Section: ENT and Head and Neck Surgery

Original Research Article

TREATING NASAL BONES FRACTURE BY ENDOSCOPE GUIDED CLOSED REDUCTION WITH TRANSCUTANEOUS TRANSOSSEOUS SPLINTING AND FIXATION WITH S-S WIRE AND SILICONE NOSE PADS

Sharad Hernot[1], Madhuri Kaintura[2], Rishabh Dogra[3], Tripti Mamgain[4], Kushagra Vatsal[5], Ayushi Kandari[6], Sameep Goyal[7]

[1]Associate Professor, Department of ENT and Head and Neck Surgery, Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun, Uttarakhand, India.
[2]Associate Professor, Department of ENT and Head and Neck Surgery, Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun, Uttarakhand, India.
[3]Assistant Professor, Department of ENT and Head and Neck Surgery, Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun, Uttarakhand, India.
[4]Professor, Department of ENT and Head and Neck Surgery, Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun, Uttarakhand, India.
[5-7]Junior Resident, Department of ENT and Head and Neck Surgery, Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun, Uttarakhand, India.

Received *: 16/03/2026*
Received in revised form *: 20/04/2026*
Accepted *: 09/05/2026*

Corresponding Author:
Dr. Sharad Hernot,
Associate Professor, Department of Ent and Head and Neck Surgery, Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun, Uttarakhand, India.
Email: hernots@gmail.com

DOI: 10.70034/ijmedph.2026.2.432

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (2); 2603-2610

ABSTRACT

Background: Nasal bone fractures are very common and account for about 40% of all facial fractures. They can be treated by close or open techniques. Closed reduction is considered as the first treatment option in nasal bone fractures. The goal of closed reduction of nasal bones is to anatomically realign the osseous and cartilaginous skeleton. While there are many studies on management of nasal bone fracture by closed reduction, there are not as many articles on management of nasal bone fractures by external fixation. We present a novel technique to manage nasal bones fracture by endoscope guided closed reduction of fracture segments followed by transcutaneous transosseous external fixation and splintage (TTEFS) of nasal bones.

Materials and Methods: Thirty adults with communited nasal fractures underwent endoscopic reduction followed by stainless steel wire fixation, silicone nose pads, and internal nasal packing. Outcomes included intraoperative parameters, postoperative oedema/ecchymosis, and aesthetic and functional results up to 1 year.

Results: Most patients were young males with trauma from road accidents. Excellent haemostasis was achieved in 70%, and 76.6% procedures were technically easy. Oedema and ecchymosis resolved by day 21. At 1 year, 76.6% reported high aesthetic satisfaction and 86.6% functional satisfaction. Minor complications included nasal skin depression in 3 cases.

Conclusion: This technique provides stable fixation and reliable aesthetic and functional outcomes in unstable nasal fractures with minimal complications.

Keywords: Nasal bone fracture, closed fracture reduction, nasal bone splinting.

INTRODUCTION

Around 5000 years ago, the treatment of nasal fractures was first recorded during the early Pharonic period in Ancient Egypt. The Edwin Smith papyrus describes repositioning of deviated nasal bones with the fingers or elevators, the insertion of splints and the application of external dressings.[1] Just as in those earlier times, nasal fractures are very common in the present times also. Isolated fractures of the nasal pyramid account for about 40% of all facial fractures, because relatively little force is

required to fracture the nasal bones, as little as 25–75 lb/in.[2]

The management of fractures of the nose is an important part of everyday ear, nose and throat (ENT) practice. Delays in management of nasal bone fracture is avoided as it can result in significant cosmetic and functional deformity that is often a cause excessive mental agony for the patient and many times a cause of subsequent medicolegal action for the surgeon.[3]

Closed reduction is considered as the first treatment option in nasal bone fractures due to speed, facility, and hence cost-effectiveness.[4] The goal of closed reduction of nasal bones is to anatomically realign the osseous and cartilaginous skeleton. Internal packing and external splints are the most commonly used materials to stabilize nasal fractures. However, the foremost issue in a nasal trauma case with complex, compound, or severely displaced fractures is that even after proper fracture reduction, internal splintage, nasal packing and external splintage, surgeon can never be certain that the fracture fragments will unite in the intended alignment and not collapse.[5,6]

We hereby present a technique to manage nasal bones fracture by endoscope guided closed reduction of fracture segments followed by transcutaneous transosseous external fixation and splintage (TTEFS) of nasal bones, to tackle this issue.

MATERIALS AND METHODS

All patients were treated at ENT and Head and Neck Surgery department of our centre between May of 2022 and June of 2024. All 30 patients in our study sustained direct trauma to their noses, which resulted in closed communited nasal bone fracture. In such unstable nasal bone fractures cases, only internal nasal packing is inadequate to support the position of the reduced nasal bones. Also, solitary use of external nasal splint will displace the fracture fragments under the nasal skin in an unpredictable direction. For such particular unstable nasal bone fracture cases, where fracture segments are unstable and have tendency to fall medially, we have developed a technique that uses zero (0°) degree, or a 30° endoscope for guided nasal bone fracture reduction, and use of stainless steel (SS) wire and ultra-soft silicone nose pads of a spectacle frame for external fixation and splintage of the nasal bones. This was done in combination with internal support by a merocele, with or without POP application. This technique provides guided, accurate, and adequate immobilization of the bony fractured segments of nasal bones as well as nasal septum. When the nasal bones are adequately immobilized, the conditions become ideal for these fractures segments to get healed faster with minimal oedema or ecchymosis of the surrounding tissues.

A detailed history, physical examination, and appropriate radiological investigations are essential for diagnosis and treatment. To begin the assessment, a precise history to know the mechanism of injury, injuring agent, direction of blow, and timing of nasal injury, presence/absence of epistaxis is recorded. A history of epistaxis is indirect evidence of laceration of the involved nasal mucosa. Patients themselves may not clearly describe their preinjury nasal shape or old nasal deformity, so reviewing of patient's old photographs may prove very helpful. Standard seven-view nasal photographs (Front view/ Right and Left laterals/ Right and Left obliques/ Low basal view/ High basal or Superior views) are taken to complete the nasal history and for record purpose.

The physical examination includes an inspection of nasal swelling, deviation and palpation of the nasal skeleton to identify tenderness, crepitus, depression, nasal shortening, and widening of the nasal base, and cerebrospinal fluid (CSF) leak.

Anterior rhinoscopy examination and diagnostic nasal endoscopy under topical anaesthesia was performed to rule out septal fracture, especially posterior bony septum, septal hematoma, lateral nasal wall mucosal or septal mucosal tears.

Non contrast computed tomography (NCCT) scan of face with three-dimensional (3-D) reconstruction was the preferred radiological modality by us.

Inclusion Criteria

1. Age > 18 years.
2. Recent history of nasal trauma.
3. Willing to undergo our described method of surgery.
4. Evidence of clinical or radiological nasal deformity.

Exclusion Criteria

1. Patient with concomitant CSF leak or CSF rhinorrhea.
2. Patient with associated extensive frontal bone injury.
3. Patient with extensive panfacial fractures which require open reduction and miniplating.

Surgical steps

All the patients were taken up under general anaesthesia. A Boies nasal elevator is placed against the external nose to measure the distance from the medial canthus to the nostril rim. This prevents the surgeon from inserting the endoscope, or the fracture reduction forceps/elevator too far superiorly and injuring the skull base.

0° endoscope is introduced one by one in bilateral nasal cavities and the nose is assessed for clotted blood, deviation, mucosal tears, and fracture segments sticking out of nasal mucosa. Clotted blood as well as fracture segments of septum or nasal bones which are protruding out of the torn mucosa and hanging freely inside nasal cavity were removed. Neuro-patties soaked in vasoconstrictive agent were placed inside the nasal aperture, and was removed after 15 minutes. 0° or a 30° endoscope is introduced inside the nasal cavity on the side with

larger deviation of fracture segment. Under endoscope guidance, Boies nasal fracture elevator is inserted just below the fracture segment (Fig.1), and the fractured bone is pulled laterally and guided into a neutral position, while an assistant holds the patient's head firmly. A palpable click may sometimes be appreciated after successful reduction. Asch forceps was used in case there is fracture of nasal septum or if elevating a centrally depressed fragment is required. Each arm of the forceps is inserted on either side of the septum and using an upward and outward force perpendicular to the dorsum, the septum is guided back into a neutral position. Any septal hematoma if present was drained under endoscopic guidance using the traditional technique of incising septal mucosa by an anteroposterior incision parallel to the nasal floor.

One ultra-soft silicone nose pad was taken, and two 16-gauge needles were passed through it (Fig. 2). The needles were gently pushed in such a way that both needles cross the nasal bones on right side, the nasal septum just below the keystone area, and comes out through the nasal bones as well as nasal skin of the left side, in one go (Fig. 3, A & B). Second nasal silicone pad was made to perforate through the needle tips so that it rests on the left side of nasal dorsum just opposite to the pad on the right side of nasal dorsum. A Stainless steel (SS) wire of 24 gauge was passed through one of the needle tip on the left side, so that it comes out of the needle hub from the right side. Stainless steel wire was then bend and the same wire was inserted through the tip of the second needle such that it comes out of the hub of the 2nd needle (Fig. 3, C, D, & E). Needles were then removed and the stainless steel (SS) wires were pulled in an upward and anterior direction to align the fracture segments of nasal bones and nasal septum in neutral position. When satisfactory lifting, alignment and positioning of fracture segments is achieved, assistant holds on to the wires so as to maintain the position of the fracture segments. Final minor alignment at this time can be done using fingers and thumb, because pulp of fingers, and thumb helps the surgeon to assure that fracture segments are aligned in a smooth contouring straight line, and no segment is palpated sticking out unfavourably under the nasal skin. Antibiotic ointment smeared merocele was inserted in both nasal cavities, and injected with normal saline so that they are fully swollen and can provide sufficient support to the nasal framework from below. If merocele is unavailable, ribbon gauze can also be used. Now, the SS wires are twisted on each other to tighten and stabilize the neo-assembly (Fig. 3. F and Fig. 4). This can sometimes be combined with application of plaster of Paris to the nasal dorsum.

After the surgery, patients were shifted to ward. Cold fomentation around the eyes using ice packs was advised for control of oedema and ecchymosis of eyelids. All patients were given intravenous antibiotics, painkillers, proton pump inhibitor, and oral antihistaminic medication, as well as serratiopeptidase. Merocele was removed on 3rd postop day, Plaster of Paris, if applied, was removed on 14th postoperative day, whereas SS wires removed on 21st post op day.

Patients were discharged on oral medications and normal saline nasal drops.

All the 30 patients were assessed for post-operative oedema and ecchymosis at 1,2, 3,7 and 21 days after the operation. Modified Kara and Gokalan Scoring system (Fig. 5) was followed for grading of periorbital oedema and ecchymosis.[7]

Scoring system for oedema is as follows:

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 is as follows:

GRADE 1 : Ecchymosis up to the medial 1/3rd of lower and /or upper eyelid.

GRADE 2 : Ecchymosis up to the medial 2/3rd of lower and /or upper eyelid.

GRADE 3 : Ecchymosis up to the full length lower and /or upper eyelid.

Comparison was done between pre-operative and post-operative photographs, and the satisfaction of both the patients and the surgeon regarding aesthetic aspect of the nose was assessed at 3 months, and 6 months, and 1 year after the operation (Fig. 6).

Whereas, functionality of nose was done using cotton wisp test at 3 months, and 6 months, and 1 year after the operation.

RESULTS

The study was conducted for a period of 2 years from May 2020 to June 2022. A total of 30 patients with age ranging from 20 years to 45 years and with clinical and/or radiological findings of nasal bone fracture formed the basis of this study. All these 30 patients were assessed for above-described technique of nasal bones fracture reduction and external fixation.

All patients were subjected to detailed history and examination, the findings of which were tabulated. The clinical profile, operative findings, and postoperative findings were also tabulated.

In our study, all patients were male and all had recent history of trauma to the nose leading to unstable nasal bone fracture. Out of 30 patients, maximum number patients belong to the 20 to 25 years age group with maximum cause of nasal bone fracture being road side accident (RSA) (Table 1). It was observed that most patients (76.6%) reported within 48 hours of injury (Table 2), whereas only 7 patients (23.3 %) reported after 48 hours of injury. Delay beyond 48 hours in these cases was attributed mainly to either getting the proper reference letter from the referring hospital, or in some cases

establishment of patient's home far from the main city. All patients were operated within 24 hours of reporting and admission to our centre.

Grading of intra operative bleeding was done in accordance with Fromme-Boezaart surgical field bleeding grading. For our study, grade 0,1, and 2 was considered Excellent hemostasis, grade 3 was considered Average hemostasis, whereas grade 4, and 5 was considered Poor hemostasis. During the surgery it was found in our study that excellent haemostasis was achieved in 21 patients (70 %), average haemostasis was achieved in 8 patients (26.6 %), whereas poor hemostasis was achieved in 1 patient. (Table 3).

Ease of performing the nasal bone reduction and external fixation was decided as excellent if the fracture segments didn't need any extensive manipulation to realign and the needles could be negotiated through bilateral nasal bones and septum easily in one go. It was considered average in cases where there was any difficulty in realignment due to snuggly impacted bony fragment, or the needle negotiation was difficult. It was observed that overall ease of performing this technique of nasal bone reduction and external fixation was excellent in 76.6 %, and average in 23.3 % (Table 4).

Average duration of surgery in our study was taken to be between 30 mins - 45 minutes excluding the general anaesthesia time, and surgeries extending beyond 1 hour was considered prolonged. Of the total 30 cases operated in the study, 25 patients (83.3%) were completed within average time, while 5 (16.6 %) patients had prolonged surgery time (Table 5).

Patients were assessed for the presence of postoperative periorbital oedema in terms of maximum grade and duration. It was observed in our study that all 30 patients developed postoperative oedema. Grade 1 oedema was present in 60% patients, while rest 40 % patients had grade 2 and 3 with equal patients (6 -6) in each group. None developed grade 4 oedema (Table 6).

Patient were assessed for the presence of oedema on post-operative day 1, 2, 3, 7, and 21. It was observed that all patients (100 %) had postoperative oedema till day 3. On day 7, only 6 patients (20 %) presented with persisted periorbital oedema. Oedema however was decreased and was of lesser grade as compared to postoperative day 1, 2, or 3, whereas no oedema persisted in any of our patient till day 21 of operation (Table 7).

Similarly, all patients were assessed for presence of ecchymosis, and it was found that out of 30, 19 patients (63.3 %) developed ecchymosis (Table 8). None developed severe (grade 3) type ecchymosis post-surgery, however out of these 19 patients, 15 (78%) showed evidence of grade 1 ecchymosis, whereas 4 (21%) showed grade 2 ecchymosis (Table 9). Patient were also assessed for the duration of presence of ecchymosis. All patients (100 %) showed evidence of ecchymosis till day 3 of operation. 8 patients (26.6 %) showed persistence of ecchymosis (grade1) till day 7, and 1 patient (3 %) showed evidence of ecchymosis (grade 1) even on day 21 of operation (Table 10).

Deformity correction at end of 3 months, 6 months, and 1 year was evaluated by comparing the pre-operative and post-operative photographs of the patients and assessing the satisfaction of both the patient and surgeon regarding aesthetic and functional improvement of nose.

On comparing patient's satisfaction regarding the aesthetic outcome of the surgery, it was observed that at end of 3 months, out of 30 patients, 19 were very satisfied with the aesthetic outcome, whereas 6 patients were moderately satisfied, and 5 patients were unsatisfied. However, at end of 6 months, there were 22 patients who were very satisfied, 4 were moderately satisfied, and 4 remained unsatisfied by their aesthetic appearance in our study. Whereas the end of 1 year, 23 (76.6%) patients were very satisfied, 5 (16.6%) were moderately satisfied, and 2 (6.6%) were unsatisfied.

On comparing surgeon satisfaction, it was observed that at end of 3 months, out of 30 patients, operative surgeon was very satisfied in 22 patients with the aesthetic outcome of the surgery, whereas moderately satisfied in 5 patients, and unsatisfied with aesthetic results in 3 patients. However, at end of 6 months and 1 year, he was very satisfied with the aesthetic outcome in 25 patients (83 %), moderately satisfied in 2 (6.6 %), and remained unsatisfied in 3 (10 %) patient (Table 11).

We realize that this increase in number of satisfied patients in both the patient and the surgeon group, was attributed to the complete resolution at the end of 1 year of whatsoever small or less oedema/ecchymosis which was persistent even at end of 3 months and 6 months.

We also noticed that there is difference in surgeon and patient's satisfaction in terms of aesthetic outcome, as shown in Table11, that number of patients satisfied with their respective aesthetic outcome is less than the surgeon expectance of the aesthetic outcome, was due to the stubborn concealed human desire of patient wherein the patient not just wants an improved nose but also a perfect nose. We have observed that irrespective of what the patient's pre-injury or post-injury shape of nose is, they believe that every small or big fault in their noses will be corrected during the surgery and they will have an absolutely new flawless nose.

This hidden desire of attaining a perfect celebrity type nose, leads to development of a hinderance to retrieve a proper unbiased response from the patient. However, despite regular patient counselling throughout the treatment, we still speculate that this variable is very difficult to control or abolish, and might alter an unbiased response from the patient.

When patients were assessed for functional improvement by cotton wisp test at the end of 3 months, out of 30 patients, 19 were very satisfied, 6 patients were moderately satisfied, and 5 patients were unsatisfied, whereas at end of 6 months, 25

patients were very satisfied, 3 were moderately satisfied, and 2 were unsatisfied. Whereas, at the end of 1 year, 26 (86.6%) patients were very satisfied, 2 (6.6%) were moderately satisfied, and 2 (6.6%) were unsatisfied (Table 12). This increase in number of satisfied patients at the end of 1 year was speculated to be related to the resolving of the recalcitrant oedema of the nasal mucosa that may persist at end of 3 and 6 months.

One complication that we encountered in 3 patients, and which remained the main cause of unsatisfaction in them (mentioned in Table 11) was the mild depression of the nasal skin beneath the nose pads. However, if judiciously assessed and avoiding overenthusiastic tightening of SS wires, this complication is easily prevented.

In our study, as mentioned, 23 patients after end of 1 year were completely satisfied with the aesthetic appearance of the nose. However, 7 out of 30 patients, in which 5 belonged to moderately satisfied and 2 who belonged to unsatisfied group were advised for residual nasal correction by rhinoplasty.

Table 1: Age distribution and Etiology of nasal bone fracture

Agegroup (in years)	RSA	ASSAULT	SPORTS INJURY	SLIPPING AT HOME/OFFICE	TOTAL PATIENTS
20 -<25	6	2	4	0	12
25- < 30	3	3	2	0	8
30 - < 35	2	1	0	2	5
35- <40	1	1	0	1	3
40-< 45	1	0	0	1	2
TOTAL PATIENTS	12	8	6	4	30

Table 2: Duration of Nasal bone injury

	Within 24 hours	Between 24 – 48 hours	Beyond 48 hours
RSA	3	8	1
ASSAULT	4	4	0
SPORTS INJURY	1	1	4
SLIPPING AT OFFICE / HOME	1	1	2
Total patients	9	14	7
Percentage	30 %	46.6 %	23.3 %

Table 3: Hemostasis during surgery according to Fromme Boezzart surgical field bleeding grading

Hemostasis	Fracture nasal bone reduction	Percentage
Excellent Grade 0: No bleeding Grade 1: Slight bleeding. No suctioning required. Grade 2: Slight bleeding. Occasional suctioning required.	21	70 %
Average Grade 3: Slight bleeding. Frequent suctioning required. Bleeding threatens surgical field a few seconds after suction is removed.	8	26.6 %
Poor Grade 4: Moderate bleeding. Frequent suctioning required. Bleeding threatens surgical field directly after suction is removed. Grade 5: Severe bleeding. Constant suctioning required. Bleeding appears faster than can be removed by suction. Surgical field threatened and surgery is not possible.	1	3.3 %
Total patients	30	

Table 4: Ease of performing nasal bone reduction

	Ease of performing fracture nasal bone reduction with external fixation	Percentage
Excellent	23	76.6 %
Average	7	23.3 %
Total patients	30	

Table 5: Duration of Surgery

Duration	Fracture nasal bone reduction with external fixation	Percentage
Average	25	83.3 %
Prolonged	5	16.6 %
Total patients	30	

Table 6: Grade of Periorbital Oedema

Grade of Periorbital Oedema	Fracture nasal bone reduction with external fixation	Percentage
Grade 1	18	60 %
Grade 2	6	20 %
Grade 3	6	20 %
Grade 4	0	0

Table 7: Duration of Periorbital Oedema

Duration of Periorbital oedema	Fracture nasal bone reduction with external fixation	Percentage
Day 1	30	100 %
Day 2	30	100 %
Day 3	30	100 %
Day 7	6	20 %
Day 21	0	0

Table 8: Presence of Ecchymosis

	Fracture nasal bone reduction with external fixation	Percentage
Present	19	63.3 %
Absent	11	36.6 %
Total	30	

Table 9: Grade of Ecchymosis

Grade	Fracture nasal bone reduction with external fixation	Percentage
Grade 1	15	78 %
Grade 2	4	21 %
Grade 3	0	0
Total	19	

Table 10: Duration of Ecchymosis

Duration	Fracture nasal bone reduction with external fixation	Percentage
Day 1	19	63.3. %
Day 2	19	63.3. %
Day 3	19	63.3. %
Day 7	8	26.6 %
Day 21	1	3.3 %

Table 11: Patient and surgeon satisfaction on deformity correction

	AESTHETIC IMPROVEMENT acc. To PATIENT			Total patients
Fracture nasal bone reduction with external fixation	Very Satisfied	Moderately satisfied	Unsatisfied	
At 3 months	19	6	5	30
At 6 months	22	4	4	30
At 1 year	23	5	2	30
	AESTHETIC IMPROVEMENT acc. to SURGEON			
At 3 months	22	5	3	30
At 6 months	25	2	3	30
At 1 year	25	2	3	30

Table 12: Functional improvement of nose

	FUNCTIONAL IMPROVEMENT by Cotton wisp test		
	VERY SATISFIED	MODERATELY SATISFIED	UNSATISFIED
AT 3 MONTHS	19	6	5
AT 6 months	25	3	2
At 1 year	26	2	2

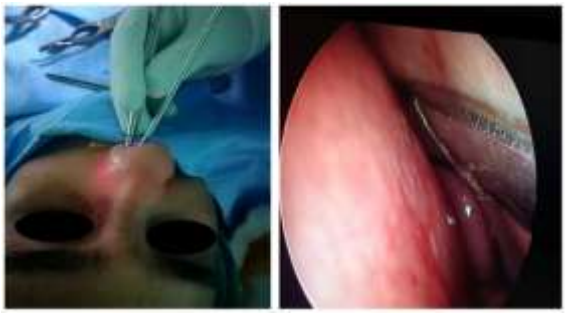

Figure 1: Under endoscope guidance, nasal fracture elevator is inserted just below the fracture segment.

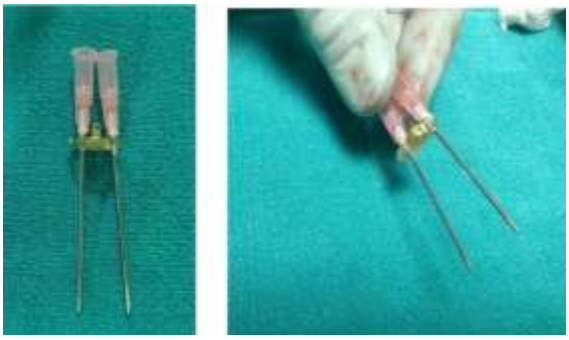

Figure 2: Showing silicone nose pads perforated with two 16-gauge needles passed through it.

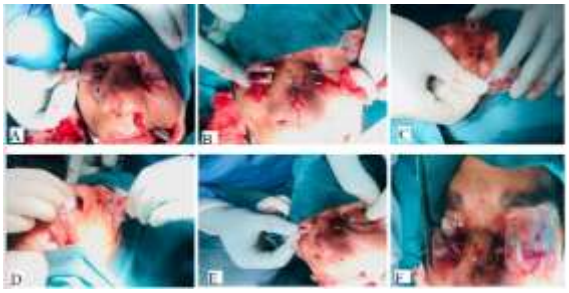

Figure 3: A) &B): Showing both needles being gently pushed to pass through the nasal bones on right side, the nasal septum just below the keystone area, and coming out through the nasal bones as well as nasal skin of the left side. (aka Transcutaneous Transosseous negotiation of needles)
C): Showing SS wire of 24 gauge being passed through one of the needle tip on the left side, so that it comes out of the needle hub from the right side.
D) & E): SS wire was then bend and re-inserted through the tip of the second
needle such that it comes out of the hub of the 2nd needle.
F): Showing twisting of SS wire on each other to tighten and achieve external fixation.

Figure 4: Intraoperative and Postoperative pic of patient with Nose pads and SS wire in place

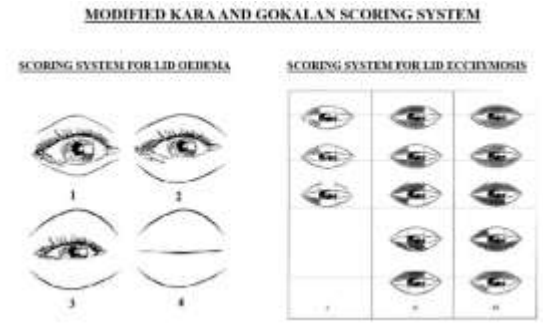

Figure 5: Showing Modified Kara and Gokalan Scoring system for lid oedema and lid ecchymosis

Figure 6: Comparative frontal view of patient at the end of 1 year postoperatively

DISCUSSION

Fractures of the nasal bone are the most common of all fractures occurring in face. Nose being the center of the face, carries the risk of being most noticeable after the injury and significantly affecting a person's appearance. Thus, functionally, and aesthetically appropriate treatment is needed for nasal bone fractures.[8]

Nasal bone fractures can be treated by close or open techniques. Because of safety, technical ease, and comparatively lower cost of surgery, like advantages, closed reduction of nasal bone fractures remains a first line of treatment. Closed treatment of nasal fractures entails reduction of the nasal bones and stabilization with packing placed into the nasal vault and a splint. External splints do not prevent unstable, flail nasal bones from being displaced medially/posteriorly.[5]

When the nasal bones are unstable because of comminution pattern, surgeon is not able to stabilize them in an anatomic position with nasal packing alone, SS-wire stabilization is a viable treatment option.

SS wires are very commonly used in intermaxillary fixation where maxilla or mandibular fixation is

required. We have observed that while there are many articles on management of nasal bone fracture by closed reduction, there are not as many articles on management of nasal bone fractures by external fixation.

Sear AJ in 1977 described a method of internal splinting for unstable nasal fractures using stainless steel wires.[9] Kim SW et al in 2002 mentioned fluoroscopy guided closed reduction and external fixation of nasal bone fracture with a 0.9 mm threaded Kirschner wire (K-wire).[8] Kosaka M et al in 2010 described nasal bone fracture closed reduction using a 1.2 mm K-wire bent into a double curve shape and wrapped in hydrocolloid dressing to form a nasal bone clip.[10] Anastassov GE et al in 2012 used two 1.6 mm K-wires to tent the dorsum and maintain 120-degree nasofrontal angle giving good results in unstable "flail" nasal fractures.[5] Recently Joshi SJ et al in 2015 described their tripod suspension and stabilization technique for closed reduction of comminuted and compound fractures of nasal bone using intranasal splint, external nasal splint, nylon sutures, and K wire.[6]

We realised that these techniques are not just technically demanding, moreover few of them carried high risk of entering the frontal sinus, injury to nasal floor, not being able to pass the suture correctly from the keystone area, or complication during splint removal etc.

Our technique covers all the key areas required to achieve a favourable result, like supporting the nasal vault from below by merocele or ribbon gauze nasal packing, and supporting the whole osseocartilaginous framework of nose by SS wires. SS wires provides superior stabilization, not just externally but also internally, maintain tenting of the nasal dorsum and septum anteriorly and superiorly. Hence, it not just takes care of the nasal bone fracture, but also of septum fracture. Whereas, nasal packing, when meticulously placed in the nasal cavity in a superior direction into the nasal vault stabilizes the fracture segments from below. Moreover, nasal packing gives equal support from both sides to the septum also.

CONCLUSION

According to our study we suggest that in the treatment of any simple two part nasal bone fracture case, or even in cases with severely displaced, and unstable nasal fractures, endoscope guided closed reduction with transcutaneous transosseous splinting and external fixation with S-S wire and silicone nose pads, is an excellent technique to provide patients with a safe, effective, and predictable aesthetic and functional outcome.

REFERENCES

1. Murray JA. Management of septal deviation with nasal fractures. Facial Plast Surg 1989; 62: 88–93.
2. Nahum AM. The biomechanics of maxillofacial trauma. Clin Plast Surg 1975; 2:59–64.
3. Kim D, Holmes S. Nasal and facial fractures. In: Watkinson JC, Clarke RW, eds. Scott brown's Otorhinolaryngology head and neck surgery. 8th ed. New York: CRC Press Taylor and Francis; 2018. p. 1183
4. Illum P. Long-term results after treatment of nasal fractures. J Laryngol Otol 1986;100(3):273–7
5. Anastassov GE, Payami A, Manji Z. External fixation of unstable 'flail' nasal fractures. Craniomaxillofac Trauma Reconstr 2012; 5: 99-106.
6. Joshi SJ, Mishra G, Panchal NK. Tripod suspension and stabilisation: an innovative splintage technique for closed reduction of comminuted and compound fractures of the nasal bones. Eur J Plast Surg 2016; 39: 85–92
7. Kara CO, Gokalan I. Effects of single-dose steroid usage on edema, ecchymosis, and intraoperative bleeding in rhinoplasty. Plast Reconstr Surg 1999; 104: 2213–8.
8. Kim SW, Hong JP, Min WK, Seo DW, Chung YK. Accurate, Firm Stabilization Using External Pins: A Proposal for Closed Reduction of Unfavorable Nasal Bone Fractures and Their Simple Classification. Plast Reconstr Surg 2002; 110: 1240-6
9. Sear AJ. A Method of Internal Splinting for Unstable Nasal Fractures. Br J Oral Surg 1977;14: 203-9
10. Kosaka M, Sai K, Shiratake Y, Ohjimi H. Nasal bone clip: A novel approach to nasal bone fixation. J Craniofac Surg 2010; 21; 552-4.