Original Article

A Comparison between External versus Internal Lateral Osteotomy in Rhinoplasty

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ABSTRACT

Background: Lateral osteotomy is a major part of rhinoplasty for remodeling external facet of the nose and narrowing of nasal base and dorsum after removal of the hump. There are two techniques for lateral osteotomy known as external and internal. Each of these provide advantages and impose limitations. The purpose of our study was to compare the severity of postoperative edema and ecchymosis between internal and external osteotomy techniques.

Methods: This study was designed as a clinical trial on 30 cases. With randomization, one side of the nasal bone was selected for internal approach, and the other side, for external approach. Then, on the 1st and 7th days after surgery, the patients were scored for the severity of edema and ecchymosis.

Results: On the first day after surgery, not only edema, but also ecchymosis was lower with the external osteotomy than with the internal approach (P = 0.037, P = 0.002, respectively). The severity of ecchymosis, on the 7th postoperative day, was lower with the external approach, and the difference was significant (P = 0.011). The severity of both edema and ecchymosis on the first postoperative day was evaluated higher in females, with statistically significant differences (P = 0.05 for edema and P = 0.003 for ecchymosis). The extension of ecchymosis on the 7th postoperative day was higher in women (P = 0.05). There were no significant differences between the two approaches in medialization of the involved bones and no apparent asymmetries either.

Conclusion: According to the results of this study, external osteotomy seems to be the approach of choice, provided that the surgeon has enough experience in doing it.

Key words: Rhinoplasty, Internal osteotomy, External osteotomy, Ecchymosis, Edema

Lateral osteotomy is known as a major part of rhinoplasty for remodeling external facet of the nose and narrowing the nasal base and dorsum after removal of the hump. There are several approaches for lateral osteotomy, namely percutaneous, intranasal, and intra-oral [1].

The two most common approaches are external percutaneous osteotomy and the internal continuous endonasal technique.

Among the various steps of rhinoplasty, surgeons have less control on lateral osteotomy because of edema and hematoma[2].

There are many reports about the complications of lateral osteotomy, such as infection, bleeding, massive edema, anosmia, lacrimal duct injury, intracranial injuries, disfigured appearance, narrow airway and nasal obstruction[3].

Ideal osteotomy is a technique to get the best results of function and beauty with a predictable control and least complications. Nonetheless, the approach of choice is still a matter of controversy.

Based on previous studies, each of the approaches applied, has some advantages and disadvantages[2,4]. Previous studies by Rohrich et al[2] and Murakami et al[4] had compared the two approaches independently on different cases. We compared both approaches on the same subjects to omit the role of anatomic characteristics and tissue properties as confounding factors.

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Materials and Methods

The study was performed on 30 cases as a clinical trial from April 2003 to March 2004. All the cases underwent primary rhinoplasty using close or open approach followed by lateral osteotomy performed by an attending surgeon. In each subject, one side was operated with internal technique and for the other side external approach was applied. Internal or external approach was chosen for either left or right side randomly using a random number table. For internal approach, a 5 mm incision was made above the inferior turbinate with a NO. 15 scalpel.

In external technique, a 3 mm incision was made on the lateral nasal aspect near the nasofacial angle and around the inferior orbital rim with a NO.11 scalpel. After lowering periostium, a high to low osteotomy was performed using a straight osteotome size 3 mm. Before lateral osteotomy with any of the approaches, medial osteotomy had been performed. The approaches used on each of the sides were charted in the files and cases were examined on the 1st and 7th days by another otolaryngologist.

Severity of edema and ecchymosis were scored according to modification of "American Academy of Facial Plastic and Reconstructive Surgery" [5].

The examiner was not aware of the selected approach. Edema had 1 score but for ecchymosis 2 scores were accounted (related to upper or lower lid) and the final score was the summation of the 2 scores. (Figure 1)

Pain and paraesthesia on each side were assessed with questions and were then charted. In the second examination after removal of the splint, existence of step and medialization on each side were also evaluated and charted if there was any difference between the two sides. Data were analyzed with "Wilcoxon ranks test". Evaluation of any relations between gender and the severity of edema and ecchymosis was tested with Mann-Whitney test.

Results

Among the 30 cases included, 8 were male and 22 were female. The age ranged from 15 to 39 years (mean 23.3 years).

1- Edema on the first day after surgery: Severity of edema on the side of external approach was lower than the other side and the difference was statistically significant (P = 0.037). The most common score with the external approach was 2 but for the internal approach this score was 3.

Mean score for the former was 1.73 ± 0.78 and in the latter was 2.06 ± 0.86 (Table 1).

2 -Edema on the 7th day after surgery: Although edema, a week after the operation, was estimated lower in the side of external approach, this difference was not significant (P = 0.078).

3- Ecchymosis on the first day after surgery: Severity of ecchymosis was evaluated with the whole score of upper and lower lids on each side. The severity of ecchymosis was lower with external technique and the difference was statistically significant (P= 0.002). The most common score in the external approach was 3 and this score in the internal approach was 6. Mean score for the former was 3.80 ± 1.82 and in the latter was 4.86± 1.90 (Table 2).

4- Ecchymosis on the 7th day after surgery: The severity and extent of ecchymosis one week after surgery was lower in the side of external approach. The difference was statistically significant (P = 0.011). The most common score in both groups was 3, but scores greater than 4 were found in only 10% of the sides with external osteotomy, however 30% of internal approach group got a score higher than 4.

Mean score for the former was 2.26 ±1.92 and in the latter was 3.20 ± 2.34 (Table 3).

5- Rapidity of edema resolution: Rapidity of edema improvement was evaluated comparing the score of edema one day after the operation and one week later.

" Score of edema resolution = score of the 1st day after operation - score of 1 week later."

This score was 1.16± 0.83 for the internal approach and 0.96 ± 0.88 for the external technique.

No significant differences were found between the two groups. (P =0.237).

6- Rapidity of ecchymosis resolution: This factor was evaluated comparing score of edema 1 day and 1 week after surgery.

"Resolution of ecchymosis = Score of the 1st day after operation - Score of 1 week later."

This score was 1.53 ± 1.96 for the internal approach and 1.66± 1.07 for the external approach. Again, the difference between the two groups was not significant. (P =0.739).

7- The effect of gender on the severity of edema: To compare the effect of gender on the edema, authors considered a whole score (including score of both

sides) for each case which ranged from 0 to 8. We found a more severe edema in women on the first examination (day 1, postoperation). The difference was statistically significant (P =0.05), but with resolution of edema within 1 week, no significant difference was found in the severity of the edema between men and women (P = 0.11) (Table4).

8- The effect of gender on the severity of ecchymosis: The severity of ecchymosis in each case was considered as summation of the score of ecchymosis on both sides which ranged from 0 to 16. The severity and extent of ecchymosis was higher in women and the difference was statistically significant (P = 0.003). Accordingly, after one week, this difference persisted and there was a statistically significant difference (P = 0.05) (Table 5).

9- Pain: According to a direct question from cases, 1 day after surgery no difference was noticed between the two sides.

10- Medialization and step: According to the examination performed on the 7th day after surgery, when splint was removed, no asymmetry or steps were found on examination.

Discussion

Various studies have compared external and internal osteotomies[2, 4]. The evaluations included clinical and endoscopic assessments, besides objective tests for examination of airway and even evaluation of the cadaver[1, 2,4,6,7].

"Rohrich" et al in "Dallas' " and "Texas" examined the nasal mucosa of cadavers endoscopically. Each side of the cadaver's nose had undergone osteotomy with either of the two approaches. In both approaches mucosal laceration were at the same place exactly anterior to the middle turbinate. However the prevalence of these lesions was higher with the internal approach rather than the external (73% Vs 11% respectively) (P =0.001). In that study, no apparent clinical difference regarding bony irregularity was found between the two groups. Evaluation of edema and hematoma in cadavers was impossible, and Rohrich et al explained bleeding and edema may be lower with the external approach[2].

"Giacomarra" et al designed a retrospective study on 142 cases and 5 cadavers. Each case had undergone either external or internal osteotomy. They reported lower edema and ecchymosis with external osteotomy versus the internal approach. Control on the fracture line was good with both approaches. With endoscopic examination of the last 25 cases and 5 cadavers, who had undergone one of the two approaches on each side, mucosal lesions were reported to be higher with internal approach and, external technique was reported to give a better control on the fracture line[1].

"Grymer" et al studied the condition of air way. They objectively evaluated 16 cadavers. In all their cases internal technique had been used. However, this approach was carried out above the inferior turbinate on one side, and below the inferior turbinate on the other side. Despite finding a significant decrease in total minimum cross-sectional area (TMCA) of 12% for both techniques, there was no significant difference between them.

In previous studies, the cases usually had primarily undergone either external or internal approach, and then a comparison was made. Considering the differences in patients' histological and anatomical characters, osteotomy may lead to different degrees of edema or ecchymosis in different patients.

This study was designed to omit the role of personal characters (i.e. anatomical and histological features) and a better justification about the two approaches of osteotomy. Like other studies, the severity of edema and ecchymosis was considered lower with the external approach; besides, the study established the role of personal characters, because the severity of edema and ecchymosis were significantly lower in men.

This may be related to the presence of much more subcutaneous fat in women, so the existence of enough laxity and a less microfibrillar tissue (collagen and elastic fiber) may lead to easier extension of edema and ecchymosis. On the other hand, dense layers prevent the formation of edema or extension of ecchymosis in men.

According to the results of this study, external osteotomy seems to have less morbidity compared to internal approach. The severity of edema and ecchymosis is less with the former technique as well. Hence, if the surgeon is expert enough in both techniques, authors recommend external technique for lateral osteotomy.

Table 1. Comparison of edema between the two groups 1 day after surgery

	External osteotomy		Internal osteotomy	
score	n	%	n	%
0	1	3.3	0	0
1	11	36.7	10	33.3
2	13	43.3	8	26.7
3	5	16.7	12	40
4	0	0	0	0
mean	1.73 0.78		2.06 0.86	

p.v = 0.037

Table 2. Comparison of ecchymosis between the two groups 1 day after surgery

	External osteotomy		Internal osteotomy	
score	n	%	n	%
0	4	13.3	0	0
1	5	16.7	1	3.3
2	3	10	1	3.3
3	6	20	7	23.3
4	3	10	6	20
5	4	13.3	1	3.3
6	1	3.3	8	26.7
7	3	10	3	10
8	3	3.3	3	10
mean	3.80 1.82		4.86 1.90	

p.v = 0.002

Table 3. Comparison of ecchymosis between the two groups on the 7th after operation

	External osteotomy		Internal osteotomy	
score	n	%	n	%
0	6	20	4	13.3
1	7	23.3	5	16.7
2	3	10	3	10
3	8	26.7	6	20
4	3	10	3	10
5	0	0	4	13.3
6	1	3.3	1	3.3
7	2	6.2	3	10
8	0	0	1	3.3
mean	2.26 1.92		3.20 2.23	

p.v = 0.011

Table 4. Comparison of edema between males and females on the 1st day after operation

Sex / Score	Female		Male	
	n	%	n	%
0	0	0	0	0
1	1	12.5	0	0
2	2	25	4	18
3	1	12.5	1	4.5
4	3	37.5	10	45.5
5	1	12.5	4	18
6	0	0	3	13.5
7	0	0	0	0
8	0	0	0	0
Total	8	100	22	100
p.v = 0.05				

Table 5. Comparison of ecchymosis between men and women on the 1st and 7th days after operation

Time	1day post operative				1week post operative			
sex	Male		Female		Male		Female	
score	n	%	n	%	n	%	n	%
0	0	0	0	0	1	12.5	2	9.1
1	0	0	1	4.5	0	0	0	0
2	1	12.5	0	0	3	37.5	1	4.5
3	0	0	0	0	0	0	5	22.7
4	0	0	1	4.5	0	0	1	4.5
5	1	12.5	0	0	1	12.5	0	0
6	2	25	1	4.5	2	25	4	18.2
7	1	12.5	2	9.1	1	12.5	2	9.1
8	3	37.5	2	9.1	0	0	1	4.5
9	0	0	2	9.1	0	0	2	9.1
10	0	0	4	18.2	0	0	1	4.5
11	0	0	4	18.2	0	0	0	0
12	0	0	2	9.1	0	0	1	4.5
13	0	0	1	4.5	0	0	1	4.5
14	0	0	1	4.5	0	0	1	4.5
15	0	0	0	0	0	0	0	0
16	8	100	22	100	8	100	22	100
	p.v = 0.05				p.v = 0.003			

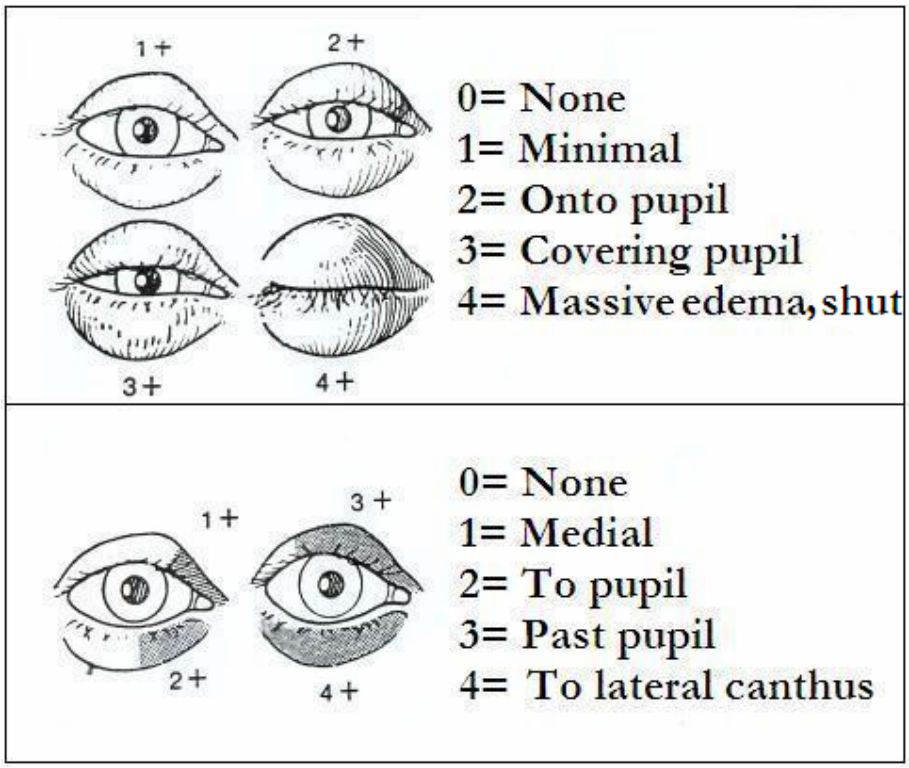

Figure 1. Scoring of periorbital edema and ecchymosis [5]

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