

# Effects of hookah and cigarette smoking on the recovery after septoplasty

Semih Ak<sup>1</sup> and mehmet erkan kaplama<sup>2</sup>

<sup>1</sup>Sanliurfa Mehmet Akif Inan Egitim ve Arastirma Hastanesi

<sup>2</sup>Affiliation not available

November 15, 2020

## Abstract

**Background:** Hookah is a tobacco product of Middle Eastern origin; however, its popularity increases in Europe and the US. Despite its frequent use, hookah's potentially detrimental effects are underestimated due to the scarcity of the relevant research. Since septoplasty is one of the most commonly performed procedures of otolaryngology practice, we aimed to investigate the impact of hookah consumption on recovery after septoplasty. **Methods:** Patients who underwent septoplasty in Sanliurfa Training and Research Hospital Department of Otolaryngology between January 2017 and December 2019 were divided into four groups based on their history of hookah and cigarette smoking. The patients' prospectively collected data, including demographic features, healing time, and presence or absence of septal perforation during follow-up, were compared between these four groups. **Results:** The entire cohort included 270 patients. The mean patient age was  $29.2 \pm 5.8$  years. One hundred and thirty-two (48.9%) patients were non-smokers, 96 (35.5%) were cigarette smokers, 27 (10%) were hookah smokers, and 15 (5.6%) consumed both tobacco products regularly. Mean healing time was 10 days, and septal perforation was encountered in 10 patients (3.7%). A comparison of the groups revealed that cigarette smoking did not impact septal perforation rates ( $p=0.326$ ) but prolonged the healing time. However, hookah smoking with or without cigarette smoking significantly influenced septal perforation rates and healing times. **Conclusion:** Patients should be questioned about hookah smoking in addition to cigarette smoking before the septoplasty procedure. Patients with a positive history of hookah smoking should be followed closely in terms of delayed healing and increased septal perforation rates.

## Effects of hookah and cigarette smoking on the recovery after septoplasty

### SUMMARY

**Background:** Hookah is a tobacco product of Middle Eastern origin; however, its popularity increases in Europe and the US. Despite its frequent use, hookah's potentially detrimental effects are underestimated due to the scarcity of the relevant research. Since septoplasty is one of the most commonly performed procedures of otolaryngology practice, we aimed to investigate the impact of hookah consumption on recovery after septoplasty.

**Methods:** Patients who underwent septoplasty in Sanliurfa Training and Research Hospital Department of Otolaryngology between January 2017 and December 2019 were divided into four groups based on their history of hookah and cigarette smoking. The patients' prospectively collected data, including demographic features, healing time, and presence or absence of septal perforation during follow-up, were compared between these four groups.

**Results:** The entire cohort included 270 patients. The mean patient age was  $29.2 \pm 5.8$  years. One hundred and thirty-two (48.9%) patients were non-smokers, 96 (35.5%) were cigarette smokers, 27 (10%) were hookah smokers, and 15 (5.6%) consumed both tobacco products regularly. Mean healing time was 10 days, and septal perforation was encountered in 10 patients (3.7%). A comparison of the groups revealed that cigarette

smoking did not impact septal perforation rates ( $p=0.326$ ) but prolonged the healing time. However, hookah smoking with or without cigarette smoking significantly influenced septal perforation rates and healing times.

**Conclusion:** Patients should be questioned about hookah smoking in addition to cigarette smoking before the septoplasty procedure. Patients with a positive history of hookah smoking should be followed closely in terms of delayed healing and increased septal perforation rates.

### Key Words

Cigarette, hookah, septal perforation, septoplasty, smoking, tobacco

### What's already known about this topic?

Septoplasty is one of the most common otorhinolaryngologic surgical procedures. Septal perforation is an important related complication that readily impacts patient quality of life. Smoking increases septal perforation.

### What does this article add?

Hookah is a tobacco product which is frequently used by people living in the Middle East. Since these people maintain this habit after they immigrate to Europe or US, hookah smoking is getting more popular in world. Moreover, the potential detrimental effects of hookah smoking is underestimated and this fact also contributes to its increasing popularity.

Septoplasty is one of the most commonly performed procedures in otolaryngology practice. In our study, we investigated the impact of hookah smoking on the healing after septoplasty and found that it had significantly deleterious effects.

## INTRODUCTION

Nasal airway obstruction resulting from a septal deformity causing mouth breathing, epistaxis, sinusitis, and even sleep apnea is observed in one-third of the population.<sup>1</sup> Therefore, septal deformity constitutes the leading indication for septoplasty procedure. Septoplasty entails identifying the area of septal deviation and removing the deviated cartilage, allowing more space for airflow through the nasal cavity.<sup>2</sup> Although it is a relatively simple procedure, it has its specific complications such as septal perforation, external nasal deformity, and persistent preoperative symptoms due to incomplete correction of the deviation.

Septal perforation is the most critical complication of septoplasty procedure.<sup>3</sup> The central pathophysiological phenomenon in septal perforation is turbulent airflow. Disruption of normal laminar airflow paves the way for septal perforation and crust formation at the edges of the perforation site. This process starts the cascade of interrelated symptoms such as dryness and whistling, which accompany septal perforation. Dryness leads to more crusting, which prompts bleeding, malodorous drainage, and obstruction. Infection follows the stasis of secretions at the perforation site and contributes to the pain. Whistling is a direct result of airflow through and around the perforated area and completes the symptom profile, which significantly diminishes the patient's quality of life.<sup>4</sup>

It is suggested that the rate of complications after septoplasty may be increased in patients smoking cigarettes regularly.<sup>5</sup> However, some studies showed controversial results regarding cigarette smoking's effects on the functional outcomes of septoplasty.<sup>6</sup> On the other hand, hookah smoking, another way of tobacco consumption, is gaining popularity amid growing evidence regarding its detrimental effects on the respiratory system.<sup>3</sup> Nevertheless, the impact of hookah smoking on the complication rates and postoperative healing after septoplasty has not been studied in the literature.

In this prospective study, we evaluated the effect of hookah and cigarette smoking on the recovery period after septoplasty by giving special consideration to healing times and the rates of septal perforation.

## METHODS

This prospective study was conducted at the Otolaryngology Department of Health Sciences University, Sanliurfa Mehmet Akif Inan Training and Research Hospital between January 2017 and December 2019. The institutional ethical review board of the same hospital approved this study. All adult patients referred to the otolaryngology department with nasal septal deviation and underwent septoplasty were included. Patients with a previous history of nasal surgery, patients older than 45, and patients who required another nasal surgery such as rhinoplasty were excluded. Since the risk of septal perforation is inherently higher in more complicated septoplasty procedures, patients with excessive septal deviation were not included for homogeneity purposes.<sup>3</sup> Also, patients who changed their smoking habits during the one-year preceding surgery and those who were lost to follow-up after surgery were excluded. Written informed consent was obtained from all patients fulfilling the inclusion criteria.

Patients who give a social history of smoking at least 1 pack of (i.e. twenty) cigarettes and/or one hookah per day regularly during the last year before the surgery were defined as smokers. Study participants were divided into four groups based on their tobacco consumption status: Non-smokers, patients smoking cigarettes only, patients smoking hookah only, and patients smoking both cigarettes and hookah. The same experienced surgeon performed all surgical procedures using the same septoplasty technique. The surgeon was blinded to the group of the patients. Silicone nasal septal splints were placed internally and removed on the 3<sup>rd</sup> postoperative day. All patients underwent a complete examination, including nasal endoscopy daily after the surgery by a physician blinded to their tobacco consumption status. Healing was considered complete when there was no longer any intranasal crusting, granulation tissue, polyps, mucosal infection, adhesions, or synechiae at the surgical site, and the patient returned to daily activities without nasal blockage. The septal perforation diagnosis was based on a complete nasal examination, including anterior rhinoscopy and nasal endoscopy. All patients were followed until they completely healed; healing times and presence or absence of septal perforation were recorded for all study participants. The study groups were compared in terms of healing times and frequency of septal perforation.

### Statistical Analysis

The data analysis was performed using the IBM SPSS Statistics 17.0 software program (IBM Corporation, Armonk, NY, USA). Data were evaluated by descriptive statistical methods, including means, standard deviations, and interquartile ranges. Categorical variables were expressed as the number of cases and percentages. The discrete quantitative variables were analyzed using the Kolmogorov-Smirnov test to assess the normality of distribution. The student's t-test was used for comparison of quantitative data between two groups. Mann-Whitney U-test was used for evaluating intergroup differences in terms of healing time. Fisher's exact test was used to compare the frequency of septal perforation among different study groups.

### RESULTS

The study cohort consisted of 270 patients. Among these patients, 169 were male (62.6%), and 101 were female (37.4%). The mean age of the cohort was  $29.2 \pm 5.8$  years [19-45]. While 132 (48.9%) patients did not consume any tobacco products (i.e., non-smokers), 96 (35.5%) were cigarette smokers, 27 (10%) were hookah smokers, and 15 (5.6%) patients were consuming both tobacco products regularly. Mean healing time was 10 days, and septal perforation was encountered in 10 patients (3.7%) (Table 1).

A comparison regarding septal perforation rates revealed no significant difference between cigarette smokers and cigarette non-smokers ( $p=0.326$ ) (Figure 1).

However, cigarette smoking significantly increased the healing time required after septoplasty; the healing time was significantly higher in the cigarette smoker group than the cigarette non-smoker group ( $p<0.001$ ) (Figure 2).

The frequency of septal perforation was significantly higher in the group that smoked hookah than the group that did not ( $p=0.01$ ) (Table 2). The healing time was significantly longer in the hookah smoker group than the hookah non-smoker group ( $p<0.001$ ). Division of the entire study cohort as tobacco consumers and non-consumers and subsequent comparison in terms of healing times and septal perforation rates revealed

that healing time was longer and septal perforation risk was higher in the tobacco consumer group ( $p=0.02$  and  $p<0.001$  respectively).

Among the hookah non-smokers, there was no significant difference between the cigarette smoker group and the cigarette non-smoker group regarding the frequency of septal perforation ( $p=0.165$ ) (Table 3). Similarly, among the hookah smokers, there was no significant difference between the cigarette smoker group and the cigarette non-smoker group in terms of the frequency of septal perforation ( $p>0.99$ ). On the other hand, among cigarette non-smokers, the frequency of septal perforation was significantly higher in the group that smoked hookah than the group that did not ( $p=0,016$ ). In the cigarette smoking group, septal perforation frequency was higher in the hookah smoking group than the non-hookah smoking group. However, the difference was not statistically significant ( $p=0.186$ ).

Among the hookah non-smokers, the healing time of the cigarette smoker group was significantly longer than the non-cigarette smoker group ( $p<0.001$ ) (Table 3). On the other hand, in the hookah smoking group, there was no significant difference between cigarette smokers and cigarette non-smokers in terms of healing time ( $p=0.337$ ). Among the cigarette non-smokers, the healing time of the patients who smoked hookah was significantly longer than the group of patients who did not smoke ( $p<0.001$ ). Analysis of the cigarette smokers' data revealed that the healing time of the group who smoked hookah was significantly longer than the group who did not smoke hookah ( $p=0.016$ ).

Thus, the two primary outcomes analyzed in this study (i.e., healing time and septal perforation rate) were negatively affected by hookah smoking. However, cigarette smoking was found to affect the healing time but not the rate of septal perforation.

## DISCUSSION

Tobacco consumption is the leading preventable cause of morbidity and mortality in the world.<sup>7</sup> The most common way of tobacco consumption is cigarette smoking. On the other hand, hookah smoking is gaining popularity, especially among young and female tobacco consumers.<sup>8</sup> Hookah smoking is also believed to promote social interaction; there are 'hookah cafes' serving hookah where people socialize together and even share hookah pipes. However, these settings lead to underestimating health risks associated with this habit and a false belief that hookah smoking is less harmful than cigarette smoking. Nevertheless, in addition to the anticipated tobacco consumption-related effects of hookah, pipe sharing can lead to the spread of infections. Besides, alcohol or psycho-active drugs that might be added to the tobacco during the preparation of hookah can cause other unanticipated deleterious effects.<sup>9</sup>

The relationship between cigarette smoking and respiratory system diseases has been extensively addressed.<sup>7</sup> However, the effect of hookah smoking on patients who undergo upper respiratory system surgeries has not been widely evaluated in the literature.<sup>3</sup> Septoplasty is a frequently performed surgery in the otolaryngology practice with favorable outcomes.<sup>2</sup> However, delayed healing and septal perforation can be encountered during the postoperative period; these complications can significantly impair this procedure's success and diminish patient satisfaction.<sup>2-4</sup> Several clinical studies emphasized the role of cigarette smoking on the emergence of these complications while –to the best of our knowledge– the relationship of hookah smoking with these complications has not yet been reported in the literature.<sup>3,4</sup>

The main adverse effect of smoking is diminishing mucociliary clearance in the nasal mucosa by exerting ciliotoxic effects and changing the viscoelasticity of the mucus.<sup>10</sup> Furthermore, the nicotine in tobacco causes acute intimal damage and desquamation in vascular endothelial cells. This intimal damage, combined with the cyclooxygenase inhibition through its effects on the thrombocytes, promotes vascular thrombosis and tissue hypoxia.<sup>11</sup> These mechanisms may explain the significantly prolonged healing time we found in our patients who smoke both hookah and cigarette. Of note, cigarette non-smokers who smoke hookah were also found to have significantly delayed healing. This finding indicates that hookah smoking can be even more deleterious than cigarette smoking in healing after septoplasty.

Although tobacco consumption was found to disrupt wound healing, Yazici and associates reported that

active cigarette smoking did not increase the complication rates after septoplasty.<sup>6</sup> Since septal perforation is the most critical complication encountered in patients who undergo septoplasty, we analyzed septal perforation rates.<sup>3,4,6</sup> A comparison of our cigarette smoker patient group with the cigarette non-smoker patient group did not reveal any difference in septal perforation rates. Therefore, our findings are consistent with the findings of Yazici et al.<sup>6</sup> However, we found that the healing time was significantly longer in the cigarette smoking patient group than the cigarette non-smoking patient group.

In our study, although cigarette smoking did not increase the frequency of septal perforation significantly, the frequency of septal perforation was significantly higher in the hookah smoking group compared with the hookah non-smoking group. Aricigil et al. showed that even once a week hookah smoking prolonged the nasal mucociliary clearance.<sup>10</sup> Mucociliary clearance is the primary defense mechanism against external harmful stimulants and helps particles move towards pharynx by ciliary transport.<sup>11</sup> These particles are then eliminated by coughing or swallowing.<sup>10</sup> Hookah smoking disrupts this fundamental defense mechanism.<sup>10,11</sup>

Moreover, since hookah contains nicotine like cigarette, it can cause the potentially deleterious effects of cigarette smoking.<sup>11,12</sup> On the other hand, aroma is usually added to hookah.<sup>13,14</sup> Erbaydar and associates demonstrated that 86.3% of hookah smokers preferred aromatic products.<sup>12</sup> We speculate that these aromatic additives may contain detrimental chemicals different and more deleterious than those included in cigarettes. Therefore, inhalation of these chemicals may lead to more severe effects in the upper respiratory tract than cigarette smoking. Prolonged healing time and increased septal perforation rate in our patients who were hookah smokers can be ascribed to this theory. As per the current literature, the relationship between hookah smoking and upper respiratory tract problems has not yet been studied in detail.<sup>15,16</sup> Studies investigating this topic are needed to further detail the impact of hookah smoking on the recovery period of the patients who underwent a septoplasty procedure.

Our study has some weaknesses that need to be considered while evaluating its findings. First, it does not have a large sample size. Second, the smoking history of the patients is not detailed. These studies cover only the one-year period before the surgery; therefore, they ignore the prior history of smoking and equate the patients who had a 10-year history of smoking with the patients who had only two-year smoking history. The frequency of smoking was also omitted.

## CONCLUSION

Despite these limitations, we conclude that the regular consumption of hookah alone or together with cigarette prolongs the healing time and increases the frequency of septal perforation after septoplasty. However, the fact that the frequency of septal perforation in cigarette smokers alone was not statistically significant in our series indicates that hookah smoking may have more deleterious effects on the upper respiratory system than cigarette smoking.

## CONFLICT OF INTEREST

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## REFERENCES

1. Tjahjono R, Alvarado R, Kalish L, et al. Health impairment from nasal airway obstruction and changes in health utility values from septorhinoplasty. *JAMA Facial Plast Surg.* 2019;21(2):146-151. doi: 10.1001/jamafacial.2018.1368. PMID: 30452512; PMCID: PMC6439790.
2. Fettman N, Sanford T, Sindwani R. Surgical management of the deviated septum: techniques in septoplasty. *Otolaryngol Clin North Am.* 2009;42(2):241-252, viii. doi: 10.1016/j.otc.2009.01.005. PMID: 19328889.
3. Cetiner H, Cavusoglu I, Duzer S. The effect of smoking on perforation development and healing after septoplasty. *Am J Rhinol Allergy.* 2017;31(1):63-65. doi: 10.2500/ajra.2017.31.4406. PMID: 28234157.

4. Mullace M, Gorini E, Sbrocca M, Artesi L, Mevio N. Management of nasal septal perforation using silicone nasal septal button. *Acta Otorhinolaryngol Ital* . 2006;26(4):216-218. PMID: 18236638; PMCID: PMC2639999.
5. Dalhamn T. The effect of cigarette smoke on ciliary activity in the upper respiratory tract. *AMA Arch Otolaryngol*.1959;70(2):166-168. doi: 10.1001/archotol.1959.00730040172003. PMID: 13669820.
6. Yazici ZM, Sayin I, Erdim I, Gunes S, Kayhan FT. The effect of tobacco smoking on septoplasty outcomes: a prospective controlled study.*Hippokratia* . 2015;19(3):219-224. PMID: 27418780; PMCID: PMC4938468.
7. Perez-Warnisher MT, De Miguel MDPC, Seijo LM. Tobacco Use Worldwide: Legislative Efforts to Curb Consumption. *Ann Glob Health* . 2018;84(4):571-579. doi: 10.9204/aogh.2362. PMID: 30779502; PMCID: PMC6748295.
8. Dadipoor S, Kok G, Aghamolaei T, Heyrani A, Ghaffari M, Ghanbarnezhad A. Factors associated with hookah smoking among women: A systematic review. *Tob Prev Cessat* . 2019;5:26. doi: 10.18332/tpc/110586. PMID: 32411889; PMCID: PMC7205165.
9. Momenabadi V, Hossein Kaveh M, Hashemi SY, Borhaninejad VR. Factors affecting hookah smoking trend in the society: A review article.*Addict Health* . 2016;8(2):123-135. PMID: 27882210; PMCID: PMC5115646.
10. Arıçgil M, Arbağ H. Hookah smoking impairs nasal mucociliary clearance. *Tob Induc Dis* . 2018 Feb 28;16:06. doi: 10.18332/tid/85067. PMID: 31516406; PMCID: PMC6659486.
11. Karaman M, Tek A. Deleterious effect of smoking and nasal septal deviation on mucociliary clearance and improvement after septoplasty.*Am J Rhinol Allergy*. 2009;23(1):2-7. doi: 10.2500/ajra.2009.23.3253. PMID: 19379604.
12. Erbaydar NP, Bilir N, Yildiz AN. Knowledge, behaviors and health hazard perception among Turkish narghile (waterpipe)-smokers related to narghile smoking. *Pak J Med Sci* . 2010;26(1):195-200.
13. Kassem NOF, Kassem NO, Liles S, et al. Acrolein exposure in hookah smokers and non-smokers exposed to hookah tobacco second-hand smoke: Implications for regulating hookah tobacco products. *Nicotine Tob Res*. 2018;20(4):492-501. doi: 10.1093/ntr/ntx133. PMID: 28591850; PMCID: PMC5896480.
14. Farag MA, Elmassry MM, El-Ahmady SH. The characterization of flavored hookahs aroma profile and in response to heating as analyzed via headspace solid-phase microextraction (SPME) and chemometrics.*Sci Rep* . 2018;8(1):17028. doi: 10.1038/s41598-018-35368-6. PMID: 30451904; PMCID: PMC6242864.
15. El-Zaatari ZM, Chami HA, Zaatari GS. Health effects associated with waterpipe smoking. *Tob Control* . 2015;24 Suppl 1(Suppl 1):i31-i43. doi: 10.1136/tobaccocontrol-2014-051908. Epub 2015 Feb 6. PMID: 25661414; PMCID: PMC4345795.
16. Aboaziza E, Eissenberg T. Waterpipe tobacco smoking: What is the evidence that it supports nicotine/tobacco dependence? *Tob Control* . 2015;24 Suppl 1(Suppl 1):i44-i53. doi: 10.1136/tobaccocontrol-2014-051910. Epub 2014 Dec 9. PMID: 25492935; PMCID: PMC4345797.

#### Hosted file

Figure 1.pdf available at <https://authorea.com/users/375822/articles/493019-effects-of-hookah-and-cigarette-smoking-on-the-recovery-after-septoplasty>

#### Hosted file

Figure 2.pdf available at <https://authorea.com/users/375822/articles/493019-effects-of-hookah-and-cigarette-smoking-on-the-recovery-after-septoplasty>

#### Hosted file

Table 1.pdf available at <https://authorea.com/users/375822/articles/493019-effects-of-hookah-and-cigarette-smoking-on-the-recovery-after-septoplasty>

#### Hosted file

Table 2.pdf available at <https://authorea.com/users/375822/articles/493019-effects-of-hookah-and-cigarette-smoking-on-the-recovery-after-septoplasty>

### Hosted file

Table 3.pdf available at <https://authorea.com/users/375822/articles/493019-effects-of-hookah-and-cigarette-smoking-on-the-recovery-after-septoplasty>