

Comparison of rate and severity of nasal mucosal tear with internal and external lateral nasal osteotomy using endoscope

Abstract

Background: A precise and reproducible lateral Osteotomy is a necessity for successful rhinoplasty. Generally, two basic techniques have been introduced: the external perforated method and the internal continuous method. There is an ongoing debate in the literature on the appropriateness of each method in terms of post-operative complications and patients' satisfaction. Nasal mucosal tear is a key element in this comparison. This study was designed to compare the two techniques using a blinded endoscopic evaluation of the nasal mucosa tear after the osteotomies were performed by one of these two techniques.

Methods & materials: In a randomized clinical trial, 30 candidates for elective nasal surgery (aged 20-30 years) were studied in Tabriz Imam Reza Teaching Center during a 12-month period. Each patient underwent an external lateral Osteotomy performed on one side and an internal lateral osteotomy performed on the alternate side by a specialist with experience in the use of both types of osteotomy. In a blinded manner, another investigator used nasal endoscopy to detect nasal mucosal tears and reported them in millimeter (mm).

Results: A total of 30 patients, 10 males and 20 females with the mean age of 26.47 ± 7.36 years (20-30) were enrolled in this study. Nasal mucosal tear was reported in all patients with internal lateral osteotomy, whereas this rate was 90% in the other group ($p=0.24$, odds ratio=1.11, 95% confidence interval=0.99-1.25). The median length of the mucosal tears was 9mm (Interquartile range, IQR=2) in the cases with internal osteotomy vs. 4mm (IQR=1) in the patients with external approach. The difference was statistically significant ($p<0.001$). The intra-group analysis stratified by the patients age and sex revealed a significant association neither with frequency nor with severity of the nasal mucosal tears.

Conclusion: This study showed that internal osteotomy, as compared with external technique, is along with significantly more severe nasal mucosal damage in patients undergoing elective nasal surgery.

Keywords: rhinoplasty, osteotomy, mucosal tear

Volume 5 Issue 4 - 2016

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Received: July 18, 2014 | **Published:** November 21, 2016

Introduction

Nose Lateral osteotomy is known as a major constituent of nose plastic surgery to correct nasal bone deformity and reducing nasal bone width. Different methods of osteotomy have been introduced so far that are categorized into two common internal and external methods. The surgeon has little control on this phase of nose plastic surgery. Several complications have been mentioned for Lateral osteotomy such as bleeding, infection, extensive edema, olfactory lost, nasolacrimal duct damage, nasal obstruction and facial deformity.^{1,2} Surgery technique and application of osteotomy is an important factor in reducing after-surgery complications in nose plastic surgery. Some researchers have mentioned the importance of maintaining adhesion of periosteum to bone in reducing after-surgery complications. However, these researchers have not compared the intensity of mucosal laceration in internal and external methods and the after-surgery complications are mostly associated with the intensity of nasal mucus and soft tissues damage rather than absence or presence of nasal mucus laceration alone.^{3,4} Not a single study has been conducted on comparing the laceration intensity in the internal and external methods since now and those studies

related to this field have compared the incidence rate of laceration in these methods. Nonetheless, it seems that after-surgery complications are mostly associated with nasal mucus laceration intensity. A heavy damage to nasal mucus can increase bleeding, extension of edema period after the surgery, instability of bone fragment and consequently non symmetry and dissatisfaction of the patient from plastic surgery results. Edema and ecchymosis are annoying for the patient and to gain patient's satisfaction surgery method should be applied which has the least complication and the best results.⁴⁻⁶ For this purpose, we tried to investigate the nasal mucus laceration rate in internal and external nose lateral osteotomy in patients who referred to Tabriz hospitals and were candidates for plastic surgery.

Materials and methods

The total number of 30 patients who were candidate for nose elective plastic surgery after being qualified and rejecting the exclusion criteria was studied. The patients, who were studied, were clinically in rank I or II based on American anesthesia specialists association (ASA) clinical status ranking. After 8hours of fasting, in the surgery day, and after induction of anesthesia and injecting of 10cc

of 1:200000 epinephrine in lateral walls, and nasal bone and after passing 7minutes for maximum effect of vasoconstrictor substance the surgery started. All surgeries were done by one person (oral and maxillofacial specialist) who had the full skill in both internal and external methods. Chemotherapy before, during and after the surgery was similar for all patients. For each patient in one side osteotomy with internal method and in the other side osteotomy with external method was performed. This division was done randomly. In internal method, at first mucosal incision was given on the lateral wall's bone, a little above the meeting point of lower turbinate, and after importing the 3mm osteotomy via guard the osteotomy started and the osteotomy was finished at internal cantus level. In external method, the 3mm osteotomy was imported between internal cantus of eye and vestibule through skin without guard and when the osteotomy's sharp tip reached to nose lateral wall bone the osteotomy was done. In both internal and external groups the osteotomy was done *high to low to high*. When the osteotomy finished, lateral wall bone of nose was moved inward with a gentle finger pressure. Nasal mucosa and the skin in osteotomy insertion site were not stitched in order to reduce the after surgery swelling. It was blinded, was hidden and the anesthesia specialist who was not aware of osteotomy method, evaluated the intensity of nasal mucus laceration via endoscope and the data were registered in the related form. The nasal mucus laceration intensity was measured in millimeter scale. Inclusion criteria: All patients who were candidate for elective nose plastic surgery and had the age of 20-30 Exclusion criteria:

- a. Patients who had systemic problems.
- b. Patients who mention former nose trauma history
- c. Non-cooperation of the patient
- d. Patients who already had nose surgery
- e. Patients who has nasal mucus inflammation
- f. Patients who has extensive nose deformity or need complex osteotomy methods

Findings

30 candidate patients for nose lateral osteotomy were studied. In one side the osteotomy was done internally and on the other side externally.

Age

Average age of the studied patients was 26.46 ± 7.36 . The minimum age was 20 and the maximum was 30.

Sex

10 patients were male and 20 of them were female. Nasal mucus laceration frequency: In internal osteotomy group all patients had some degrees of nasal mucus laceration. In external osteotomy group 27 patient had some degrees of nasal mucus laceration. The relevant percentage is shown in diagram 2. Based on the result of fisher exact test no significant difference was identified between these two groups in this respect ($p=0/24$, $OR=1/11$, $95\%CI=0/99-1/25$). Nasal mucus laceration intensity (rate): In internal osteotomy group the nasal mucus laceration rate was $9/03 \pm 1/27$ mm. The median of nasal mucus laceration rate in this group was reported as 9 mm ($IQR=2$). The minimum rate was 6 mm and maximum rate was 12 mm. In external

osteotomy group the nasal mucus laceration rate was $3/47 \pm 1/36$ mm. The median of nasal mucus laceration rate in this group was reported as 4 mm ($IQR=1$). The minimum rate was 0 mm and the maximum rate was 5 mm. The relevant box plot is shown in diagram.³ Based on the results of ManwhitneyU test the median of nasal mucus laceration rate in internal osteotomy group was significantly higher than the median of nasal mucus laceration rate in external osteotomy ($p<0/001$).

Discussion

Lateral osteotomy is done in two internal and external methods.⁷ The external method was first introduced by Goria in 1955.⁸ Although the nasal mucus damage in the internal lateral osteotomy group was higher than the external group, this difference was not statistically significant ($p=0/24$). In Kuran et al. (1996)'s study on a corpse,⁹ the incident rate of nasal mucus damage in external lateral osteotomy was reported as 37/5%. In a study conducted by Rohrich et al. on 19 corps the results of internal and external lateral osteotomy were compared.¹⁰ The mucosal damage and bone disorders in these two methods were compared using endoscopy. In external lateral osteotomy group, the mucosal laceration was reported in 11% of cases and 74% of the cases in internal osteotomy (statistically significant difference). Therefore, it was concluded that the external method has less relevant complications (such as bleeding, edema and ecchymosis) than the internal method due to reducing the mucosal damage. In Rohrich et al (2001)'s study on corpse, it was indicated that the nasal mucus damage rate in external lateral osteotomy was dramatically less than nasal mucus damage in internal lateral osteotomy. In the study of Sinha et al. 4 all 10 patients whom internal lateral osteotomy was done upon them developed nasal mucus damage.¹¹ On the other side, in 8 patients who received external lateral osteotomy, the nasal mucus damage was reported in only 30% of patients. although the results of our study is in line with the results of above mentioned studies in terms of higher frequency of nasal mucus damage in internal lateral osteotomy method than the external method, however, the difference of nasal mucus damage rate in existing studies is significant. In this study we considered the existence of any kind of mucus damage as a positive case and maybe this is one of the reasons of higher frequency of this finding in our study compared to similar studies.^{4,5} Moreover, the results of 3 of the above mentioned studies were the results of study on corpse and this may be the major reason of low nasal mucus damage reported in those studies. The major finding of this study is a significant difference between intensity (rate) of nasal mucus damage in internal lateral osteotomy and external lateral osteotomy (9 mm versus 4 mm, $p<0/001$). In line with these findings, Harshbarger and Sullivan (1999) in their study on 17 corpses concluded that the mucosal complications of external lateral osteotomy are less than the internal method.¹¹ Giacomarra et al.,⁵ in their study on comparison of mucus damage on corpse reported significantly lower mucus damage in external lateral osteotomy group. Mucus damage in this group of patients is important because it can lead to instability, excessive bleeding, prolonged edema, ecchymosis, asymmetry and tightening of nasal space after the surgery.¹² On the other side, it should be noted that the present study is the first study in the field of comparing mucus damage intensity in doing lateral osteotomy in two methods of internal and external on a living human and as already noted, all the previous studies in this field were done on a dead body. Osteotomy type and size also may be involved in the difference of results between different studies in this field. Moreover, it is shown that the some specific techniques and measures such as isolation of mucus with local anesthesia and applying Elevator can prevent mucus damage

during lateral osteotomy. The impact of these surgery methods on the osteotomy result and incidence of mucus damage needs to be investigated in future studies.

Conclusion

Nasal mucus laceration rate in internal and external nasal lateral osteotomy methods was 90 % and 100% respectively. The average nasal mucus laceration intensity in internal and external methods of nasal lateral osteotomy was 9/03 and 3/47 mm respectively. Nasal mucus laceration rate in internal and external methods of nasal lateral osteotomy hadn't statistically significant difference. The median of nasal mucus laceration intensity with internal method were significantly higher than the median of nasal mucus laceration intensity with external method.

Acknowledgments

None.

Conflicts of interest

The authors declare that there are no conflicts of interest.

Funding details

None.

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