

Research Article

LATERAL NASAL OSTEOTOMY IN RHINOPLASTY: EXTERNAL AND INTERNAL APPROACH

Anil Kumar^{1*}, Sumiksha Bharti², Sonika Kanotra³, Shaifali⁴

¹Senior Resident, Department Of Otorhinolaryngology, Head & Neck Surgery GMC Doda

²Senior Resident, Department Of Otorhinolaryngology, GMC Rajouri

³Professor and HOD, Post Graduate Department of Otorhinolaryngology, Head & Neck Surgery, S.M.G.S. Hospital, Govt. Medical College, Jammu.

⁴Junior Resident, Department Of Otorhinolaryngology, GMC Rajouri

***Corresponding author:** Dr. Anil Kumar, Senior Resident, Department Of Otorhinolaryngology, Head & Neck Surgery GMC Doda, India

Email: ak030807@gmail.com

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Abstract:

Background: Rhinoplasty is becoming a commonly performed procedure to improve nasalaesthetics. Different techniques have been developed to reduce the complications which include hemorrhage, periorbital edema, ecchymosis, excessive damage to nasal mucosa, and asymmetry.

Methods: A total number of 50 patients attending the ENT outpatient department of SMGS hospital, Government Medical College Jammu presenting with nasal deformities who were willing for corrective surgery were enrolled for the study and the following observation were made.

Results: Our patient population was younger and had a higher male-to-female ratio compared to other studies. The proportion of patients with a history of nasal trauma differed from other studies, potentially reflecting regional differences in trauma prevalence. Type II septal deviations were the most common, and crooked noses were the predominant external deformity.

External osteotomy was associated with less periorbital ecchymosis and fewer cases of edema compared to internal osteotomy, although differences were not always statistically significant. External osteotomy resulted in significantly lower mucosal injury rates, supporting its advantage in reducing intranasal trauma. Pain levels decreased significantly over time for both techniques, with initial pain being higher in the external osteotomy group. Scarring from external osteotomy was minimal and faded over time.

Conclusion: external osteotomy demonstrated several advantages, including lower rates of mucosal injury, reduced bleeding, and less periorbital edema and ecchymosis. Both techniques resulted in high patient satisfaction and similar outcomes regarding persistent deviation and synechiae formation. These findings suggest that while both methods are effective, external osteotomy may offer benefits in

minimizing trauma and improving hemostasis.

Keywords: Lateral Nasal Osteotomy, Rhinoplasty, External and internal

INTRODUCTION

The lateral osteotomy is done by giving a small incision at pyriform aperture just above the level of detachment of inferior turbinate. Medial to lateral subperiosteal tunnel is formed up to level of medial canthus. Osteotome is engaged and passed along the sulcus of frontal process of maxilla (nasofacial groove) with tap stroke of mallet. It separates the lateral bony wall of pyramid from nasal process of maxilla.

Lateral osteotomy is of three types, high low high, low to high and low to low osteotomy. Lateral osteotomy is a mainstay of rhinoplasty surgery and involves fracture of the nasal and maxillary bones to narrow or widen the nasal dorsal bridge and base. To avoid nasal midvault collapse following rhinoplasty, the accepted "high-low-high" lateral osteotomy technique advocates for the preservation of a triangular strut of maxillary bone when initiating the osteotomy. It involves a curved cut that begins "high" on the pyriform aperture at the level of the attachment of the inferior turbinate.

The cut turns and proceeds upward deep in the maxillary groove (the "low" portion) before curving superiorly and anteriorly, terminating inferiorly to the nasofrontal suture line (thus termed "high")¹

In low to high osteotomy, A stab is performed in the nasal mucosa just superior to the insertion of the inferior turbinate bone into the maxilla at the pyriform aperture. A 3 mm osteotome is engaged and passes in a

gentle superoanterior arc to the level of the medial canthus.

In low to low osteotomy, we start low and remain low going parallel to naso-maxillary suture into intercanthal line which is later joined by medial osteotomy. Sometime a little concave bone needs an intermediate osteotomy to joined the medial osteotomy.

Conducting osteotomy through either percutaneous (external) or endonasal (internal) techniques, are associated with advantages and disadvantages. Are Excessive narrowing can cause cosmetic or functional problem resulting in nasal obstruction at times. The upper end of lateral osteotomy should be superficial to medial canthus to prevent injury to the middle canthal ligament or lacrimal sac. The middle canthal ligament is attached to the frontal process of maxilla in the anterior lacrimal Crest in front of lacrimal groove Joseph techniques of doing lateral osteotomy including cutting the frontal process of maxilla with saw without highlighting any precautionary measures regarding the upper end of the Bony cut.

External osteotomy is easy and precise approach. Periosteum was not elevated for any possibility of disrupting the lacrimal sac or damage to the medial canthus ligament.

There is green stick fracture so the bone stumps are stable. The reduced bleeding reduces the edema formation and ecchymosis around the eyes. The damage to the mucosa is minimal and the cutaneous scars are virtually invisible a month after the surgery.

External osteotomy produces less intranasal trauma and less morbidities of hemorrhage, edema, and ecchymosis around the eyes.²

Lateral osteotomies via internal approach have been reported to be associated with a high risk of damaging the periosteum, the supporting tissues, and the mucosa.³ In this regard, osteotomy is considered an ideal method if it leads minimum level of damage to the soft tissue and its outcome can be predictable and reproducible.

In Internal approach. The fracture line is difficult to control at the level of the root of nose (Horizontal osteotomy). A medial fracture that is too high might lead to a bone protrusion above the root of the nose (Becker's rocker formation) A fracture that is too low leads to lateral depression of the pyramid.

Basic principles of osteotomy first is always do interrupted cut line osteotomy as this will give a ragged edge which helped in rapid healing and give more stability.

Interrupter line gives a controlled cut while a deep one disrupts the mucosa. Another thing is always keeping your osteotome sharp, use the smallest one, 2 mm osteotome is the best. Always keep osteotome angulated as this will required less force and produced an accurate cut.

MATERIAL AND METHODS

This observational prospective study was conducted in department of ENT & HNS SMGS hospital Jammu after obtaining ethical committee approval from the institutional ethics committee .Patients underwent rhinoplasty over a period from 1 st august 2023 to 31st July 2024 were included in the study. The study group comprised of 50 patients. Patient were divided into two groups randomly.

Group A (PERCUTANEOUS OSTEOTOMY): 25

Group B (INTERNAL OSTEOTOMY): 25

Inclusion Criteria

- (1) Patients in the age group of 17– 50years.
- (2) Patients with external nasal deformity with or without septal deviation will be included in the study

Exclusion Criteria

- (1) Patient aged less than 17 years and greater than 50 years
- (2) Patients with coexisting Debilitating diseases, Major systemic disease or facial asymmetry.
- (3) Patients with concomitant nasal and para-nasal sinus pathology
- (4) Patients with active respiratory tracts infection preceding two weeks of surgery
- (5) Patients not giving consent for surgery.

METHODS

All the selected patient underwent thorough history regarding nasal trauma, previous nasal surgery, granulamatus disease, history of excessive bleeding or bruising, allergic rhinitis, complete physical examination, And detailed local examination to assess the type of nasal deformity on the basis of mladina classification. Baseline investigation were conducted, includes haemogram, bleeding time, clotting time, renal function test liver function test, blood sugar, chest x ray, ECG, nasal x-ray (lateral view), CT SCAN. Preoperative and postoperative photographs were taken, including i.e frontal, right lateral, left lateral, basal and left and right three quarter lateral view and helicopter view. Preoperative counselling was done in all the patients regarding bruising, ecchymosis and swelling of eyes. Intra and postoperative photographs were taken for documentation.

All the patients were operated on under General anesthesia. The nose was injected with adrenaline 1:1 lakh infiltration to reduces bleeding Immediately after the performing the osteotomies, all the patients were examined by rigid endoscope to asses mucosal damage. Postoperative Periorbital oedema , mucosal tear, ecchymosis, scar and pain according to Visual analogue scale (VAS) ere assessed in the ward in the 1 st, 7 th and 21st day. The scoring system for oedema and ecchymosis as:

Scoring system for edema

Grade 1 – No coverage of iris with eyelids,

Grade 2 - Slight coverage of iris with swollen eyelids,

Grade 3- Full coverage of iris with swollen eyelids,

Grade 4 – Full closure of eyes.

Scoring system for ecchymosis –

Grade 1 - Ecchymosis up to the medial one-third part of lower and /or upper eyelid,

Grade 2 - Ecchymosis up to the medial two-third part of the lower and/or upper eyelid.

Grade 3 - Ecchymosis up to the full length and /or upper eyelid

Surgical procedure

The patients in group (A) underwent percutaneous lateral osteotomy with 2 mm. osteotome.

The patients in group (B) underwent endonasal / internal lateral osteotomy.

Parameter like mucosal tear, periorbital edema, ecchymosis, scar and pain asses on 1 st, 7 th and 21 st day postoperatively.

RESULTS

In this study a total of fifty patients were enrolled. Maximum no. of patients i.e 43(86%) were in age group 15-25, 4 (8%) were in 26-35 age group, 3 (6%) patients was in 36-45 age group. Mean age in our study was 21.6 years. Young patients was 16 years and the oldest was 45 years of age with mean age 21.64+/-6.08.

In this study female patients were less in number as compared with male patients. 37(74%) patients were male and 13 (26%) were females. In the external osteotomy group included 19 (76%) males and 6 (24%) females. The internal osteotomy groups consisted of 18 (72%) males and 7 (25%) females. The obtained data demonstrated no significant difference between the two groups regarding gender distribution.

Table 1 .Type of external nasal deformity in patients under study.

Types of external nasal deformity	No. of Patients	Percentage
Crooked nose	30	60.0
Hump nose	15	30.0
Saddle nose	2	4.0
Crooked nose with tip deformity	3	6.0
Total	50	100.0

The most common nasal deformity was the crooked nose, accounting for 30 cases (60% of the total).The hump nose was the second

most prevalent, present in 15 patients (30%). Less common were the saddle nose, observed in 2 patients (4%), and the crooked

with tip deformity ,seen in 3 patients (6%)
Out of 50 patients 15 (30%) patients had

history of trauma, while 35 patients did not
have a history of trauma

Table 2: Types of septal deformity in patients under study.

Type of Septal Deformity (Deviation)	No. of patients	Percentage
Type I	12	24.0
Type II	18	36.0
Type III	8	16.0
Type IV	5	10.0
Type V	3	6.0
Type VI	2	4.0
TypeVII	2	4.0
Total	50	100.0

A total of 50 patients were classified into 7 types. The distribution of patients among the types was as follows: Type 1 accounted for 24% (12 patients), Type 2 was the most prevalent with 36% (18 patients), while Type 3 made up 16% (8 patients). Type 4 constituted 10% (5 patients), followed by Type 5 with 6% (3 patients). The remaining types had smaller percentages, with Types 6 and 7 each accounting for 4% (2 patients).

Table 3: Grading of periorbital edema in patients under study.

Grading	External Osteotomy	Internal Osteotomy	χ^2	P Value
24 hours after surgery				
0	7	4	30.645	0.988
1	15	16		
2	3	5		
3	0	0		

Total	18	21		
7 th Day				
0	22	21	5.958	0.843
1	3	3		
2	0	1		
3	0	0		
Total	3	4		

In External osteotomy, 24 hour after study ,15 patients had grade 1 edema ,3 patients had grade 2 edema, 7 patients had no edema and Day 7 th ,3 patients had grade 1 edema, 22 patients had no edema ,Whereas in Internal osteotomy groups ,on 24 hours after surgery , 16 patients had grade 1 edema , 5 patients had grade 2 ,4 patients had no edema and day 7 th , 3 patients had grade 1

edema, 1 patients had grade 2 edema and 21 patients had no edema. The result shows that both techniques were not significantly different (p =0.98 on 24 hours following surgery) and (p=0.843 on 7 th day). Percutaneous lateral osteotomy led to fever periorbital edemas than endonasal lateral osteotomy.

Table 4: Grading of periorbital ecchymosis in patients under study

Grading	External Osteotomy	Internal Osteotomy	χ^2	P Value
24hoursaftersurgery				
1	10	15	6.447	0.011
2	4	3		
3	2	3		
4	3	2		
Total(out of 25)	19	23		
7 th Day				
1	5	7	2.460	0.483
2	2	3		
3	0	0		
4	0	0		
Total(out of 25)	7	10		

In External osteotomy, 24 hours after surgery, 10 patients had grade 1 ecchymosis, 4 patients had grade 2 ecchymosis, 2

patients had grade 3 ecchymosis, 3 patients had grade 4 ecchymosis and day 7 th, 5 patients had grade 1 ecchymosis, 2 patients

had grade 2 ecchymosis whereas in Internal osteotomy groups, 24 hours after surgery, 15 patients had grade 1 ecchymosis, 3 patients had grade 2 ecchymosis, 3 patients had grade 3 ecchymosis, 2 patients had grade 4 ecchymosis and Day 7 th , 7 patients had grade 1 ecchymosis ,3 patients had grade 2 ecchymosis. No patients in either groups had postoperative oedema on day 21 .The two technique is significant on 24 hour after study (0.01) and 7 th day onwards not significant ($P = 0.483$) Fewer periorbital ecchymoses were observed in cases with percutaneous lateral osteotomy than endonasal lateral osteotomy.

In external osteotomy, 24 hours after surgery, 18 (72%) patients experienced postoperative pain while 7(28%) patients had no pain, and by day 7 th, 2 (8%) patients experienced postoperative and 23(92 %) patients had no pain whereas in internal osteotomy, 24 hours after surgery ,15 patients experienced pain after surgery, 10

patients had no pain and on 7 th day 3 patients experienced pain, 22 patients had no pain.

According to results, the level of pain after operation had a decreasing trend in both endonasal and percutaneous cases , such that 33 patients had pain in 24 hours after operation ,which decreased to 5 on the 8 th day , therefore, endonasal lateral osteotomy and percutaneous lateral osteotomy were statistically significant on 24hour after surgery ($p=0.043$) and day 7 th onwards ($p=0.032$).

In this study the Mucosal injury was seen in 2(8%) undergone external osteotomy and 10 (40%) was seen in internal osteotomy.

Nasal packing was needed to control epistaxis in 20 patients undergoing internal osteotomy as compared to only 3 patients undergoing osteotomies.

In this study both techniques had no synechiae formation postoperatively

Table 5: Persistent edema in patients under study.

Days	External Osteotomy	Internal Osteotomy	P Value
3	13	14	0.099
5	8	7	
7	0	4	
Total(out of 25)	21	25	

In the external osteotomy group, edema was in 13 patients on day 3, and in 8 patients by day 5. In the internal osteotomy group, edema was seen in 14 patients on day 3, 7 patients on day 5 and 4 patients on day 7. In the study comparing edema between the external osteotomy group and the internal

osteotomy group, the following observations were made: The p-value for the comparison of persistent edema between the two groups was 0.099 indicating that the differences observed were not statistically significant.

Patient satisfaction outcomes were evaluated using VAS scale, with scores ranging from 0

to 10. Results: In external Osteotomy- 20 patients (66.7%) Very Satisfied: 5 patients (16.7%) satisfied. whereas in Internal Osteotomy:- 15 patients (55.6%) very satisfied and 10 patients (37%) satisfied. The difference in patient satisfaction between the two groups was not statistically significant (p -value = 0.797, indicating that both external and internal osteotomy procedures result in high patient satisfaction rates, with no significant difference between the two techniques.

Persistent Deviation Comparison between External and Internal Osteotomy In the study of persistent deviation post-surgery for the external osteotomy group, 2 out of 25 patients (8%) experienced persistent deviation, while 23 patients (92%) did not. Whereas, In the internal osteotomy group, 4 out of 25 patients (16%) had persistent deviation, and 21 patients (84%) did not. The comparison between the two groups yielded a p -value of 0.462, indicating no significant difference in the rate of persistent deviation between external and internal osteotomy procedures. The results showed that external osteotomy group demonstrated a lower rate of persistent deviation, with only 2 cases out of 25, whereas the internal osteotomy group showed a higher incidence with 4 cases.

DISCUSSION

In our study of 50 patients, only 15 (30%) patients gave a history of nasal trauma, whereas 35 (70%) patients did not. This is in contrast with the results of study conducted by Hernot S et al., (2023), who reported that 71% of their patients had history of nasal trauma.²

We classified nasal septal deformities according to Mladina classification. In our study, Type II (36%) was the most common septal deviation, followed by Type I (24%), consistent with Mladina's classification. Similarly, Jee Hye Wee et al. (2012) found that Type II (41.4%) and Type I (35.4%) were the most common deformities according to Guyuron's and Mladina's classifications, respectively.

Lateral osteotomies can be done via the external approach or the internal approach. We performed lateral osteotomy via the external approach and internal approach in 25 patients each. In our study, we evaluated the incidence of edema following external and internal osteotomy techniques. At day 1 after surgery, the external osteotomy group 15 patients had grade 1 edema, 3 had grade 2 edema, and 7 had no edema. By the 7th day, the numbers decreased to 3 patients with grade 1 edema and 22 with no edema.

In contrast, the internal osteotomy group 16 patients had grade 1 edema, 5 had grade 2 edema, and 4 had no edema on day 1 after surgery. By the 7th day, the numbers decreased to 3 patients with grade 1 edema, 1 with grade 2 edema, and 21 with no edema. Statistical analysis revealed no significant difference between the two techniques at 24 hours ($p=0.98$) or on the 7th day ($p=0.843$). Our results found that in the percutaneous lateral osteotomy group there were fewer cases of periorbital edema compared to endonasal lateral osteotomy. Additionally, the number of patients with edema decreased significantly over time with both the techniques. Our findings are consistent with previous studies.

In our study, we evaluated periorbital ecchymosis at 24 hours and 7 days after surgery in patients undergoing external and internal osteotomy techniques. At day one after-surgery, in external osteotomy group 19 patients had ecchymosis, 10 patients had grade 1 ecchymosis, 4 patients had grade 2, 2 patients had grade 3, and 3 patients had grade 4. By the 7th day, the numbers decreased to 5 patients with grade 1 ecchymosis and 2 with grade 2. In contrast, 23 patients had ecchymosis in the internal osteotomy group. 15 patients had grade 1 ecchymosis, 3 patients had grade 2, 3 patients had grade 3, and 2 patients had grade 4 on day one after surgery. By the 7th day, the numbers decreased to 7 patients had grade 1 ecchymosis and 3 patients had grade 2. Statistical analysis revealed a significant difference between the two techniques on day one after surgery ($p=0.01$), but this difference was no longer statistically significant by the 7th day ($p=0.483$). Our results suggest that the percutaneous lateral osteotomy results in less periorbital ecchymosis compared to endonasal lateral osteotomy. Our findings are similar with the study conducted by Vikas Sinha et al. (2007), who found that external osteotomy results in less ecchymosis.⁵

Our study found a significant difference in mucosal injury between external and internal osteotomy techniques. Only 2 patients (8%) in the external osteotomy group had mucosal injury, whereas 10 patients (40%) in the internal osteotomy group had mucosal injury. This discrepancy highlights the external technique's advantage in minimizing mucosal trauma. Our finding is in line with the previous

studies. Rohrich et al. (1997) compared external and internal lateral nasal osteotomies using 19 fresh cadaver heads and found that mucosal tear occurred in 11% of cases with external osteotomy versus 74% with internal osteotomy.⁶ They concluded that the external approach is preferable due to its ability to produce a more controlled fracture with reduced intranasal trauma.

In our study, we used the Visual Analog Scale (VAS) to assess postoperative pain. For patients who underwent external osteotomy, 18 patients (72%) reported pain 24 hours after surgery, while 7 patients (28%) experienced no pain. By the 7th day, the number of patients experiencing pain decreased significantly to 2 (8%), with 23 patients (92%) reporting no pain. In contrast, for those who underwent internal osteotomy, 15 patients experienced pain 24 hours after surgery, while 10 patients reported no pain. On the 7th day, 3 patients continued to experience pain, and 22 patients had no pain. Overall, our results show that postoperative pain decreased over time for both techniques. Initially, 33 patients reported pain within 24 hours post-surgery, but this number dropped to 5 by the 7th day. Statistical analysis revealed a significant difference in pain levels between the two techniques at both 24 hours ($p = 0.043$) and on the 7th day ($p = 0.032$). Our findings are consistent with the previous studies.

Akbas et al. (2004) reported that pain following percutaneous rhinoplasty decreases significantly over time, despite being present immediately after the procedure.⁷

In our study, only of the 25 patients, 3 patients (12%) had a scar at the site of the

external osteotomy one month after surgery, while 22 patients had no visible scarring.

Our finding is in line with the previous studies. Gryskiewicz et al.,(2004) found that external osteotomy results in visible scars in only 6% of cases, and noted that careful cleansing of the chisel before percutaneous entry can minimize scarring.⁸

The difference in satisfaction between the two groups was not statistically significant (p -value= 0.797), indicating high patient satisfaction rates for both techniques. Our findings differ from those of Hernot S, et al., (2023) who used the ROE scale to evaluate patient satisfaction. 2 They found that external osteotomy resulted in higher satisfaction rates, with 36 patients (72%) being very satisfied, compared to the internal osteotomy group, where 32 patients (64%) were very satisfied.

Our study found a significant difference in intraoperative bleeding between the external and internal osteotomy techniques. Our findings align with those of Hernot S, et al., (2023), who reported that external osteotomy resulted in less bleeding and better hemostasis compared to the internal continuous technique.² They achieved excellent hemostasis in 33 cases (66%) in the external osteotomy group, compared to 19 cases (38%) in the internal osteotomy group.

We performed nasal endoscopy 2 weeks postoperatively to assess the intranasal mucosa for synechiae formation. Notably, our study found no patients with synechiae formation in either the internal or external osteotomy groups. This contrasts with the findings of Hernot S, et al., (2023) 2 who reported synechiae formation in 2 patients

(4%) in the external osteotomy group and 4 patients (8%) in the internal osteotomy group. They concluded that external osteotomy results in less synechiae formation compared to internal osteotomy. However, our study did not replicate this finding, as no synechiae were observed in either group.

Although the difference in edema resolution between the two groups was not statistically significant (p = 0.09), it suggests a trend towards a faster and more complete resolution of edema with external osteotomy. Our findings align with those of Hernot S, et al., (2023) 2 who observed edema in both groups during the first week postoperatively. Specifically, they noted that 11 (22%) patients in the internal technique group had ongoing edema, compared to 7 (14%) in the external technique group. This supports our observation that the internal technique may be associated with more severe edema, requiring a longer time to resolve.

The comparison between the two groups yielded a p -value of 0.462, indicating no significant difference in the rate of persistent deviation between external and internal osteotomy procedures. The results showed that external osteotomy group demonstrated a lower rate of persistent deviation, with only 2 cases out of 25, whereas the internal osteotomy group showed a higher incidence, with 4 cases. This could be attributed to incomplete osteotomies via the internal approach.

CONCLUSION

Our study provides valuable insights into the outcomes of percutaneous lateral versus

internal lateral osteotomy techniques. Key findings include: Our patient population was younger and had a higher male-to-female ratio compared to other studies. The proportion of patients with a history of nasal trauma differed from other studies, potentially reflecting regional differences in trauma prevalence. Type II septal deviations were the most common, and crooked noses were the predominant external deformity. External osteotomy was associated with less periorbital ecchymosis and fewer cases of edema compared to internal osteotomy, although differences were not always statistically significant. External osteotomy resulted in significantly lower mucosal injury rates, supporting its advantage in reducing intranasal trauma. Pain levels decreased significantly over time for both techniques, with initial pain being higher in the external osteotomy group. Scarring from external osteotomy was minimal and faded over time. Satisfaction levels were high and similar for both techniques. Internal osteotomy was associated with higher intraoperative bleeding and greater need for nasal packing. No synechiae were observed in either group, differing from some previous studies. Both techniques showed similar rates of persistent deviation, with a slight advantage for external osteotomy. Overall, external osteotomy demonstrated several advantages, including lower rates of mucosal injury, reduced bleeding, and less periorbital edema and ecchymosis. Both techniques resulted in high patient satisfaction and similar outcomes regarding persistent deviation and synechiae formation. These findings suggest that while both methods are effective, external

osteotomy may offer benefits in minimizing trauma and improving hemostasis.

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