

mance satisfaction for the Ultratine as 100% (excellent/satisfactory/good) at the 90-day interval.

At 90 days, 100% of the patients were satisfied or very satisfied with the Ultratine device, but only 75% were satisfied with the Endotine. There was slight or no visibility in 100% of the patients with the Ultratine device and in only 91.7% of the patients with Endotine. There was slight or no palpability in 100% of the patients with the Ultratine device and in only 58.3% of those with the Endotine. Sensibility was markedly less in those with the Ultratine (**Figure 2** and **Figure 3**).

Comment. In patients with the Ultratine device, by the 90-day follow-up visit, tissue elevation was maintained, the patient's sensitivity had decreased, and the device palpability and visibility had decreased. Overall, physicians rated the product performance satisfaction as 100% (excellent/satisfactory/good). The device exceeded all acceptance criteria set in the study protocol with a high level of patient satisfaction.

The Ultratine forehead fixation device contains a revised polymer concentration of PLA-PGA that results in a softer material at the 3-month interval and 70% bioabsorption in 10 months. Results in a series of 12 patients observed for 90 days indicate that all patients achieved secure and permanent fixation and elevation of their forehead-lifts without regression or redescend. Palpability, visibility, and sensitivity of the device were markedly diminished or absent by the 3- to 4-month interval. The Ultratine device represents an improved evolution over the original Endotine device. It is expected that further experience will result in a general acceptance of the Ultratine device in a wide variety of cases as a satisfactory replacement for the Endotine device.

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1. Stevens WG, Apfelberg DB, Stoker DA, Schantz SA. The Endotine: a new bio-degradable fixation device for endoscopic forehead lifts. *Aesthetic Surg J.* 2003; 23:103-107.
2. Holzapfel AM, Mangat DS. Endoscopic forehead-lift using a bioabsorbable fixation device. *Arch Facial Plast Surg.* 2004;6(6):389-393.
3. Berkowitz RL, Jacobs DI, Gorman PJ. Brow fixation with the Endotine device in endoscopic brow lift. *Plast Reconstr Surg.* 2005;116(6):1761-1764.
4. Saltz A. Endoscopic temporal-incision only midface lift is enhanced by Endotine technique. *Aesthetic Surg J.* 2005;25:80-83.
5. Chowdhury S, Malhotra R, Smith R. The Endotine forehead device for brow and forehead lift. *Ophthalm Plast Reconstr Surg.* 2007;23(5):358-362.
6. Boehmler JH, Judson BL, Davison SP. Reconstructive application of the Endotine suspension device. *Arch Facial Plast Surg.* 2007;9(5):328-332.
7. Byrne PJ. Efficacy and safety of Endotine fixation device in endoscopic brow-lift. *Arch Facial Plast Surg.* 2007;9(3):212-214.

Safety of Surgeon-Directed Conscious Sedation in Nasal Surgery

Nasal surgery requires numerous, painful local anesthetic injections. Systemic sedation-analgesia is therefore administered concurrently via intravenous conscious sedation (IVCS), deep sedation (DS) with propofol, or general endotracheal anesthesia (GETA). Although DS and GETA are effective, these approaches are substantially more resource intensive than IVCS. The study by Byrd et al¹ showed that outpatient plastic surgery can be safely performed; however, multiple procedures and anesthesia methods were pooled. Given the difficulty in achieving and maintaining analgesia in nasal surgery, it is not clear whether IVCS is appropriate in these procedures. Furthermore, recent reports of adverse outcomes in outpatient surgery and increased regulations² suggest that more studies to verify safety of surgeon-directed IVCS are necessary. The current study examines the safety of IVCS limited to patients undergoing nasal surgery.

Methods. The medical records of all patients who underwent nasal surgery (rhinoplasty, septoplasty, and septorhinoplasty with or without turbinate reduction) from January 2005 to December 2006 were retrospectively reviewed. The procedures were performed by the otolaryngology department at a single academic health center. Procedures performed using DS or GETA and that had incomplete medical charts were excluded. Patients who returned for a revision procedure on a different day were classified as new patients. Medical charts were reviewed for patient demographics, intraoperative and postoperative vital signs, medication dosage, anesthetic complications, recovery time, and unplanned admissions. Statistical analysis was performed by the biostatistician at the academic health center. An institutional review board approved the study prior to implementation.

Results. A total of 150 procedures were performed using IVCS during the time period studied. In total, 3 cases were excluded: 2 because the medical charts were incomplete and 1 because the operation was canceled (an adequate level of sedation-analgesia was unattainable in a patient with a history of opiate abuse). The procedures in this study were performed largely on young, healthy, active-duty military men (see **Table 1** for demographic data and **Table 2** for case parameters). Because the study took place at a military institution, most cases were performed for functional or reconstructive rather than aesthetic reasons. No major complications occurred during either the operative or perioperative period, and there were no deaths, intubations, intraoperative ventilation requirements, seizures, or arrhythmias (**Table 3**).

After analyzing the patient demographics, case parameters, and complications, we found that postoperative nausea prolonged recovery time ($P < .001$) and increased unplanned admission ($P = .03$). Nonadmission recovery time was not associated with age, sex, procedure performed, surgical time, or medication dosage administered.

Table 1. Patient Demographic Profile

Characteristic	No. (%)
Age, mean (SD) (range)	32.8 (10.8) (16-70)
Sex	
Male	107 (72.8)
Female	39 (26.5)
ASA class	
I	107 (72.8)
II	39 (26.5)
Hypertension	14 (9.5)
Diabetes mellitus	2 (1.4)
Coronary artery disease	2 (1.4)
Asthma	8 (5.4)
Smoker	39 (26.5)
Psychiatric history	11 (7.5)
Sinus disease	11 (7.5)
Allergic rhinitis	21 (14.3)
Alcohol abuse	33 (22.4)
Prior surgery ^a	116 (78.9)

Abbreviation: ASA, American Society of Anesthesiologists.

^aOne patient had a history of postoperative complications; this patient had no complications associated with nasal surgery.

Table 2. Case Parameters

Parameter	Value ^a
Preoperative medication, No. (%) ^b	147 (100)
Intraoperative medication	
Fentanyl citrate, µg	80.6 (47.3) (0-225)
Morphine sulfate, mg	7.3 (3.7) (0-24)
Midazolam hydrochloride, mg	8.2 (3.9) (1-22)
Intraoperative antiemetic administered, mean (SD) ^c	72 (49.0)
Surgical time, min	106.7 (51.4) (10-260)
Recovery time excluding admissions, min	89.3 (58.6) (17-350)

^aData are given as mean (SD) (range) unless indicated otherwise.

^bOral zolpidem tartrate; and oxycodone hydrochloride, 10 mg, and acetaminophen, 325 mg.

^cOndansetron hydrochloride and granisetron hydrochloride.

Intraoperative antiemetic administration was inversely correlated with age ($P = .02$) and associated with female sex ($P < .001$). An increased surgical time predicted intraoperative antiemetic requirements ($P = .03$). An increased fentanyl citrate dosage was associated with intraoperative antiemetic administration ($P = .02$), whereas morphine sulfate and midazolam hydrochloride dosages were not.

Surgical time was directly proportional to the fentanyl dosage ($r = 0.40$; $P < .001$), morphine dosage ($r = 0.40$; $P < .001$), and midazolam hydrochloride dosage ($r = 0.39$; $P < .001$). Older patients required statistically significantly less fentanyl ($r = -0.37$; $P = .001$), morphine ($r = -0.37$; $P < .001$), and midazolam hydrochloride ($r = -0.31$; $P < .001$) than younger patients. An increased morphine dosage was associated with intraoperative hypertension ($P = .003$) and with postoperative hypertension that required treatment ($P = .01$). An increased midazolam hydrochloride dosage was associated with intraoperative hypertension ($P = .004$).

Table 3. Complications

Complication	No. (%)
Transient hypertension ^a	
Intraoperative	35 (23.8)
Required treatment	2 (1.4)
Postoperative	19 (12.9)
Required treatment	2 (1.4)
Transient hypotension ^b	
Intraoperative	6 (4.1)
Required treatment	0
Postoperative	0
Intraoperative emesis	0
Postoperative nausea	30 (20.4)
Postoperative emesis	17 (11.6)
Required antiemetic	18 (12.2)
Dyspnea	1 (0.7)
Emergent intubation	0
Mechanical ventilation	0
Anesthetic reversal agent	
Intraoperative	1 (0.7)
Postoperative	1 (0.7)
Seizure	0
Arrhythmia	0
Unplanned admission	7 (4.8)
Death	0

^aSystolic blood pressure higher than 150 mm Hg for more than 5 minutes.

^bSystolic blood pressure lower than 90 mm Hg for more than 5 minutes.

Comment. Analysis of the unscheduled admissions revealed several important points. Two patients were admitted solely secondary to emesis; neither of these patients had received an intraoperative antiemetic. In retrospect, this may have been beneficial. One patient was admitted secondary to postoperative epistaxis, which seems to have been unrelated to the sedation-analgesia method. One patient had a history of obstructive sleep apnea and was admitted as a precautionary measure after oxygen desaturation to a level of 90% to 92%; the concern was that the agents administered might cause catastrophic desaturation during the immediate postoperative period. In retrospect, this precaution was unnecessary. One patient was admitted for monitoring of postoperative tachycardia with chest pain and emesis. It is hypothesized that her symptoms were related to dehydration because her symptoms resolved after fluid administration. She underwent unremarkable revision nasal surgery the following year even though the same anesthetic technique was employed. It is our experience that patients are often admitted secondary to minor complaints when the surgery is performed late in the day or if the patient lives some distance from the hospital; however, this was not an issue in the unscheduled admissions discussed herein.

The final unscheduled admission involved a patient with a history of opiate abuse and posttraumatic stress disorder that was not elucidated until after surgery. Although the patient's surgery was uneventful, he had marked postoperative pain and anxiety that required patient-controlled analgesia, methadone hydrochloride, and zolpidem tartrate. During the evening, approximately 18

hours after surgery, he experienced an apneic episode that required bag-mask ventilation and naloxone hydrochloride administration. The patient recovered completely and was not intubated. However, this case illustrates the importance of obtaining a thorough clinical history and the potential complications from oversedation. Indeed, it has been shown that most avoidable deaths after office-based surgery result from oversedation and inadequate monitoring.³ The current case also highlights the need to have transfer and emergency protocols in place. Finally, presurgical consultation with the pain management service and/or injection of the surgical sites with bupivacaine hydrochloride at the conclusion of the procedure may have been prudent.

Several important associations were determined in this study. Nausea prolonged recovery and led to more unplanned admissions. This association has been previously observed.⁴ The lack of association between surgical time and unplanned admission rates differs from previous studies⁵ and perhaps reflects the shorter mean duration of surgical time in this study. If so, there may be a "critical" duration of surgery in which clinical judgment leads to overnight admission. Clinically, a higher fentanyl dosage, younger age, female sex, intraoperative hypertension, and a preoperative diagnosis of hypertension were all associated with nausea. The fact that younger patients had more nausea likely reflects the fact that older patients required less medication to achieve adequate sedation-analgesia. Female patients experienced more nausea than male patients, reflecting a known sex difference.⁶

In this study, a history of hypertension predicted intraoperative hypertension, postoperative hypertension, and postoperative emesis. Excellent preoperative control of hypertension may assist in reducing the amount of opioid given during surgery (because hypertension can be easily misconstrued as pain) and help reduce postoperative nausea. Also of note, hypotension was seen less frequently than hypertension, both intraoperatively (4% vs 24%) and postoperatively (0% vs 13%), perhaps reflecting the short duration and minimal blood loss in nasal surgery.

The many benefits of IVCS compared with DS and GETA include more efficient resource utilization, less patient risk, and less required training to administer and monitor. In addition, IVCS has a lower risk of airway or ventilation problems (compared with DS) and lower risk of DVT (compared with GETA).⁷ Also, a high level of patient satisfaction is evident with IVCS in aesthetic surgery.⁸ In this study, surgeon-directed IVCS was safe in nasal surgery, with no major airway, ventilatory, or hemodynamic complications during surgery or in the immediate postoperative period. Nausea was statistically significantly associated with prolonged recovery ($P < .001$) and led to more unplanned admissions ($P = .03$).

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1. Byrd HS, Barton FE, Orenstein HH, et al. Safety and efficacy in an accredited outpatient plastic surgery facility: a review of 5316 consecutive cases. *Plast Reconstr Surg.* 2003;112(2):636-641.
2. Florida Board of Medicine. Rule 64B8-9.009. Standard of Care for Office Surgery; February 27, 2001.
3. Clayman MA, Caffee HH. Office surgery safety and the Florida moratoria. *Ann Plast Surg.* 2006;56(1):78-81.
4. Fortier J, Chung F, Su J. Unanticipated admission after ambulatory surgery: a prospective study. *Can J Anaesth.* 1998;45(7):612-619.
5. Iverson RE. Patient safety in office-based surgery facilities, I: procedures in the office-based surgery setting. *Plast Reconstr Surg.* 2002;110(5):1337-1342.
6. Nitahara K, Sugi Y, Shono S, et al. Risk factors for nausea and vomiting following vitrectomy in adults. *Eur J Anaesthesiol.* 2007;24(2):166-170.
7. Reinisch JF, Rosso RF, Walker JW, et al. Deep venous thrombosis and pulmonary embolus after facelift: a study of incidence and prophylaxis. *Plast Reconstr Surg.* 2001;107(6):1570-1577.
8. Hasen K, Samartzis D, Casas L, et al. An outcome study comparing intravenous sedation with midazolam/fentanyl (conscious sedation) versus propofol infusion (deep sedation) for aesthetic surgery. *Plast Reconstr Surg.* 2003;112(6):1683-1689.

COMMENTS AND OPINIONS

Thread-lifts: The Good, the Bad, and the Ugly

In recent years, parallel with the rise in interest in antiaging therapy, there has been an increasing demand from patients for facial plastic surgeons to explore and develop less invasive alternatives to cosmetic surgical procedures, particularly minimally invasive methods of facial rejuvenation. In this context, the barbed suture was introduced and popularized in the late 1990s.¹ These so-called thread-lifts were met with initial enthusiasm and demonstrated application in treatment of the nasolabial fold, melomental fold, lateral brow, and platysma banding. They were soon popularized, and series of up to 350 patients with good results were soon presented.² We similarly began incorporating threads into the senior author's (D.A.F.E.) practice and offered them to patients with modest expectations who were reluctant to undergo more invasive surgical intervention.

Soon thereafter, however, problems with the thread-lifts began to arise and be reported, including puckering, thread breakage, and extrusion.^{3,4} In addition, radiologic reports demonstrated fragmentation.⁵ Histologic reports had suggested encapsulation and fibrosis, and although this was initially felt to improve overall results, the possibility of irregular nodularity remained.⁶ We be-