Pulp Necrosis During Septorhinoplasty

Saeed Moradi, MD; Mehdi Poursadegh, MD; Mehdi Bakhshaee, MD; Reyhaneh Bonyadimanesh, MD; Vahid Poursadegh, MD

INTRODUCTION

Rhinoplasty is among the most demanding of all esthetic surgeries. The art of rhinoplasty surgery demands a thorough knowledge of the science. Every surgical operation can be complicated; therefore, it is essential that knowledge of relevant complications and sequelae is clearly communicated to the patient. A knowledgeable decision can be made for reducing the incidence of such complications, minimizing the enormity of a possible complication, and treating a complication once it has occurred. Although the majority of the septorhinoplasty complications are well known, the occurrence of dental injuries are still in doubt. During septorhinoplasty, the proximity of the maxillary arch may cause teeth to be susceptible to pulp injury due to an indirect injury to the neurovascular bundle resulting from concussion trauma when osteotomy of the lateral nasal wall, maxillary crest, and/or anterior nasal spine are performed. There are reports of numbness or pain in the central incisors or in the mucosa of the hard palate just posterior to the incisors after resection or trimming of the maxillary crest or when working on the nasal spine. This lack of sensation or complaint of pain is generally a short-lived phenomenon. Infraorbital nerve injury has been reported as well, which can affect the teeth directly.

There are only two cases of pulp necrosis reported after septorhinoplasty. However, to our knowledge, no previous study has examined pulpal vitality in teeth suffering dental trauma related to septorhinoplasty. The aim of the present study was to examine pulpal vitality in permanent upper incisors and canines suffering dental trauma during septorhinoplasty. An alternative goal was to assess the influence of different parameters, such as type of osteotomy, type of septoplasty, nasopalatine artery cauterization, and anterior nasal spine manipulation.

MATERIALS AND METHODS

In this prospective cross-sectional study, 73 candidates of septorhinoplasty were evaluated from the point of pulpal vitality before surgery and subsequently in three periods (2 weeks, 3 months, and 6 months) after the surgery. Besides the clinical view, the common methods for pulp sensitivity testing, thermal (cold and heat) and electrical stimulation were used. When pulp necrosis was suspected we considered taking radiographs. Four maxillary incisors (central and lateral of both sides), two canines...
(left and right) of all cases (including 438 teeth), and one mandibular lateral incisor as a control (73 total) were entered into the study. Six patients were lost to follow-up, and analysis was done on the remaining patients. The study protocol was fully explained to the patients and a written informed consent was obtained from them. In addition, our survey was approved by the ethics committee of Mashhad University of Medical Sciences.

The clinical examination included the crown discoloration (normal or grayish) and sensitivity tests with cold, heat, and electrical stimulations. Discoloration in the crown, loss of pulpal sensitivity, and periapical radiolucency, were all the necessary criteria for diagnosis of pulp necrosis.5

The cases with a previous history of dental trauma, dental caries, difficult intubation, ambiguous vitality test, positive preoperative test, and those with dental trauma during follow-up were excluded from the study.

Statistical Analysis

The $\chi^2$ test was used to detect significant differences regarding the frequency of pulp sensitivity changes after performing the operation. Furthermore, a $\chi^2$ test was also carried out to determine any significant correlations between pulp sensitivity and type of osteotomy, type of septoplasty, nasopalatine artery cauterization, and anterior nasal spine manipulation. The significance level was set at $\alpha = .05$. Statistical analysis was performed with the Statistical Package for the Social Sciences version 13.0 (SPSS Inc., Chicago, IL).

RESULTS

Seventy-three consecutive patients including 11 males and 62 females met the study criteria. Septoplasty with anterior maxillary crest trimming and anterior nasal spine manipulation was performed in 63 and 52 cases, respectively. Cauterization of the nasopalatine artery during maxillary crest removal was done in 47 cases. Ten cases underwent conservative septoplasty without manipulation of the maxillary crest or the anterior nasal spine. Based on clinical presentation and pulp testing, no case of pulp necrosis was seen during the 6-month follow-up. Transient sensitivity changes for each tooth are shown in Table I and Table II.

There was no significant correlation between dental sensitivity changes and type of osteotomy, type of septoplasty, nasopalatine artery cauterization, and anterior nasal spine manipulation ($P > .05$).

There were some changes in sensitivity of teeth that might indicate transient pulpitis. Seventy-four (17.5%) teeth showed early sensitivity changes (after 2 weeks), whereas such changes occurred late (after 6 months) in 32 (8.1%) teeth (Fig. 1). Hypersensitivity and hyposensitivity were seen in 88% and 12% of cases, respectively. Hyper- and/or hyposensitivity were more common in canines and lateral incisors than central incisors.

DISCUSSION

Besides bacterial irritation, pulp or periradicular tissues can also be injured mechanically. Impact trauma, hyperocclusion, endodontic procedures, and accidents can cause pulpal injury and irritate periapical tissues. Depending on the severity and duration of the insult and the host’s capacity to respond, the pulpal response ranges from transient inflammation to total necrosis. These changes often occur without pain and without the awareness of the patient or dentist.6

Dental neurovascular injury due to surgery can decrease the pulp blood flow resulting in pulp necrosis. When the neurovascular dental supply is compromised, symptoms, such as a loss of sensitivity, periapical radiolucency, and tooth discoloration, usually occur. This type of pulpal injury has also been reported to be a complication of some surgical procedures, such as orthognathic surgery,7,8 Caldwell-Luc operation,9 septorhinoplasty,3,4 and reduction malarplasty.10 However, there are only two reports of pulp necrosis after rhinoplasty.3,4 It is believed that the pulp necrosis in this case was the result of the surgery, because no other cause could be

| TABLE I. | Sensitivity Changes of Teeth After 2 Weeks of Septorhinoplasty According to Pulpal Tests. |
|-----------------|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                | Right Central Incisor | Right Lateral Incisor | Left Central Incisor | Left Lateral Incisor | Right Canine | Left Canine |
| Hypersensitivity | 6 | 11 | 3 | 9 | 24 | 12 |
| Hyposensitivity | 0 | 0 | 0 | 1 | 5 | 4 |
| No change | 67 | 62 | 70 | 60 | 37 | 51 |
| No response | 0 | 0 | 0 | 0 | 0 | 0 |
| Missing data | 0 | 0 | 0 | 3 | 7 | 6 |

| TABLE II. | Sensitivity Changes of Teeth After 6 Months of Septorhinoplasty According to Pulpal Tests. |
|-----------------|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                | Right Central Incisor | Right Lateral Incisor | Left Central Incisor | Left Lateral Incisor | Right Canine | Left Canine |
| Hypersensitivity | 3 | 6 | 1 | 5 | 9 | 4 |
| Hyposensitivity | 0 | 0 | 0 | 0 | 2 | 2 |
| No change | 64 | 61 | 66 | 62 | 53 | 59 |
| No response | 0 | 0 | 0 | 0 | 0 | 0 |
| Missing data | 6 | 6 | 6 | 6 | 9 | 8 |
identified. Although it was impossible to precisely explain the mechanism of the development of the pulp necrosis, it might be associated with an anatomic variation of the anterior superior alveolar nerve supplying the ipsilateral incisors and canine teeth, transmission of the osteotomy force to the dental root in a mechanism of concussion, or even unrelated to the surgery.

Concussion is defined as an injury to the tooth support structures without abnormal loosening or displacement of the tooth but with marked reaction to percussion. During septorhinoplasty, because of the proximity of maxillary teeth to the operative field, transmission of mechanical insult to the teeth occurs when a surgeon tries to perform osteotomy either on lateral nasal bone or maxillary crest. The question is whether such a concussion trauma is severe enough to cause pulpal injury or not. To the authors' knowledge based on searching medical records, there is no such study that specifically discusses and evaluates this issue. There are only two case reports of pulp necrosis and scattered reports of upper alveolar disturbances after septorhinoplasty.

Considering the previous reports and our findings in the current study, which implies transient changes in pulpal vitality and not pulp necrosis, it seems as if permanent serious dental injury is not a considerable complication during septorhinoplasty. The reported pulp necrosis might have happened due to an anatomic variation of the superior alveolar neurovascular bundle or as an unrelated accident, such as impact dental trauma during a difficult intubation.

**CONCLUSION**

Permanent severe dental injury that leads to pulp necrosis is not a well-established complication during septorhinoplasty. Some transient sensitivity changes in the anterior maxillary teeth, which might have resulted from a concussion trauma related to osteotomy, are probable.

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**BIBLIOGRAPHY**