient satisfaction with pain management. Nasal surgery pain scale scores (A), opioid requirements (B), and overall patient satisfaction (C) demonstrate a statistically significant benefit with nerve blocks.

over time from all included studies. Plot of pain scale score effect size over intervals of time from all included studies. Time points were defined as 0–1, 1–12, 12–24, and 48+ hours. Nerve block groups had significant pain relief effect sizes throughout all time points. The highest effect was observed between 1 and 12 hours postoperatively and decreased gradually over the remaining time. http://links.lww.com/PRSGO/C696). Improved pain control was significant postoperatively, peaking between 1 and 12 hours postoperatively, and decreasing gradually over 48 hours. Nerve blocks resulted in statistically higher pain relief compared with placebo at all time points. One study evaluated pain scores further out to days 5 and 7, and reported no significant differences

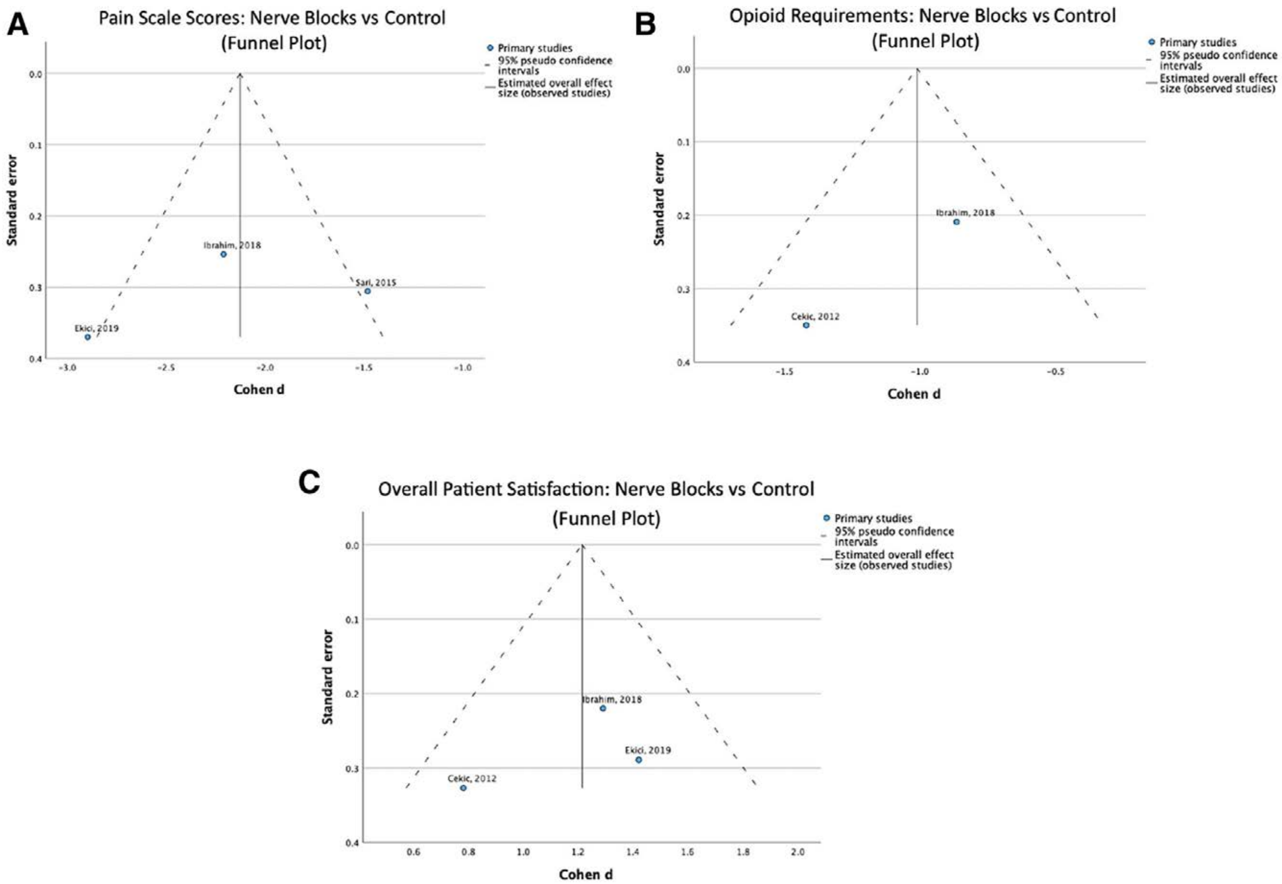

Fig. 3. Funnel plots illustrating the absence of publication bias in the meta-analysis of outcomes. The symmetrical funnel shape indicates a balanced representation of studies across a range of effect sizes, suggesting minimal publication bias. The funnel plots are shown for meta-analysis of nasal surgery pain scale scores (A), opioid requirements (B), and overall patient satisfaction (C).

between both groups.[17] An additional higher-powered meta-analysis confirmed the overall effect size on pain scale scores over time (Cohen *d*, 2.11; 95% CI, −2.30 to −1.91; $P < 0.001$).

DISCUSSION

Nasal surgery involves reshaping the soft tissue, cartilage, and bone of the nose to enhance or restore its appearance, functionality, or both. Common procedures include rhinoplasties and septoplasties,[18,19] which can serve to improve facial proportions,[20] nasal breathing,[21,22] and olfaction.[23,24] Mitigating perioperative pain is vital for an optimal patient recovery experience. Despite advances in surgical techniques and analgesia, low sample sizes and lack of standardization in existing studies have precluded the establishment of a reliable standard for perioperative pain management after nasal surgery.[15] The purpose of this systematic review and meta-analysis was to evaluate randomized controlled trials investigating the efficacy of perioperative nerve blocks in nasal surgery.

A thorough understanding of sensory innervation is essential when comparing the nerve blocks for nasal surgery. The external nose is primarily innervated by the maxillary (V_1) and ophthalmic (V_2) divisions of the trigeminal nerve. The supratrochlear, infratrochlear, and external nasal nerves are cutaneous branches of the ophthalmic division that provide sensory innervation to the upper nose, whereas the external nasal nerves supply the dorsum and tip of the nose.[25,26] Effective analgesia of this area may be achieved with an ENN block. The infraorbital and nasopalatine nerves are cutaneous branches of the maxillary division. The infraorbital nerve innervates the nasal sidewall, ala, and tip, whereas the nasopalatine nerve innervates the nasal septum.[14,27] Thus, an ION block would provide adequate analgesia to this area.[14] The sphenopalatine ganglion also provides sensory innervation to the nose and is located within the pterygopalatine fossa.[28] Projections from the ganglion innervate the nasopharynx, nasal cavity, and palate via the nasopalatine nerve, the greater palatine nerve, the lesser palatine nerve, and the posterior, superior, and inferior lateral nasal branches.[29] Therefore, SPG blocks have been used extensively to provide analgesic support after endoscopic sinus surgery,[30–35] and it has been postulated that they may also help reduce postoperative pain after other types of nasal surgery.[15] The TNB technique described by Sari et al consisted of blocks to bilateral supratrochlear areas, medial epicanthal areas, keystone areas, pyriform apertures, suspensory ligaments, and entire septal walls. The CFB technique added bilateral

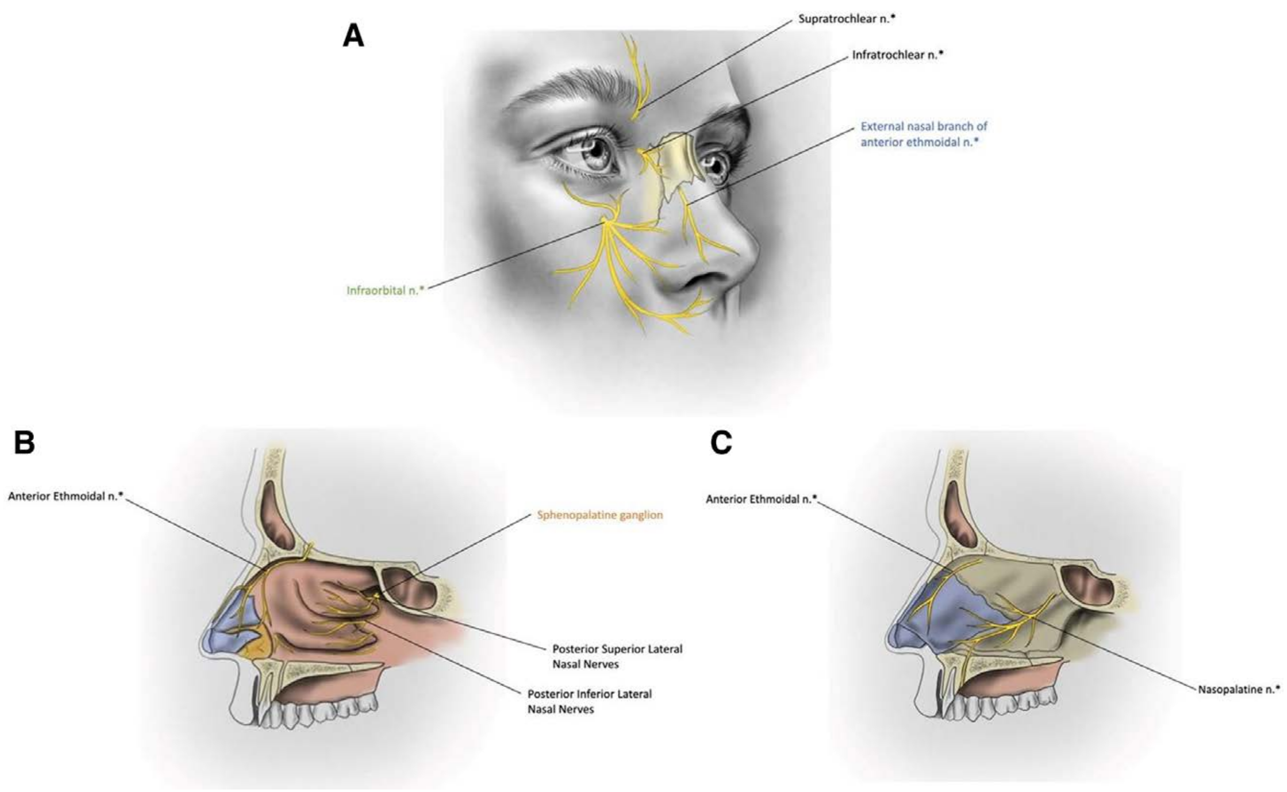

Fig. 4. Nasal nerve anatomy and nerves targeted by each study. Asterisks indicate nerves targeted by Sari (2015),[18] not including the greater palatine and posterior ethmoidal nerves. The green text denotes block by Cekic (2013),[14] the blue text denotes block by Ibrahim (2018),[17] and the orange text denotes block by Ekici and Alagöz (2019). A, The supratrochlear, infratrochlear, and external nasal nerves are cutaneous branches of the ophthalmic division of the trigeminal nerve. The supratrochlear nerve supplies the bridge of the nose, whereas the infratrochlear nerve provides sensory innervation to the lateral nose.[26] The external nasal nerves supply the dorsum and tip of the nose.[27] The infraorbital nerve is a cutaneous branch of the maxillary division of the trigeminal nerve and innervates the nasal sidewall, ala, and tip.[15] B, The anterior ethmoidal nerve is a branch of the ophthalmic division and provides sensory innervation to the anterior portion of the nasal cavity.[28] The posterior superior and inferior lateral nasal nerves are branches of the maxillary division that supply the lateral walls of the nasal cavity, including the superior, middle, and inferior nasal concha.[30] C, The nasopalatine nerve is a branch of the sphenopalatine ganglion that provides sensation to the nasal pharynx, nasal cavity, and anterior palate.[30] The TNB technique utilized in Sari et al[18] consists of targeting the supratrochlear, infratrochlear, external nasal, anterior and posterior ethmoidal, greater palatine, and nasal palatine nerves. The CFB technique adds bilateral infraorbital nerve blocks.

ION blocks to the TNB technique. Figure 4 illustrates the relevant nerve anatomy and the approach utilized in each included study.

The use of anatomical nerve blocking has become increasingly important in modern clinical practice due to its ability to provide targeted and effective pain relief.[36] New long-acting local anesthetics, such as levo/bupivacaine, offer prolonged pain relief compared with traditional short-acting local anesthetics such as lidocaine.[37] However, they have drawbacks, such as an increased risk of local anesthetic systemic toxicity that may lead to respiratory arrest, arrhythmias, and central nervous toxicity.[38] Different combinations of long-acting agents, short-acting local anesthetics, and local opioids can provide a more balanced and effective pain relief profile. For example, an opioid can be added to levo/bupivacaine to enhance the quality and duration of the block, such as in Cekic et al[14] This combination can reduce the need for supplemental analgesics. In the trials by Ibrahim et al[16] and Sari et al,[17] a combination of lidocaine and epinephrine was used. Epinephrine is a vasoconstrictor that can be added to lidocaine to prolong the duration of the block and reduce the risk of systemic toxicity.[39] Combining agents with different mechanisms of action can also improve efficacy. The specific combination used must be carefully selected based on the individual patient's needs and the expected duration of the procedure.

The randomized controlled studies included in this review focused on the efficacy of intraoperative nerve blocks for postoperative pain management. All four studies found that nerve blocks, together with general anesthesia, resulted in enhanced pain control, lower opioid requirements, and an increased overall patient satisfaction with pain management. Compared with control groups, the experimental groups that received a TNB, CFB, SPG block, or ENN block had significantly lower pain scores and required less opioids during recovery. Additionally, Cekic et al[14] found that patients who received either levobupivacaine or levobupivacaine and tramadol combination nerve blocks had longer times to analgesia failure than the saline group. Overall, intraoperative nerve blocks with the addition of adjuvants show potential to optimize patient satisfaction with the quality of their pain management.

CFB showed the highest effect size in reduction of pain scale scores compared with SPG block, ENN block, and TNB, likely due to its comprehensive approach targeting multiple anatomical areas. Furthermore, using an opioid as an adjuvant to local anesthetic influenced multiple outcomes. In a study by Cekic et al,[14] when adding tramadol to levobupivacaine for an ION block, opioid requirement was lower, overall patient satisfaction was higher, and time to first analgesia was longer than with levobupivacaine alone; in this study, tramadol was chosen for its local anesthetic effect on peripheral nerves and its ability to prolong block duration.[40] Similar results were seen in included studies by Ibrahim et al[16] and Sari et al,[17] where patients receiving epinephrine reported significantly reduced pain scores. Unlike the opioid-based tramadol, epinephrine exerts its effects through vasoconstriction, slowing the absorption and metabolism of the primary anesthetic,[41] and decreasing intraoperative bleeding.[42]

The efficacy of nerve blocks in reducing postoperative pain in nasal surgery has also been demonstrated in studies that did not meet inclusion criteria for this review. A study by Mariano et al[43] found that bilateral ION blocks with 0.5% bupivacaine were effective in reducing postoperative pain. Although actual time to discharge was not decreased, the ION block group reported lower pain scores and decreased opioid requirements in the PACU and at home.[43] A second study (study by Parthasarathy et al[44]) reported that bilateral nasociliary and maxillary nerve blocks with 0.5% bupivacaine and 2% lignocaine resulted in lower intraoperative fentanyl dose requirements and lower incidence of emergence agitation, consistent with the results of Ibrahim et al[16] Similar to Cekic et al,[14] the time to first analgesia was significantly longer in the nerve block group than in the control group. Of note, studies by both Mariano et al[43] and Parthasarathy et al[40] did not identify a difference in nausea and vomiting scores between the nerve block and control groups. Although not part of the analysis in this review, these studies complement the findings of the included articles supporting the use of nerve blocks for enhanced postoperative pain control.

The use of intraoperative nerve blocks has also been shown to improve pain levels in other types of facial procedures. A previous review demonstrated that intraoperative nerve blocks provided adequate pain control in patients undergoing cleft lip and palate surgery, effectively reducing pain scores and prolonging time to analgesia failure.[9] Similar results have been reported in studies regarding bimaxillary surgery. A randomized controlled trial by Shetty et al[45] found that administration of maxillary and mandibular nerve blocks before bimaxillary surgery with 0.25% bupivacaine significantly reduced patients' postoperative pain, discomfort, and analgesic consumption. Thus, the findings of this review add to the growing body of literature supporting the efficacy of intraoperative nerve blocks in managing pain after head and neck surgery.

The articles reviewed did not report major complications related to the nerve blocks used in the experimental groups. In Cekic et al,[14] edema developed in two patients, but no other side effects were observed. However, there are several potential risks associated with using nerve blocks. Nerve blocks can lead to complications such as hematoma formation, infection, nerve damage, and systemic toxicity from local anesthetic agents.[46] In rare cases, nerve damage can be permanent, resulting in chronic pain, weakness, and altered sensation. Hematoma formation can cause pressure on surrounding structures, resulting in ischemia, pain, and nerve damage. Infection can also occur due to poor aseptic technique, leading to abscess formation and systemic infection. Lastly, systemic toxicity can result from accidental intravascular injection of local anesthetics, leading to seizures and cardiac arrest.[38,46,47] Therefore, although nerve blocks are generally considered safe, there are potential risks that must be carefully considered before performing the procedure.

This study has limitations. although pain levels, opioid requirements, and satisfaction were measured, PACU duration was not included in the reported outcomes. PACU discharge criteria assesses multiple variables, including nausea and vomiting, level of consciousness, airway and breathing, circulation, and, relevant to this analysis, pain levels.[48] It is therefore difficult to assess whether PACU duration had any confounding effect on patient satisfaction scores or opioid consumption.[44] Only randomized controlled trials (LOE I and II) were included in this meta-analysis to limit bias, which limited the number of studies available for statistical comparison. Of the included studies, there exists variability in the type of nasal surgery performed; intervention regimen used, including type of block and adjuvant; reported outcomes; and timing of measurements. Nonetheless, all studies consistently reported the highest pain modulation effect in the nerve block groups early in the postoperative period followed by a gradual decline. Finally, the pain and patient satisfaction scales, although standardized,[49–52] used in these studies are patient-dependent evaluation instruments that may be subject to bias. Although the validity of the verbal analog scale, numeric rating scale, and Quality of Recovery Questionnaire QoR-40 has been established in previous literature, Ekici and Alagöz[15] and Cekic et al[14] do not reference or report the validity of their patient satisfaction surveys. Although these surveys were standardized, the use of unvalidated surveys increases the risk of inaccurate interpretation of treatment effects and thus may limit the generalizability of the findings. Another limitation of this study is the lack of involvement of a patient and public involvement group. As the findings were primarily based on patient ratings and satisfaction, the perspective and insight of a patient and public involvement group could have enhanced the relevance and applicability of the results. Finally, case duration was relatively short; the average operative time was approximately 1 hour. This may limit the effectiveness of such blocks on longer procedures.

CONCLUSIONS

Incorporation of a standardized, evidence-based multimodal pain management approach to nasal surgery will only improve outcomes and the patient experience. Our review found that the use of targeted nerve blocks in anesthesia may enhance recovery for patients undergoing nasal surgery and provide an effective alternative to postoperative opioids for pain control. Moreover, including an opiate-based adjuvant in the nerve blocks may offer pronounced pain modulatory effects. The most effective technique seems to be a central facial block, likely due to its coverage of multiple zones.

Miles J. Pfaff, MD, MHS
Department of Plastic Surgery
University of California, Irvine
200 S. Manchester Ave, Suite 650
Orange, CA 92868
E-mail: mpfaff@hs.uci.edu
Instagram: @drmilespfaff

DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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