

# EXTERNAL VS. INTERNAL OSTEOTOMY IN RHINOPLASTY

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**Abstract : Background:** The aim of study is to compare the external osteotomy vs. internal osteotomy in patients undergoing rhinoplasty.

**Methods:** The study group comprised of 45 patients that had undergone rhinoplasty surgery. The 25 patients had undergone internal / endonasal continuous lateral osteotomy and 20 patients had undergone external / percutaneous perforating digital osteotomy. The internal osteotomy was done high to low to high using 4 mm. curved guarded osteotome. The external osteotomy was done by 2 mm sharp osteotome. The scoring system of Kara and Gokalan was followed for edema and ecchymosis.

**Conclusion:** External osteotomy is an easy approach to carryout and makes fracture with high precision along preset lines. The bone stump is stable. The damage to the nasal mucosa is much less. There is reduced bleeding, reduced edema and reduced ecchymosis around eyes. The cutaneous scar at the entry site of osteotome is invisible.

**Keywords:** Lateral osteotomy, internal / endonasal osteotomy, percutaneous perforating digital osteotomy,

## INTRODUCTION

Lateral osteotomies are generally the last step in aesthetic rhinoplasty. The osteotomies are performed blindly using tactile guidance <sup>(1)</sup> and there is always the risk of injuring supporting mucosa and periosteum <sup>(2)</sup>. It is important to achieve adequate mobilization of the bony skeleton and minimize the damage to the supporting soft tissue to avoid excessive narrowing. An ideal osteotomy produces precise, predictable and reproducible <sup>(3)</sup> aesthetic, functional result and minimizing soft tissue damage. The lateral osteotomy in rhinoplasty is done to correct the asymmetric lateral nasal wall and to narrow the nose. The bony pyramid of the nose mainly consists of paired nasal bones attached on either side at the frontal process of maxilla, superiorly with frontal bone and its projecting spine. The bony nasal septum consist of perpendicular plate of ethmoid bone, vomer bone and there is attachment of bony septum with nasal bone. In any marked deviated nose (especially involving the bony pyramid) with previous history of trauma, the intricate relationship between these bony attachments is disturbed.

**Rationale** - The excessive damage to the intranasal mucosa or periosteum can lead to postoperative destabilization, excessive hemorrhage, prolonged edema, ecchymosis and asymmetry resulting in post rhinoplasty aesthetic deformity and excessive narrowing <sup>(4)</sup>. The lateral osteotomy medialises the lateral portion of the nose. It can be done either by the internal /endonasal continuous osteotomy or by external / percutaneous perforating digital osteotomy. Both the techniques are practiced widely and one can perform the lateral osteotomy in either way. The purpose of this paper is to compare internal / endonasal continuous lateral osteotomy with external percutaneous perforating digital osteotomy of the patients who had undergone rhinoplasty at the department of Otorhinolaryngology and Head and Neck Surgery at B.J.Medical College (Civil Hospital) Ahmedabad, India. Both the types of osteotomies have their own advantages and disadvantage and it has become matter of debate, controversy and personal choice of surgeon to perform the type of osteotomy

**Material and method** - A retrospective study was done of total 45 patients who were operated for the rhinoplasty in department of Otorhinolaryngology and Head and Neck Surgery, B.J.Medical College (Civil Hospital) Ahmedabad, India. All the 25 patients who had undergone internal / endonasal continuous lateral osteotomy were compared with 20 patients who had undergone external / percutaneous perforating digital osteotomy. All the patients had undergone the surgery by the first author (corresponding author) under local anesthesia. The local anesthesia was given with standard technique. Ice packs were used in the form of gauze soaked in the ice-cold saline. For this purpose, saline bottle was kept in the deep freezer and was taken out at the time of osteotomy. After the osteotomy, only ice packs were used to minimize the bleeding, edema and ecchymosis of the eyes. This procedure was adopted in all the cases. The scoring system for edema and ecchymosis was followed (as modified from Kara and Gokalan in 1999 <sup>(5)</sup>)

**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 upto the medial one-third part of lower and /or upper eyelid, Grade 2 - Ecchymosis upto the medial two-third part of the lower and/or upper eyelid. Grade 3 - Ecchymosis up to the full length and /or upper eyelid.

**Operative Procedure** - The 25 of the patients in this present study had undergone endonasal high to low to high continuous lateral osteotomy with 4 mm. curved guarded osteotome and the 20 patients had undergone percutaneous perforating digital osteotomy.

**Continuous lateral osteotomy** - The proposed line of osteotomy was marked with marking pen for the accurate path of osteotomy.

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2% xylocaine with adrenaline (1:200,000) was injected at pyriform aperture and at the proposed line of osteotomy. The lateral osteotomy was done by giving small incision at pyriform aperture just above the level of attachment of inferior turbinate. The osteotomy below the attachment of inferior turbinate was avoided as it may medialise inferior turbinate in long term and cause nasal obstruction and may also damage so called Webster's bony triangle which may cause alteration in the shape of vestibule. The periosteum was elevated only 2/3 of its length by the periosteum elevator. The osteotome was engaged and passed along the sulcus of frontal process of maxilla (nasofacial groove) with tap tap stroke of the mallet. The purpose of first tap is to engage the osteotome and is done always with light force at short distance from the base of osteotome and second tap is done with more distance and force from the base of osteotome to introduce and move it further. The fingers of other hand always guide the movement of osteotome. The osteotome was gently curved medially (Figure I) as approaches the infraorbital rim and continues superiorly about the level of intercanthal line. The pyriform aperture incision was closed at the end of surgery by chromic catgut.

**Percutaneous perforating digital osteotomy** - A stab incision was given at the midpoint between vestibule and medial canthus. The tip of 2 mm osteotome was firmly pressed against the bone. Periosteum was not elevated for any possibility of disrupting the lacrimal sac or damage to the medial canthus ligament. It was incised cleanly with tip of osteotome by sweeping the osteotome up and down at the proposed line of osteotomy. (None of our patients had any lacrimal sac problem or instability in the follow up period) and perforation of bone was done with 2 mm sharp osteotome. The multiple site bone perforation was done by rotating the osteotome up and down (cephalic and caudal direction) from the same skin incision (Figure II) and bone was perforated at 2mm. distance with tap tap stroke of the mallet taking care not to damage the underlying mucosa of the bone. The change of sound of the tapping of osteotome signals that internal cortical bone has been broken. There is also a give way feeling which warns the surgeon against the undue perforation of nasal mucosa. For transverse osteotomy, after injecting 2% xylocaine with adrenaline (1:200,000), a mid point was selected

between medial canthus and nasion and stab incision was given. Periosteum was incised with tip of osteotome and perforating osteotomy was done as described earlier. Firm digital pressure was applied for the medialisation of lateral nasal wall. The skin stab incision was not closed any time and it healed without any scar formation in any of the patient.

For medial osteotomy in all the cases, straight 4 mm. sharp osteotome was engaged pare median to mid line in order to safe guard the keystone area to avoid loss of septal support and was directed 15 – 25 degree lateral to meet the curved end of endonasal continuous lateral osteotomy or medial end of horizontal perforating transverse osteotomy. The similar procedure is being done on the opposite side.

**Observation-** The nasal endoscopy was done in 10 patients of endonasal continuous lateral osteotomy and 8 cases of percutaneous perforating digital osteotomy to assess the nasal mucosa tear after the osteotomies. All the 10 patients of endonasal osteotomy (100%) had definite tear of nasal mucosa at some place or other while only 3 patients of external osteotomy (30 %) had mucosa tear due to undue perforation of osteotome. All the 25 patients who had undergone endonasal continuous lateral osteotomy had periorbital edema, 3 patients (12%) had grade 4 edema, 8 patents (32)% had grade 3 edema, 12 patients (48%) had grade 2 edema, 2 patients (8%) had grade 1 edema. The ecchymosis of grade 1 was found in 18 cases (72%). All the patients were given the injectable dexamethasone 4 mg. three times daily for 1-2 days depending upon the response and grade of individual case along with oral anti-inflammatory and seropeptide combination. The 20 patients who had undergone percutaneous perforating digital osteotomy only 4 patients (20%) developed grade 2 periorbital edema and were given the steroid as described above along with antiinflammatory. The remaining 16 patients (80%) had grade 1 edema did not require steroid and were managed by anti-inflammatory and seropeptide combination alone. None of the patients developed ecchymosis.

**DISCUSSION**

The external technique was used by Gorla in 1955 (6) and popularized by Straatsma (7). This technique causes less tear of



Fig 1 : Showing lateral and paramedian osteotomy

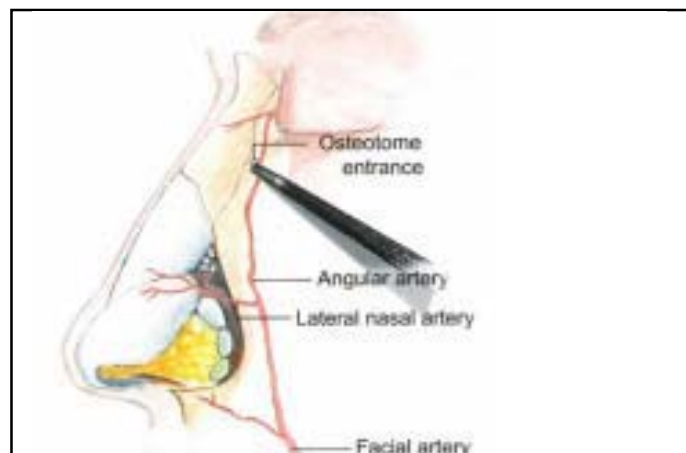


Fig II : Showing percutaneous external digital osteotomy

internal mucosa of the nose as seen in the cadaver studies<sup>(3)</sup>. The preservation of periosteum in external technique provides excellent control and the reduction in the intranasal complication and postoperative morbidity such as bleeding, edema and ecchymosis<sup>(5)</sup>. However in all our external cases we did not elevate the periosteum but made sweeping up and down the movement at the proposed line of external osteotomy reaching the underlying the bone directly. Only 4 patients had grade 2 edema and 16 patients had grade 1 edema and no ecchymosis to any of the patients. It has also been found that steroids reduce the edema and ecchymosis only on the first day of the surgery and did not have the effect on the following day<sup>(5)</sup> however Yucel<sup>(8)</sup> in his study of external or internal osteotomy found the edema score same in the both groups on second and seventh day of the surgery and the ecchymosis score also the same between two groups on the seventh day. He found external and internal technique of osteotomy almost give the same results regarding edema and ecchymosis but internal continuous technique shows a tendency to produce less ecchymosis on second postoperative day. He did not use steroid and found 48 hours is the peak time and seventh day of the surgery is the resolving time of edema. However our result was very different from him as we found external technique to produce less edema and ecchymosis.

Rohrich et al<sup>(9)</sup> performed anatomical study of 19 fresh cadavers' heads to compare lateral nasal osteotomies using the internal continuous technique and the external perforating technique. They used direct nasal endoscope to evaluate the nasal mucosa after the osteotomy and found mucosal tear in 11% cases of external perforating osteotomy as compared to 74% mucosal tear in internal osteotomy. They concluded that external approach is preferable because it results in a more controlled fracture with less intranasal trauma and less morbidities of hemorrhage, edema and ecchymosis. Our finding correlated well with their findings.

It is not always necessary for the osteotome blade to cut through the entire thickness of bone to achieve fracture as partial thickness fracture produces micro fracture of the remaining thickness and osteotome that are smaller than the patient nasal bone thickness can be used<sup>(1)</sup>. The green stick fracture by applying digital pressure to complete the fracture line of osteotome mobilizes the nasal bones to narrow the lateral nasal wall with precision and predictable correction of the deviated nose. The lifting of subperiosteal tunnel itself is matter of debate. Those who develop the subperiosteal tunnel before the osteotomy believe that subperiosteal tunnel serves as a pathway for the osteotome thus cutting the bone easier. Secondly it also lifts the angular artery and vein away from the osteotome and reduces the periorbital edema and ecchymosis. Those who do not develop the subperiosteal tunnel before the osteotomy believe that raising the subperiosteal tunnel carries a greater risk of disrupting the lacrimal sac or damage to the medial canthus ligament<sup>(10)</sup> and damage the overlying vessels causing periorbital ecchymosis, subconjunctival ecchymosis and edema<sup>(11)</sup>. Our findings suggest the same. Gyskiewicz and Gyskiewicz<sup>(12)</sup> carried out lateral osteotomy in 50 patients (25 perforating lateral osteotomy and 25 continuous osteotomy) and found that perforating lateral osteotomy with 2 mm straight osteotome reduces postoperative

ecchymosis and edema in rhinoplasty patients compared with continuous osteotomy (4 mm curved guarded osteotome) and concluded that use of perforating osteotomies should be encouraged than continuous osteotomies. Our findings were similar as above. Giacomarra et al<sup>(10)</sup> in their review of one hundred forty two rhinoplasty also found external osteotomy an 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. None of the patients developed any scar formation at the entry site of the external perforating osteotomy nor did they develop discoloration at the entry site even in their long-term follow-up. Our findings are similar as above

## CONCLUSION

External osteotomy is an easy approach to carryout and to make fracture with high precision along preset lines. The fracture is greenstick type so the bone stump is stable. Any irregularity the dorsum can be rasped immediately after the osteotomy. The damage to the nasal mucosa is much less. There is less bleeding, less edema and ecchymosis around eyes. The cutaneous scar at the entry site of osteotome is invisible after the surgery.

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