Transnasal Stabilization in Naso-orbito-ethmoid Fractures: The Easy Way!

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Abstract Effective management of naso orbito ethmoidal fractures involves both functional and esthetic correction. While functional correction is routinely achieved, in our experience, most secondary deformities resulted from inadequate nasal bridge projection. We hereby suggest a simple technique to stabilize the nasal bridge after mild overcorrection thereby improving the esthetic outcome in naso orbito ethmoidal fractures.

Keywords Naso-orbito-ethmoidal fracture · Nasal fractures · Transnasal fixation

Introduction

An individual is recognized for his ethnicity and race primarily by the shape of the eyes and the middle third of the face. Minimal change in the architecture of the nasomaxillary area can lead to major disfigurement in one's face. For this very reason repair of the naso-orbito-ethmoid (NOE) region is a challenge to the clinician. Appropriate management of NOE fractures involves functional and esthetic correction. While functional correction is routinely achieved, in our experience, most secondary deformities resulted from inadequate nasal bridge projection. We hereby suggest a simple technique to stabilize the nasal

bridge after mild overcorrection thereby improving the esthetic outcome in NOE fractures.

Materials and Methods

Patients of NOE fractures reporting to the emergency department and departments of otorhinolaryngology and maxillofacial surgery, who were planned for open reduction were selected. Those with associated head injury were excluded.

Material Required

- Nasal reduction forceps
- 18 gauze needle
- Size 1.0 non resorbable suture

The Basic Concept

Nose is a wedge shaped structure and application of compressive forces at the base increases the projection (Figs. 1, 2).

Technique

After proper reduction of the naso ethmoid fractured bones using the nasal reduction forceps, an 18 gauze needle was passed transcutaneously from the base of the nasal bridge on one side to the contralateral side thereby retaining the nasal bridge in its elevated position and establishing nasal prominence (Fig. 3). A 1–0 polypropylene suture material was used to secure the needle in place. The sharp end of the needle and the hub were cut using a wire cutter so that it does not obstruct vision. The edges were smoothed using

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Fig. 1 Geometry of nasal projection

Fig. 2 Bilateral equal compressive forces at the base of the triangle enhancing nasal projection

Fig. 3 Anatomical position of the needle demonstrated on a skeleton

a file. The needle was pulled out under topical anesthesia after 2 weeks of stabilization. Patient tolerance on post op day two and day fourteen was recorded using a Visual Analog Scale and a mean tolerance was generated.

Results

Seven patients were treated by this method. Patient tolerance ranged from 5 to 8 on VAS scale as obtained from a mean of post-operative day two and day fourteen values

Table 1 Individual patient details and tolerance towards the needle

Serial number	Age	Sex	Diagnosis	Mean tolerance towards the needle
1	25	M	FNOE	6
2	21	M	Le Fort III	7
3	24	M	NOE	8
4	27	M	Right Le Fort III Left Le Fort II	5
5	38	M	Le Fort III	8
6	44	M	FNOE	8
7	26	M	FNOE	7

Fig. 4 Pre-operative frontal picture of a case of NOE complex fracture showing loss of nasal projection and flaring of nasal bridge

(Table 1). We achieved a satisfactory nasal projection with an esthetically acceptable result (Figs. 4, 5, 6).

Discussion

With the increased incidence in high-velocity injuries there are more number of naso-orbito-ethmoid (NOE) fractures in a typical trauma setup. NOE fractures remain the most complex of all facial fractures to diagnose and treat mainly because of the intricate anatomy and difficulty in fracture fixation. NOE fractures can be very difficult to repair. Successful management of NOE fractures demands a thorough knowledge of both the hard and soft tissues, and in-depth understanding the regional anatomy. Misdiagnosis and less than adequate or delayed treatment often result in facial deformities and functional defects that are at best only partially correctable with secondary care [1–4].

NOE fractures are commonly associated with other facial injuries due to anatomic projection and most vulnerable central location on the face. Management is aimed at both esthetic and functional rehabilitation and can be achieved by closed or open techniques. Closed reduction involves reduction of fragments by combination of

Fig. 5 Intra-operative frontal picture with transnasal stabilization needle in situ

Fig. 6 Post-operative lateral view of same patient demonstrating the nasal projection after needle removal on post-operative day fourteen

Walsham's forceps and digital manipulation followed by external or internal stabilization using nasal pack and external cast splint. The open method involves reduction under direct vision and fixation of the fracture fragments using mini plates or wires. Both the approaches have pros and cons depending on the technical expertise of the treating surgeon.

Closed method in combination with stabilization may not always establish the contour and projection of the nasal bridge to satisfaction. While intranasal packing can lead to over correction and widening of nasal bridge, external cast splint can become loose after 48–72 h

postoperatively once the edema settles. Open method does not always deliver a satisfactory outcome due to the frequent comminution of the fracture segments and presence of multiple small bone fragments which makes it difficult to explore and replicate the exact pre-injury anatomy. In the process of restoring the function of the face and jaws one might end up giving little importance to smaller bones like nasal bones which actually determine the esthetics of the face.

We present in this article a modification for a method of minimal intervention which was described earlier for use in the reduction and stabilization of NOE fractures. This method is simple, less time consuming, economical and successful in re-establishing the contour and projection of the nose. A number of approaches reported by authors in the past for reconstructing these very difficult injuries [4–8]. Unfortunately there is no universally accepted or fool-proof technique that consistently works. Exposure and visualization of the fractures may range from a wide exposure with a coronal incision to minimal access surgery using endoscopic visualization. The key areas concerned are the medial walls of the orbit and nasal dorsum, which can be either restored by reduction and fixation or reconstructed using bone grafts or alloplastic materials. A canthopexy may be performed under direct visualization with non resorbable sutures or with a transnasal wiring technique. Isolated nasal bone fractures are usually treated via closed reduction, whereas fractures associated with mid-face fractures are treated with open reduction. After reduction of fractures internal and external splints may be used wherein the former are usually maintained for 3 days and latter for 7–10 days. While placing internal splints, there is chance of disturbing orientation and there may be a change in the size of external splint. The incidence of post reduction secondary deformities that may require secondary rhinoplasty has been reported to range from 14 to 50%.

In all our cases after open reduction with coronal approach no internal splint was kept, its function was performed by the trans-nasal needle stabilization supporting the base of the nasal bridge which decreased chances of depression and saddle deformity. The materials used for the technique are easily available in the operating room as compared to lead plates or buttons previously described. Patients were satisfied with the outcome on the post-op 6 weeks follow up. Our technique is easy to perform with no additional armamentarium and negligible extension in operative time. When used with proper reduction techniques, provides a valuable tool to ascertain adequate nasal projection thereby reducing the incidence of residual deformities requiring secondary rhinoplasty.

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