

Complex Nasal Reconstruction in a Wide-awake Ambulatory Setting: A Study of Efficacy and Perioperative Patient Experience

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Background: The use of local anesthesia in nasal surgery has gained popularity as a cost-effective and safe alternative. With the potential benefit of reconstruction without using general anesthesia, the goal of the study was to evaluate the patient-reported experience in addition to surgical outcomes and perioperative complications.

Methods: A mixed-methods study was completed with retrospective chart review and patient-reported outcome questionnaire. The primary outcome measures were demographics, oncologic and surgical details, and postoperative complications. Secondary outcome measures were aesthetic outcomes and procedure tolerance, which were gathered from the FACE-Q questionnaire.

Results: Of the 22 patients who met inclusion criteria, nine patients (41%) had forehead flaps performed and 13 patients (59%) had multilayer reconstruction with local flaps and cartilage grafts. The average number of surgeries performed, including revisions, was 2.3 ± 0.2 . The overall complication rate for reconstructions and revisions was 20%, most of these were minor complications. The overall subjective rating of patient's appearance was excellent with an average score of 83.9 (± 17.3) out of 100. There was minimal appearance distress as a product of the surgery with an average score of 84.9 (± 18.8). On a scale of one to five, patients reported an average of 4.3 for convenience, 3.8 for efficiency of setup and procedure, and 3.4 out of 5 for comfortability with having an operation performed on their face wide awake.

Conclusion: Our study demonstrated that complex nasal reconstruction performed under local anesthetic in a minor procedure setting is a feasible and safe option with good patient-reported outcomes. (*Plast Reconstr Surg Glob Open* 2022;10:e4431; doi: 10.1097/GOX.0000000000004431; Published online 29 July 2022.)

INTRODUCTION

In the past, general anesthesia was widely used for patients undergoing complex nasal reconstructive surgery; however, with advancements in surgical techniques

and anesthetic control, the use of local anesthesia in nasal surgery has gained popularity as a cost-effective and safe alternative.¹⁻⁴ The use of local anesthesia improves patient outcomes, resulting in lower rates of postoperative nausea and vomiting, reduced surgical bleeding, and shortened recovery time.^{1,2,5} Under local anesthesia, patients can avoid the multiple risks associated with general anesthesia, while maintaining similar anesthetic control.^{2,6} Additionally, local anesthesia enables surgeons to perform operations outside the operating room, reducing nonoperative and operative surgical time, and the need for extensive medical equipment.^{7,8} This is particularly appealing to surgeons performing procedures requiring multiple revisions as it is a more cost-effective and time-efficient option.

Although local anesthesia demonstrates benefits over general anesthesia in the context of nasal reconstruction, the complexity and length of the procedure should be considered before selecting the appropriate course

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of action. Studies using local anesthesia for reconstruction of nasal skin cancer defects reported desirable aesthetic outcomes with minimal complications and flap failures.^{9–11} In these studies, locoregional flaps, including rhomboid flaps, glabellar flaps, bilobed flaps, nasolabial flaps, and V-Y advancement flaps, were all successfully performed with minimal complications under local anesthesia; however, more complex forehead flaps were performed under general anesthesia.^{9–11} Due to the complexity of forehead flaps, most surgeons prefer these types of reconstructions being performed under general anesthesia; however, a few more recent studies have demonstrated that forehead flaps can be safely used for reconstruction of nasal defects under local anesthesia.^{12,13} In the studies^{12,13} that performed forehead flaps under local anesthesia, one used tumescent local anesthesia and the other had small defects of an average side of 22 mm.^{12,13} Overall, very few studies exist evaluating more complex reconstructions performed under local anesthesia using forehead flaps or multisubunit locoregional flaps. With the potential benefit of reconstruction without using general anesthesia, the goal of the study is to evaluate the surgical outcomes and perioperative complications to determine the efficacy and safety of complex nasal reconstructions under such settings.

METHODS

Study Design

A mixed-methods single-center retrospective chart review and a patient-reported outcome questionnaire were conducted for patients who underwent complex nasal reconstruction in a minor procedure setting between April 2016 and February 2020. Complex nasal reconstruction was defined as patients who underwent nasal reconstruction with either paramedian forehead flap (with or without cartilage grafting) or a multilayer reconstruction of soft tissue, cartilage, and mucosa. Only patients with primary cancerous nasal defects were included in the study. Reconstruction was performed either immediately postexcision with frozen sections by the senior authors, or on patients referred for complex reconstruction following Mohs surgery. All surgeries were performed exclusively under local anesthetic. Patients under 18 were excluded from the study. Consent was obtained from all patients who agreed to have their photographs used for the purpose of the study and participated in the patient-reported questionnaire.

Data Collection

Billing records were used to identify all patients who underwent nasal reconstruction with paramedian forehead flaps with or without cartilage grafting or multilayer reconstruction of soft tissue, cartilage, and mucosa. If patient did not require forehead flap, the complexity of the reconstruction includes large local flap and cartilage grafting for support. Information regarding age, smoking status, diabetes status, and other comorbidities was gathered for each patient using an electronic medical record system. Operative reports were used to gather information

Takeaways

Question: Is complex nasal reconstruction in a wide-awake setting feasible and well tolerated?

Findings: A mixed-methods study with retrospective chart review and patient-reported outcome questionnaire. Complex multilayer reconstruction was safely performed under local anesthetic with overall subjective rating of patient's appearance with average score of 83.9 out of 100.

Meaning: Complex nasal reconstruction performed in a wide-awake setting is a feasible and safe option with good patient-reported outcomes. It should be considered more often as an alternative to general anesthesia to reduce perioperative anesthetic risk.

regarding the type of cancer, location of the defect, and flap type performed for the reconstruction. Finally, all documents, including photographs when available, were reviewed for each patient to assess for complications and aesthetic outcomes. A minimum follow-up of 3 months after reconstruction or revision was used.

Outcome Measures

The primary outcome measures were demographics, oncologic and surgical details, and postoperative complications. Complications, such as bleeding, infection, wound dehiscence, and flap necrosis, were reported. Bleeding was separated into minor and major bleeding. Minor bleeding was defined as bleeding that was managed conservatively with dressing changes and local wound care. Major bleeding was defined as significant bleeding requiring hospital admission, transfusion, or anticoagulation reversal. Infection was defined by clinical evidence and antibiotic treatment.

The secondary outcome measures involved patients' subjective experiences of their nasal reconstruction. Patients were invited to complete a questionnaire assessing their satisfaction with their nasal reconstruction, as well as their experience having the surgery performed in a minor procedure setting. To standardize the assessment of patient satisfaction, components of the FACE-Q skin cancer module, a patient-reported outcome measure, were incorporated into the questionnaire. Specifically, three FACE-Q subcategories of facial appearance, quality of life, and experience of care were included in the questionnaire. Questionnaires were completed through the phone with a research team member or online. A minimum of 3 months postrevision or surgery was used before completing the questionnaire. Subjective rating scales of one to five were used for the questionnaire. The results for the three FACE-Q modules were calculated using the provided scoring system.

RESULTS

A total of 22 patients met the inclusion criteria. Eighteen patients underwent reconstruction for basal cell carcinoma (BCC), two patients for squamous cell carcinoma, one patient for melanoma, and one patient had

both squamous cell carcinoma and BCC. Demographic characteristics are summarized in Table 1. The median age of the population was 72.6 ± 2.8 years with an age range of 35–93. Current smokers made up 23% of the patient population. Diabetes was present in three patients (14%). A total of eight patients (36%) were taking antiplatelet therapy daily, and four patients (18%) were taking anticoagulation therapy. Two patients had previous nasal BCC that was treated with radiotherapy.

Of the 22 patients who required nasal reconstruction, 11 patients (50.0%) underwent Mohs surgery and the other 11 patients had excision with frozen sections. Most defects involved multiple subunits with the nasal ala being involved in 19 patients (86.3%). A total of nine patients (40.9%) had forehead flaps performed and 13 patients (59.1%) had multilayer reconstruction with local flaps and cartilage grafts. A total of 20 patients (90.9%) received cartilage grafts. Cartilage grafts were harvested from the conchal bowl. The posterior aspect of the paramedian forehead flap was dressed with skin graft, which was most often harvested from the supraclavicular or neck region. Some examples of multiple subunit defects with complex reconstruction include defect of nasal dorsum, side wall, tip, soft triangle, ala, cartilage, and mucous reconstructed with paramedian forehead flap, cartilage graft, mucosal flap, and skin graft (Figs. 1 and 2). Another example is reconstruction of nasal ala and medial cheek with mucosal flap from septum, cartilage graft from the conchal bowl, and V-Y advancement flap (Figs. 3 and 4).

The average number of surgeries performed, including revisions, was 2.3 ± 0.2 . The revision surgeries included division of pedicled flaps, thinning of flaps, or revision to provide more superior aesthetic outcome (Fig. 5). The average time between Mohs surgery and reconstruction was 3 days \pm 0.5, except for one patient with melanoma in-situ who had delayed reconstruction to wait for surgical pathology. Patients who underwent paramedian forehead flaps were managed postoperatively with home nursing care for dressing changes in the initial 1–2 weeks postoperatively.

The overall major complication rate for reconstructions and revisions was 20%. The summary of all complications is reported in Table 2. Complication rates were higher in the forehead flap group (30.8%) versus the local flap group (8.0%) (Fig. 6). Three patients had minor postoperative bleeding, and one patient had

major postoperative bleeding that required intervention and admission to hospital. One patient had an infection that was treated with wound debridement and intravenous vancomycin, as the patient was methicillin-resistant *Staphylococcus aureus* (MRSA) positive. There were no cases of significant flap necrosis. Two patients had hypergranulation tissue over exposed bone that was treated with silver nitrate. One patient had wound dehiscence after a revision surgery. Two patients undergoing multilayer reconstruction with local flap and cartilage grafting had scar tissue that was causing nasal obstructive symptoms requiring a revision surgery.

Eighteen of 22 patients participated in the patient-reported outcome questionnaire, with an 81.8% response rate. Just over half of the patients (61.1%) reported previously having had surgery under local anesthetic. All the patients have previously had surgery under general anesthetic. On a subjective rating scale of one to five, the average rating for cosmetic appearance following surgery was 3.7. The average ability to breath following reconstruction was 3.9. Patients rated the surgical result to be as best as it can be 4 out of 5. The average rating of how their new nose compared with their old nose was 3.4. Patients generally agreed that their surgical result was the best it can be with a rating of 4 out of 5.

The FACE-Q skin cancer module was used to measure patient satisfaction with their nasal reconstruction. Three subcategories of facial appearance, quality of life, and experience of care were assessed. FACE-Q scores were calculated based on the grading system and converted to a scale of 0 (worst) to 100 (best). The overall subjective rating of patients' appearance was excellent with an average score of 83.9 (\pm 17.3) out of 100. There was minimal appearance distress as a product of the surgery with an average score of 84.9 (\pm 18.8). Patients felt that the information they received from the treatment team regarding their surgery was sufficient with an average score of 60.7 (\pm 19.2). A few patients who received Mohs surgery and were referred for reconstruction either the same day or the following day expressed dissatisfaction with how quickly they were transitioned to another surgery.

Patient-reported experiences in a minor procedure setting were assessed. On a scale of one to five, patients reported an average of 4.3 for convenience and 3.8 for efficiency of setup and procedure. They reported 3.4 out of 5 for comfortability with having an operation performed on their face wide awake. Pain was also assessed at three stages: during the initial injection of local anesthetic, intraoperatively, and postoperatively. They reported initial pain of the needle from the injection of local anesthetic to be 3.4 out of 5, and pain during the procedure to be lower around 1.9 out of 5, indicating minimal pain during procedure. The reported average for postoperative pain was 2.8 out of 5. Pain scores were higher in the patients who underwent multilayer reconstruction with local flaps versus those who had paramedian forehead flaps. The pain scores were consistently higher in the local flap group with initial pain (4 versus 3), pain during the procedure (2 versus 1.7), and postoperative pain (3 versus 2).

Table 1. Demographic Characteristics

Characteristic	Value
Age, median (SD, range)	72.6 (13.01, 35–93)
Male, no. (%)	14 (63.6)
Female, no. (%)	8 (36.4)
Current smoker, no. (%)	5 (22.7)
Diabetes mellitus, no. (%)	3 (13.6)
Hypertension, no. (%)	11 (50)
Atrial fibrillation, no. (%)	5 (22.7)
Coronary artery disease, no. (%)	3 (13.6)
Immunosuppressive therapy, no. (%)	1 (4.5)
Antiplatelet therapy, no. (%)	9 (40.9)
Anticoagulation therapy, no. (%)	4 (18.2)



Fig. 1. Defect involving nasal dorsum, side wall, tip, soft triangle, ala, cartilage, and mucous. Preoperative frontal (A) and lateral (B) views.

Finally, most patients would be agreeable to proceeding with another surgery under local anesthetic with 11 indicating yes, four indicating maybe, and only three indicating no. A few patients emphasized in the comment section of the questionnaire their discomfort during the administration of local anesthesia.

DISCUSSION

The use of local anesthesia in nasal surgery has gained popularity as a cost-effective and safe alternative.¹⁻⁴ Local anesthesia enables surgeons to perform operations outside the operating room, reducing nonoperative and operative

surgical time, and the need for extensive medical equipment.^{7,8} Half of the patients had immediate reconstruction following their frozen section resection. The other half had Mohs surgery followed by reconstruction within a median of 3 days. This allowed relatively quick access from oncological resection to reconstruction given the availability of clinic procedure time in comparison to the limited access to main operating room resources.

Additionally, with nasal reconstruction requiring revisions, this is likely a more cost-effective and time-efficient option. The average number of surgeries performed, including revisions, was 2.3 ± 0.2 . The revision surgeries



Fig. 2. Reconstruction with hinge door septal mucosal flap, conchal bowl cartilage graft, and three-stage paramedian forehead flap. Postoperative lateral (A), frontal (B), and bottom-up (C) views.



Fig. 3. Defect involving the nasal ala and medial cheek. Preoperative frontal (A) and lateral (B) views.

included division of pedicled flaps, thinning of flaps, or revision to provide more superior aesthetic outcome. The ability to perform these revision surgeries in a minor procedure setting under local anesthetic provides the patient and staff with more flexibility as well as availability given the accessibility to clinic time as opposed to main operating room time. Although we were unable to perform a cost analysis, we can estimate that there would be cost savings associated with procedures under local anesthetic in a minor procedure setting due to limiting the cost of hospitalization; perioperative, intraoperative, and postoperative care; and nursing.

Our study has also demonstrated that complex nasal reconstruction under local anesthetic in minor procedure setting is feasible and safe. We could treat a variety of defects including large defects that required forehead flaps as well as multilayer reconstruction with cartilage grafts and local flaps under wide-awake local anesthesia. Only one patient developed major bleeding that required surgical intervention; otherwise, patients had minor complications that resolved without surgical intervention.

Although local anesthesia demonstrates benefits over general anesthesia in the context of nasal reconstruction, the complexity and length of the procedure should be considered before selecting the appropriate course of



Fig. 4. Reconstruction with mucosal flap from septum, cartilage graft from the conchal bowl, and V-Y advancement flap. Postoperative lateral (A), bottom-up (B), and frontal (C) views.

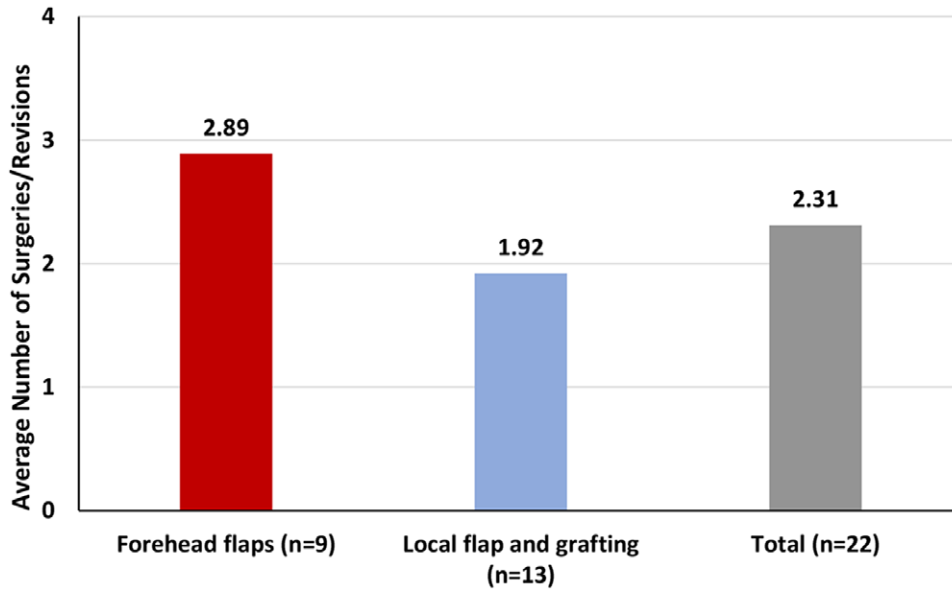


Fig. 5. Average number of surgeries/revisions separated by flap type.

Table 2. Summary of Complications

Characteristic	Value (n = 51)
Total complications, no. (%)	10 (19.6)
Infection, no. (%)	1 (1.96)
Major bleeding, no. (%)	1 (1.96)
Minor bleeding, no. (%)	3 (5.88)
Wound dehiscence, no. (%)	1 (1.96)
Flap necrosis, no. (%)	0 (0.0)
Hypergranulation tissue, no. (%)	2 (3.92)
Scar tissue causing nasal obstruction, no. (%)	2 (3.92)

action. The limitations of this study included the retrospective nature and potential recall biases associated with our questionnaire, as well as the lack of cost analysis to provide further evidence of the cost-savings associated

with this approach. Despite this, we believe that this setting should be considered more often as an alternative to general anesthetic. We believe that the application of our approach for future patient care, especially in the current limited healthcare resource setting, should be more often considered to provide more time and cost-efficient care for patients.

CONCLUSIONS

Our study demonstrated that complex nasal reconstruction performed under local anesthetic in a minor procedure setting is a feasible and safe option with good patient-reported outcomes. It should be considered more often as an alternative to general anesthesia to reduce

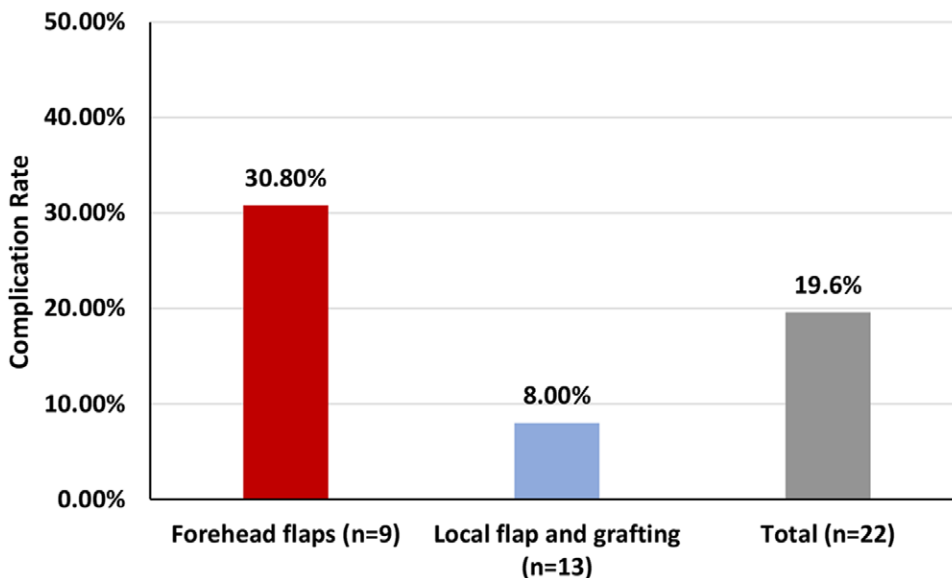


Fig. 6. Complication rates separated by the type of reconstruction performed.

perioperative anesthetic risk, particularly in older patients. This is also an option that likely provides decreased health care costs and resources.

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PATIENT CONSENT

Patients provided written consent for the use of their images.

REFERENCES

1. Fedok FG, Ferraro RE, Kingsley CP, et al. Operative times, post-anesthesia recovery times, and complications during sinonasal surgery using general anesthesia and local anesthesia with sedation. *Otolaryngol Head Neck Surg.* 2000;122:560–566.
2. Dogan R, Erbek S, Gonencer HH, et al. Comparison of local anaesthesia with dexmedetomidine sedation and general anaesthesia during septoplasty. *Eur J Anaesthesiol.* 2010;27:960–964.
3. Harley DH, Collins DR Jr. Patient satisfaction after blepharoplasty performed as office surgery using oral medication with the patient under local anesthesia. *Aesthetic Plast Surg.* 2008;32:77–81.
4. Scott JR, Sowerby LJ, Rotenberg BW. Office-based rhinologic surgery: a modern experience with operative techniques under local anesthetic. *Am J Rhinol Allergy.* 2017;31:135–138.
5. Gittelman PD, Jacobs JB, Skorina J. Comparison of functional endoscopic sinus surgery under local and general anesthesia. *Ann Otol Rhinol Laryngol.* 1993;102(4 Pt 1):289–293.
6. Lalonde D, Wong A. Local anesthetics: what's new in minimal pain injection and best evidence in pain control. *Plast Reconstr Surg.* 2014;134(4 suppl 2):40S–49S.
7. Alter TH, Warrender WJ, Liss FE, et al. A cost analysis of carpal tunnel release surgery performed wide awake versus under sedation. *Plast Reconstr Surg.* 2018;142:1532–1538.
8. Prickett KK, Wise SK, DelGaudio JM. Cost analysis of office-based and operating room procedures in rhinology. *Int Forum Allergy Rhinol.* 2012;2:207–211.
9. Uzun H, Bitik O, Kamburoğlu HO, et al. Assessment of patients who underwent nasal reconstruction after non-melanoma skin cancer excision. *J Craniofac Surg.* 2015;26:1299–1303.
10. Marcasciano M, Tarallo M, Maruccia M, et al. Surgical treatment with locoregional flap for the nose. *Biomed Res Int.* 2017;2017:9750135.
11. Salgarelli AC, Bellini P, Multinu A, et al. Reconstruction of nasal skin cancer defects with local flaps. *J Skin Cancer.* 2011; 2011:181093.
12. Kendler M, Averbek M, Wetzig T. Reconstruction of nasal defects with forehead flaps in patients older than 75 years of age. *J Eur Acad Dermatol Venerol.* 2014;28:662–666.
13. Cecchi R, Troiano G. Forehead flaps for nasal reconstruction: a single-center experience. *Dermatol Ther.* 2017;30:e12475.