Evaluating the Safety of Rhinoplasty in Smokers

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PATIENT SAFETY

Video DISCUSSION

Background: Smoking's impact on tissue perfusion and wound healing is particularly relevant in rhinoplasty, where precise tissue healing is crucial for functional and aesthetic outcomes. Although the nasal region's robust vascular supply mitigates smoking's detrimental effects, concerns remain about postoperative complications. This study investigates whether smoking should be contraindicated for rhinoplasty by comparing infection and revision rates between smokers and nonsmokers.

Methods: A retrospective review was conducted on 1884 rhinoplasty cases from 2014 to 2022. Patients were categorized as active smokers, former smokers, or nonsmokers. Only patients with at least 12 months of follow-up were included. All procedures were open rhinoplasties conducted under general anesthesia. Primary outcomes analyzed included infection and revision rates. Between-group statistical comparisons were performed.

Results: A total of 1884 patients consisted of 80 active smokers, 39 former smokers, and 1765 nonsmokers. Average follow-up was 23.8 months. The overall revision rate was 3.3%, with 3.8% in smokers and 3.3% in nonsmokers; 3.8% of smokers required additional antibiotics for cellulitis compared with 1.6% of nonsmokers; all cases resolved without long-term complications. There were no significant differences between smoker and nonsmoker rhinoplasty patients in rates of revision, postoperative infection, or wound complications.

Conclusions: Active smoking does not appear to be a strict contraindication for rhinoplasty. Smoker and nonsmoker primary and revision rhinoplasty patients exhibited similar revision, postoperative infection, and wound complication rates. This suggests that, with proper perioperative optimization, rhinoplasty can be safely performed in smokers. Although smoking cessation should still be recommended, it may not be mandatory for satisfactory outcomes. *(Plast. Reconstr. Surg.* 157: 43, 2026.)

Smoking is a well-established risk factor in surgery because of its negative effects on tissue perfusion and wound healing.[1] Cigarette smoke contains nicotine and other toxic chemicals that cause vasoconstriction, a weakened inflammatory response, and decreased oxygen delivery to tissues. These effects can subsequently raise the risk of infection, wound dehiscence, and delayed healing. These biological impacts are particularly concerning in plastic surgery where optimal wound healing is essential for both functional and aesthetic outcomes.[2] The challenges of performing operations on smokers have been extensively discussed across many fields of medicine, but in the context of plastic surgery, and specifically rhinoplasty, the effects of smoking present a unique set of considerations.

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Rhinoplasty is one of the most commonly performed facial operations, addressing both cosmetic and functional aspects of the nose.[3] Complications from smoking are well-documented in various plastic surgery treatments, including breast surgery, abdominoplasty, and rhytidectomy.[4–6] For example, infections and skin necrosis can be more common in smokers having these procedures.[1] Although similar concerns extend to rhinoplasty, the data specific to this procedure have remained inconsistent. We therefore wanted to explore the consequences of smoking in our senior author's (R.G.R.) rhinoplasty patient population.[7–9]

The potential for smoking to impact rhinoplasty outcomes raises the question of whether smoking should be considered a contraindication for this procedure. Although many plastic surgeons enforce strict smoking cessation policies before extensive elective procedures involving extensive tissue manipulation, the same surgeons routinely perform rhinoplasties on active smokers, especially in nations where smoking is more prolific. Given the nasal region's robust blood supply, the impact of smoking on wound healing in rhinoplasty may not be as consequential.[10] The deleterious consequences of smoking that are observed in other procedures involving widespread dissection, such as breast reconstruction, rhytidectomy, and abdominoplasty, may be mitigated in rhinoplasty by its extensive vascular network.[11]

The nasal bloody supply is a robust network of vessels that properly oxygenate and nourish the tissues. This intricate system draws from both the internal and external carotid arteries, which are interconnected through a complex system of collateral circulation to ensure that the blood flow is not interrupted. The ophthalmic artery, from the internal carotid artery, branches into smaller vessels such as the anterior ethmoidal, dorsal nasal, and external nasal arteries to nourish the upper nose. The external carotid artery also supports the nasal blood supply, particularly to the nasal tip and envelope, dominantly through the facial artery's labial and angular branches.[10] The superior labial artery supplies the nasal sill, septum, and base of the columella, branching further into the columellar branches. The angular artery further branches into the lateral nasal artery which ensures blood supply to the lateral surfaces of the lower nasal envelope, including the nasal tip. These arteries travel within the subdermal layer, allowing for rich collateralization that can sustain adequate perfusion even when some of the vessels are disrupted. The venous drainage mirrors the arterial network, returning blood to the facial vein.

However, smoking may still pose risks in rhinoplasty in terms of postoperative infections and wound healing complications. Some studies suggest that smokers are more likely to experience complications related to vascular compromise in open rhinoplasty.[9] Others have shown that smoking does not necessarily lead to a significant increase in major complications or the need for revision surgery following rhinoplasty.[7,8] This suggests that although smoking may influence short-term healing, it may not have a long-term detrimental effect on overall surgical outcomes in rhinoplasty, provided that patients are appropriately managed. In principle, rhinoplasty involves less soft-tissue undermining and involves an anatomical region with a strong blood supply, avoiding the clinically significant risk factors associated with other elective procedures in plastic surgery when combined with careful perioperative management.

By comparing postoperative problems in smokers and nonsmokers—specifically, the need for revision surgery and the incidence of infections—this study aims to investigate whether active smoking should be regarded as a strict contraindication for rhinoplasty. Our goal is to elucidate whether the risks posed by smoking are significant enough to justify excluding smokers from undergoing rhinoplasty or whether these risks can be managed through perioperative optimization. Specifically, we focus on infection rates as indicated by the need for additional postoperative antibiotics beyond the standard postoperative course and revision rates. By examining these outcomes, this study aims to expand the body of knowledge guiding clinical practices when performing rhinoplasty on smokers. The intention is to help plastic surgeons make well-informed decisions, ensuring rhinoplasty can remain a safe and effective option for both smokers and nonsmokers, with the appropriate management strategies in place. Long-term surgical success and patient care will both be improved by knowing how smoking affects rhinoplasty results.

PATIENTS AND METHODS

A retrospective single-surgeon chart review was conducted of the senior author's (R.G.R.) practice from July of 2014 to June of 2022. All patients who underwent rhinoplasty during this period were included in the review. The study was approved by the Biomedical Research Alliance of New York Institutional Review Board. All patients underwent open rhinoplasty under general anesthesia. In both primary and revision

rhinoplasty cases, the patient's septal cartilage was prioritized for reconstruction. In cases where septal cartilage was insufficient, fresh frozen cartilage from MTF Biologics was used. No alloplastic materials were used during rhinoplasty for any patient. All patients were given 1 week of oral antibiotics as routine postoperative prophylaxis.

Inclusion criteria consisted of patients undergoing open rhinoplasty; both primary and revision rhinoplasty patients were included. Patients were stratified to 3 different statuses including active smoker, former smoker, and nonsmoker. A patient was defined as an active smoker if any inhaled tobacco products were used, including but not limited to cigarettes, cigars, and vaping, within 4 weeks of rhinoplasty procedure and/or continued use following the operation. A former smoker was defined as a patient who discontinued smoking more than 4 weeks before surgery without intention of continuing to smoke again in the future. A patient who had never used tobacco products was categorized as a nonsmoker. Patients who had less than 1-year follow-up were excluded from the study. After reviewing 2003 cases of rhinoplasty, 1884 patients were found to meet the inclusion criteria.

Manual chart review was conducted to collect patient demographics and surgical outcomes. Primary outcomes were defined as rates of infection and revision. Infections were considered to have occurred if patients presented with clinical signs of infection and were treated with antibiotics or surgical intervention after completing the routine course of postoperative prophylactic antibiotics. Secondary outcomes were incidence of open wound, nonhealing wound, and skin necrosis. Subsequent revision rhinoplasty was defined as any subsequent open rhinoplasty procedure. Both infection and revision rates were stratified into 3 groups: active smokers, former smokers, and nonsmokers. These groups were further categorized for outcome analysis into overall, primary, and revision rhinoplasty patients. Statistical analyses were conducted to evaluate differences in the rates of revisions and the requirement of additional antibiotics among patient groups stratified by smoking status (overall, active smokers, former smokers, and nonsmokers). The chi-square test for independence was used to assess differences between groups. Values were derived using a 2-tailed approach to determine statistical significance. A value of $P < 0.05$ was considered statistically significant.

RESULTS

A total of 1884 patients consisting of 1673 (88.8%) women and 211 (11.2%) men met inclusion criteria, with an average age of 30.7 years and body mass index of 22.5 kg/m^2. Among these patients, 1421 (75.4%) were primary rhinoplasty cases and 463 (24.6%) were revisions. The average length of follow-up was 23.8 months. This study's rhinoplasty patient population consists of 81 active smokers (4.3%), 38 former smokers (2.0%), and 1765 nonsmokers (93.7%) (Table 1).

In our patient population, we included patients who underwent both primary and revision rhinoplasty. In the overall population of 1884, there were 62 patients (3.3%) who underwent subsequent revision. Thirty-six of 1421 (2.5%) of these patients belonged to the primary rhinoplasty group and 26 of 463 (5.6%) belonged to the revision rhinoplasty population. In comparison, revisions were performed on 3 of 80 active smokers (3.8%), 1 of 39 former smokers (2.6%), and 58 of 1765 nonsmokers (3.3%). These groups included both the primary and secondary rhinoplasty patients. In the primary rhinoplasty active smoker population, 3 of 71 (4.2%) underwent subsequent revision. There were no revisions in the active smoker secondary rhinoplasty population. In the nonsmoker population,

Table 1. Patient Demographics

Characteristic	Value (%)
Total no. of rhinoplasty patients	1884
No. of primary rhinoplasty patients	1421 (75.4)
No. of revision rhinoplasty patients	463 (24.6)
No. of primary rhinoplasty/active smoker patients	71 (3.8)
No. of primary rhinoplasty/former smoker patients	31 (1.7)
No. of primary rhinoplasty/nonsmoker patients	1319 (70.0)
No. of revision rhinoplasty/active smoker patients	9 (0.5)
No. of revision rhinoplasty/former smoker patients	8 (0.4)
No. of revision rhinoplasty/nonsmoker patients	446 (23.7)
Average follow-up time, mo	23.8
Mean age, yr	30.7
Sex	
Men	211 (11.2)
Women	1673 (88.8)
Mean BMI, kg/m^2	22.5
Active smokers	80 (4.3)
Former smokers	39 (2.0)
Nonsmokers	1765 (93.7)

BMI, body mass index.

the distribution was 32 of 1319 (2.4%) for primary and 26 of 446 (5.8%) for secondary rhinoplasty cases. There were no statistically significant differences between groups in the need for subsequent revision (Table 2).

Overall, 32 of 1884 patients (1.7%) required 5 to 7 days of additional postoperative antibiotics for cellulitis. This was in addition to the standard postoperative antibiotic prophylaxis. Twenty-one of 1421 (1.5%) of these patients belonged to the primary rhinoplasty group and 11 of 463 (2.4%) belonged to the revision rhinoplasty patient population. Three of 80 patients (3.8%) requiring additional postoperative antibiotics were active smokers and 29 of 1765 (1.6%) were nonsmokers. There was no incidence of use of additional postoperative antibiotics in the former smoker rhinoplasty population. There were no statistically significant differences between the groups in the need for additional postoperative antibiotics (Table 3). There were no instances of open wounds, nonhealing wounds, or skin necrosis (Table 4).

DISCUSSION

Even though smoking is a strict contraindication for many procedures, given the robust blood supply of the nose and the less significant dissection necessary, we wanted to explore whether this principle holds true in rhinoplasty. According to our study, smoking does not significantly increase the rate of revision surgery or postoperative infection. The findings from this sizable group of 1884 patients provide some insight into clinical decision-making when treating smokers who are seeking rhinoplasty.

The study shows comparable rates of revision between smokers and nonsmokers. The revision rate for smokers was 3.7%, whereas the rate for nonsmokers was 3.3%, indicating that the long-term surgical outcomes between these groups do not differ significantly. Although surgeons are appropriately wary of operating on smokers, and smoking should still be optimized before surgery given the known deleterious effects on other procedures, our data do not support a difference. Therefore, although we would encourage people not to smoke, we do not believe rhinoplasty is one of the procedures that needs to be canceled if a patient admits to smoking.

These findings align with existing studies suggesting that rhinoplasty may be less vulnerable to smoking-related complications because of the unique anatomical and physiologic characteristics of the nasal region. The nose is characterized by a rich vascular supply; this helps diminish the detrimental effects of smoking and its byproduct on tissue perfusion and healing. The vascular supply likely buffers tissue from ischemic insult, ultimately allowing for similar outcomes between smokers and nonsmokers.

To add further evidence to the vascular resilience of the nasal blood supply, in open rhinoplasty, which all patients in our study underwent, the transcolumellar incision was essential for surgical exposure. This technique requires sacrifice of the columellar branches of the superior labial

Table 2. Rates of Revision[a]

Characteristic	Overall (%)	In Active Smokers (%)	In Former Smokers (%)	In Nonsmokers (%)	*P*
Primary rhinoplasty patients requiring revision	36 of 1421 (2.5)	3 of 71 (4.2)	0 of 31 (0.0)	32 of 1319 (2.4)	0.637
Revision rhinoplasty patients requiring subsequent revision	26 of 463 (5.6)	0 of 9 (0.0)	1 of 8 (12.5)	26 of 446 (5.8)	0.742
Total revisions	62 of 1884 (3.3)	3 of 80 (3.8)	1 of 39 (2.6)	58 of 1765 (3.3)	0.990

[a]Patients requiring subsequent revision rhinoplasty, stratified by smoking status and primary/revision rhinoplasty status.

Table 3. Rates of Infection[a]

Characteristic	Overall (%)	In Active Smokers (%)	In Former Smokers (%)	In Nonsmokers (%)	*P*
Primary rhinoplasty patients requiring additional antibiotics	21 of 1421 (1.5)	3 of 71 (4.2)	0 of 31 (0.0)	18 of 1319 (1.4)	0.235
Revision rhinoplasty patients requiring additional antibiotics	11 of 463 (2.4)	0 of 9 (0.0)	0 of 8 (0.0)	11 of 446 (2.5)	0.934
Total patients requiring additional antibiotics	32 of 1884 (1.7)	3 of 80 (3.8)	0 of 39 (0.0)	29 of 1765 (1.6)	0.436

[a]Patients stratified by smoking status and primary/revision rhinoplasty status.

Table 4. Rates of Wound Complications[a]

Characteristic	Open Wound (%)	Nonhealing Wound (%)	Skin Necrosis (%)	Total Wound Complications (%)
Primary/active smoker rhinoplasty patients	0 of 71 (0.0)	0 of 71 (0.0)	0 of 71 (0.0)	0 of 71 (0.0)
Primary/former smoker rhinoplasty patients	0 of 31 (0.0)	0 of 31 (0.0)	0 of 31 (0.0)	0 of 31 (0.0)
Primary/nonsmoker rhinoplasty patients	0 of 1319 (0.0)	0 of 1319 (0.0)	0 of 1319 (0.0)	0 of 1319 (0.0)
Revision/active smoker rhinoplasty patients	0 of 9 (0.0)	0 of 9 (0.0)	0 of 9 (0.0)	0 of 9 (0.0)
Revision/former smoker rhinoplasty patients	0 of 8 (0.0)	0 of 8 (0.0)	0 of 8 (0.0)	0 of 8 (0.0)
Revision/nonsmoker rhinoplasty patients	0 of 446 (0.0)	0 of 446 (0.0)	0 of 446 (0.0)	0 of 446 (0.0)

[a]Patients stratified by smoking status and primary/revision rhinoplasty status.

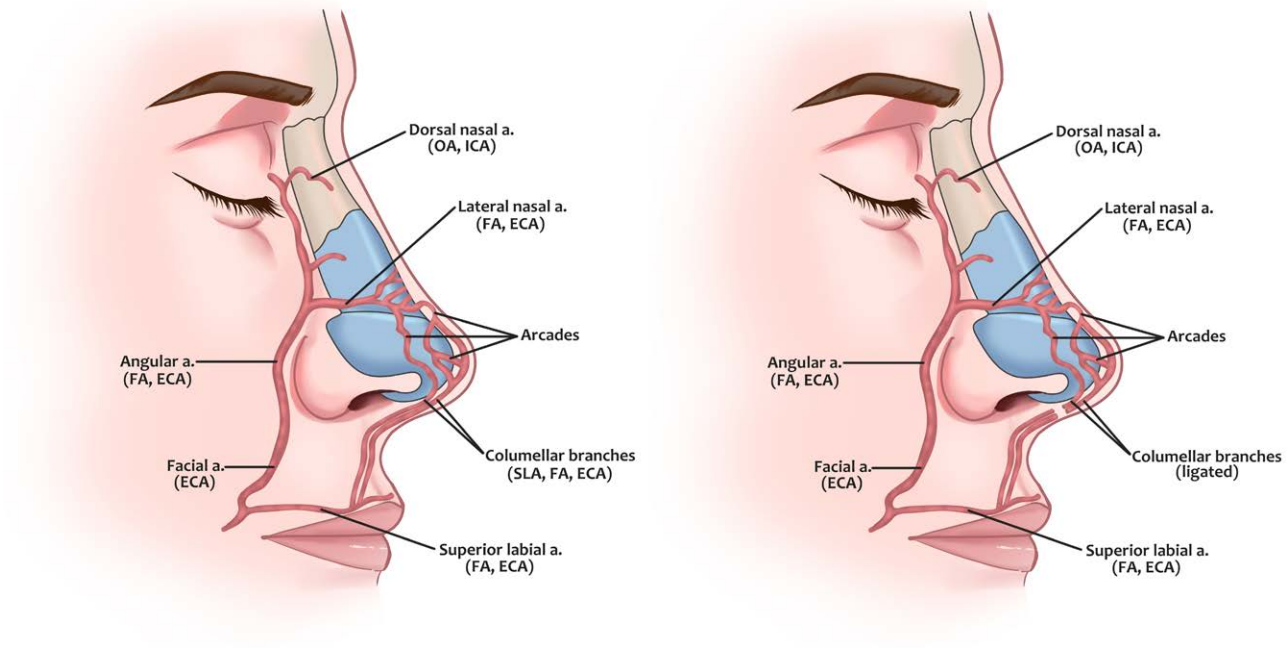

Fig. 1. Blood supply to the nose before (*left*) and after (*right*) open rhinoplasty. The origin of the vessels from distal to proximal are noted in *parentheses*. *FA*, facial artery; *ECA*, external carotid artery; *OA*, ophthalmic artery; *ICA*, internal carotid artery; *SLA*, superior labial artery.

artery. Despite this intentional disruption, however, the vigorous vascular supply of the nose continues to provide rich perfusion. Retrograde blood from the nasal tip plexus continues to support the distal columellar skin, even after the columellar branches are ligated.[12] This built-in redundancy of the nasal blood supply system, along with meticulous surgical techniques, ensures that nasal tissues remain well perfused after open rhinoplasty, minimizing risk of complications such as necrosis or delayed wound healing (Fig. 1).

In addition to comparable revision rates, our study also did not show a statistically significant difference in the incidence of infection rates between smokers and nonsmokers. The infections that did occur in both populations of patients were characterized by minor cellulitis and were treated with 5 to 7 days of additional postoperative antibiotics beyond the standard prophylactic dose. Notably, all infections resolved without any residual deficits or need for additional surgical intervention. This finding highlights the true risk profile of smokers undergoing rhinoplasty. Although the rate of postoperative infection increased in active smokers, this was managed effectively with antibiotics without any permanent wound complications or necrosis. This implies that smoking-related hazards can be reduced

Fig. 2. A female active smoker in her 20s is shown preoperatively (*left*) and 1 year after open rhinoplasty (*right*) in left profile views. She had a drooping nasal tip and small dorsal hump preoperatively. She underwent dorsal hump reduction, tip deprojection, nasal tip refinement, and nasal tip elevation.

with appropriate postoperative surveillance and prompt management, enabling excellent recovery even in patients with a history of smoking (Figs. 2 through 5).

Smoking has well-documented negative effects on tissue oxygenation and immune function, which in turn can increase the incidence of minor infections.[13–15] More specifically, smoking compromises microcirculation, which impairs the ability of tissue to receive adequate nutrients and oxygenation.[16,17] This subsequently can delay the healing process and also increase tissue susceptibility to bacterial colonization.[18] Furthermore, the inflammatory response, which is critical in fighting infection, is also weakened by smoking.[19] The greater incidence of cellulitis in active smokers in our study is likely explained by these pathophysiologic mechanisms. However, notably, these minor infections did not escalate into more severe outcomes with permanent consequences or the need for operative intervention with at least 12 months of follow-up.

The findings of this study have significant ramifications for clinical practice, specifically, for the management and counseling of smokers seeking rhinoplasty by plastic surgeons. According to the findings, smoking does not necessarily indicate an absolute contraindication for rhinoplasty if surgeons follow strict preoperative and postoperative guidelines to reduce risks. Importantly, vigilance is required to monitor for early signs of infection in smokers, with initiation of additional antibiotics when indicated. The results of this study may also serve to support surgeons in the setting of medicolegal litigation regarding smoking in rhinoplasty patients.

In plastic surgery, preoperative counseling is still crucial for treating smokers. It is still

Fig. 3. Preoperative (*left*) and postoperative (*right*) right profile views of the patient shown in Figure 2.

recommended to encourage smoking cessation before surgery, even if the data indicate that smokers can have rhinoplasty with results similar to those of nonsmokers. Quitting smoking, even for a short time, may help promote quicker, more dependable healing and lower the risk of mild infections. Setting realistic expectations and making sure patients know how important it is to follow postoperative care guidelines is essential for patients who are unable or unwilling to stop smoking. For patients unwilling or unable to quit smoking, setting appropriate expectations while stressing the importance of adhering to standardized postoperative guidelines is critical.

The literature regarding outcomes in plastic surgery in active smokers often produces mixed results. Theocharidis et al. reported a higher incidence of complications in smokers undergoing facial plastic surgery; however, notably, this study involved operations with extensive soft-tissue dissection such as rhytidectomy and abdominoplasty.[20] In contrast, rhinoplasty involves less undermining and also benefits from the nasal region's robust vascularity. Similar to our study, Erol and Koycu found that although active smokers had a higher chance of delayed healing in rhinoplasty, the rates of significant complications such as the rate of revision surgery was comparable to their nonsmoker cohort.[21] These results are corroborated by our research, adding further weight that rhinoplasty can be safe to perform on active smokers with appropriate perioperative care.

Although there is evidence in this study that rhinoplasty is safe for smokers, there are several limitations that should be noted. First, the retrospective design may introduce selection bias, which could limit the incidence of complications. Selection bias may also be introduced by the single-surgeon nature of our study. Patients who have problems or desire revision sometimes seek care elsewhere and could be missed given the retrospective nature of this study. Furthermore,

Fig. 4. Preoperative (*left*) and postoperative (*right*) oblique views of the patient shown in Figure 2.

the surgical technique used in our single-surgeon study avoids aggressive undermining or overresection of soft tissue, which would compromise blood flow to the surgical site; however, because approaches to rhinoplasty vary widely, this could potentially limit the generalizability of our study.

Our study relied on self-reported smoking status, which may not be an accurate indicator of certain patients' frequency or intensity of smoking. Intuitively, there may be a dose-dependent effect between volume and frequency of smoking and outcomes; to give a better picture of how smoking intensity influences surgical outcomes, future research could benefit from including more objective indicators of smoking exposure, such as cotinine levels. In addition, the inclusion criteria of 12-month follow-up may miss the need for revision in patients past that mark, making the revision rate for this population potentially an underestimate from the final revision rate. Likewise, in our practice, postoperative photographs are routinely taken at 12 months. Although no minor or major complications were observed in these images or documented for study participants, the retrospective design and reliance on a 12-month photographic timeline may theoretically limit our ability to detect revisions required after this period. However, because this timeframe is consistent across both groups, we suspect that the revision rate would likely remain comparable even with extended follow-up. Notably, the average follow-up duration in our study was 23.8 months. Lastly, this study focuses on infection and revision rates but does not capture any possible difference in other features in rhinoplasty, such as graft

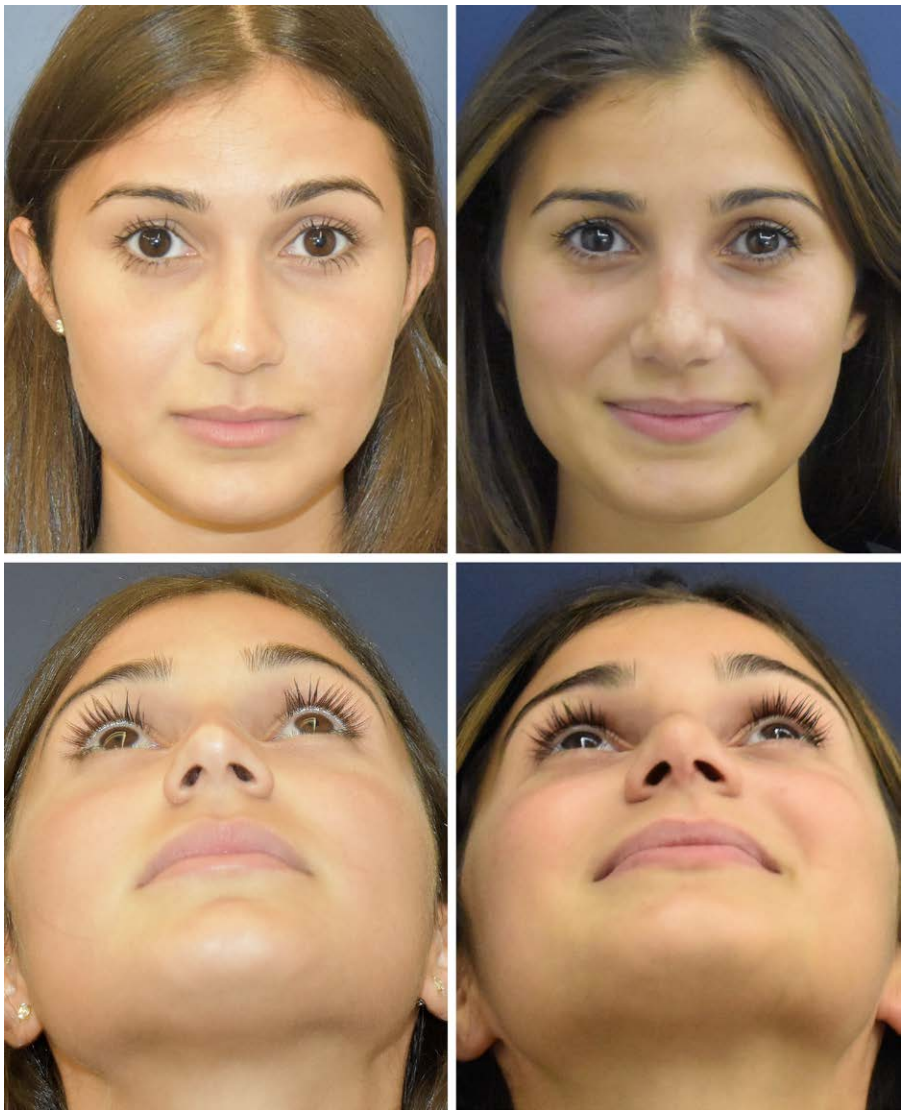

Fig. 5. Preoperative (*left*) and postoperative (*right*) frontal and basal (worm's-eye) views of the patient shown in Figure 2.

resorption, which is harder to measure accurately with our data.

Another limitation is our study population's comparatively low smoking prevalence. Although the number of smokers was sufficient to draw meaningful conclusions, a larger sample of smokers would have provided greater power in comparing outcomes between smokers and nonsmokers.

Given these results, future research on refining perioperative care protocols for smokers undergoing rhinoplasty would be a fitting complement. The management of these patients could be advanced further by investigating the optimal duration and type of antibiotic therapy for smokers with infectious complications, and perhaps the potential benefit of adjunctive therapies such as hyperbaric oxygen. Furthermore, prospective studies with even longer term follow-up would assist in providing confirmation regarding overall patient satisfaction and aesthetic outcomes in active smokers who have had rhinoplasty.

CONCLUSIONS

The results of this study indicate that active smoking should not be considered an absolute contraindication for rhinoplasty, as there is no significant increase in the need for revision operations in actively smoking patients compared with nonsmokers. Although smoking is commonly associated with impaired wound healing and increased risk of infection, our data demonstrate that these concerns can

be managed effectively in the context of rhinoplasty. To be clear, despite the findings of the study, we still advocate for smoking cessation counseling for all patients before undergoing rhinoplasty.

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DISCLOSURE

The senior author is a consultant for MTF Biologic. All other authors have no financial interests or conflicts of interests to disclose.

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