Transnasal Fixation of NOE Fracture: Minimally Invasive Approach

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Received: 17 May 2011 / Accepted: 27 September 2011 / Published online: 18 October 2011
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Abstract

Purpose Nasal fractures may occur in association with other facial injuries like Le-forte II and III and also severe comminuted midface fractures or by themselves. Bony fractures of the nose may involve one or both nasal bones, the frontal process of the maxilla, the bony septum, and in severe trauma the nasal–orbital–ethmoid complex. Treatment of these fractures range from closed reduction and support to open reduction and miniplate osteosynthesis. Purpose of this article is to describe a technique of managing nasal bone fractures associated with midface fractures.

Patients and Methods Four consecutive patients who sustained nasal bone fracture associated with multiple midfacial fractures were included in the study.

Results Postoperatively, results showed symmetry in the intercanthal to lateral canthal width. Nasofrontal angle and nasal prominence was established to the expected position in most of the cases.

Conclusion This technique can be used for Le forte II and III cases where nasal bones to be addressed. This method has shown predictive results with minimal intervention.

Keywords Naso-orbito-ethmoid fracture (NOE fracture) · Le forte II and III fractures · Transnasal wiring

Introduction

The nose is the most frequently injured facial structure, accounting for approximately 40% of bony injuries in facial trauma [1]. Nasal fractures may occur in association with other facial injuries like Le Forte II and III and also severe comminuted midface fractures or by themselves. Because of the prominence of the nose and its central location on the face it is equally important to manage nasal bone fracture along with larger segments. Failing to do so can lead to both aesthetic and functional deformities.

Bony fractures of the nose may involve one or both nasal bones, the frontal process of the maxilla, the bony septum, and in severe trauma the nasal–orbital–ethmoid complex. The most likely area of fracture of the nasal bones is the thinner lower two-thirds [2]. Simple nasal fractures must be separated from the more serious naso-orbito-ethmoid fracture (NOE fracture) where the fracture extends into the nose through the ethmoid bones. These fractures may cause injury to the dura and a subsequent cerebrospinal fluid leak.

Treatment of nasal bone fractures can be by two methods, one is closed reduction of fragments by combination of Walsham's forceps and digital manipulation and stabilization with nasal pack and external cast splint. Other method is open reduction and fixation using mini plate or wires. Each of these methods has varied results because of the technique involved.

Closed method in combination with nasal pack and external cast splint may not establish the contour and projection of the nasal bridge. In this method, 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 oedema settles. This requires another cast to be replaced.

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When there is comminuted nasal bone fracture along with midface fracture it was found difficult to explore and join the bone fragments. Fixation of the bony fragments is accomplished with a combination of microplates for larger bony segments and wires (28 or 30 gauge) for smaller bony segments. It is always stated in the open method, location of the medial canthal tendon is necessary if it is attached to a small bony fragment or avulsed. A wire is passed through the bony fragment in anticipation of the transnasal cantopexy. However, with tiny fragments, it can sometimes be difficult to secure a wire through segment [3]. When following the sequence of facial fracture repair nasal part is considered after fixing the other major segments [4]. So, most of the concentration and time goes in aligning and fixing major bony segments, at the end land up in giving little importance to smaller bones like nasal bones. While considering the open method requires an additional incision to be placed if there is no existing laceration. This in itself has tissue morbidity associated with flap can affect the aesthetic. In such cases it is usually difficult to open and fix the fractured nasal complex. This leads to widened and collapsed nasal bridge. But nasal bone realignment is equally important because this reflects the overall success of the surgery at the end. This can be because of lack of time or surgeon must have tried by then.

So a method of minimal intervention and promising results, which was described earlier is modified and used in our multiple facial bone fracture cases. This method is simple, less time consuming, economical and successful in re-establishing the contour and projection of the nose. This article describes the technique of managing nasal bone fractures associated with midface fractures.

Patients and Methods

All patients were treated at KLE PK medical centre, KLE University (Belgaum, India). All patients who had nasal bone fracture component along with midface fractures and treated from December 2008 to February 2009 were included in the study. Various midface fracture sustained by the patients included Le Forte II and III, zygomaticomaxillary complex, mandible parasymphysis and angle fractures and one patient sustained panfacial trauma. Follow up ranged from 4 to 24 weeks.

Technique

The technique objective was to reduce and align the skeletal and cartilaginous nasal structures to their pre-trauma state. Submental intubation and corneal shield was used in all the cases. Closed reduction is performed using an

instrument such as Ash septal forceps, Walsham's nasal bone forceps or a periosteal elevator placed internally to elevate the nasal bones, while externally moulding the bony and soft tissues with the opposite hand. Percutaneous transnasal wiring is done once the bony fragments are reduced. Drilling a hole for wire to be passed is unnecessary because of the comminution that frequently accompanies such injuries. Instead a needle of 18 gauge is used to pass the wire transnasally. Two points for the needle insertion are identified, one at the deepest portion of the root of the nose at the lateral aspect and another approximately 5–7 mm inferior depending on the support needed. The needle is inserted through the first point transnasally to the opposite side. A wire of 26 gauge is passed through the lumen of the needle, and then the needle is withdrawn leaving the wire in position. A part of the needle cap is used to support the reduced fracture segments externally on the nasal region. Needle cap is cut to 5–7 mm depending on the area which needs support. Wire is now passed through this needle cap and then it is passed on the other side using the needle. Again a cut piece of needle cap is passed through the wire and both ends of the wire are twisted together (Figs. 1, 2). Care was taken not to tighten the wire too hard to avoid pressure induced necrosis. Horizontal mattress fashioned wiring and the rigid needle cap together will maintain the contour and the projection of the nasal bridge. Additional nasal packing was used in septal injuries.

Results

This technique is used for Le Forte II and III cases where nasal bones to be addressed. Postoperatively, results showed symmetry in the intercanthal to lateral canthal width. Nasofrontal angle and nasal prominence was

Fig. 1 Needle with transnasal wire in position

Fig. 2 Needle with transnasal wire in position

Fig. 3 Preoperative photographs

established to the expected position in most of the cases (Figs. 3, 4, 5, and 6). Small scar was visible on lateral view on the medial orbital region at the place of needle insertion. But this scar was not visible on frontal view of the face. Postoperative photographs are reviewed with the patient opinion regarding pretrauma status. All patients had satisfactory opinion.

Discussion

Before 1960, the treatment of NOE fractures generally involved closed reduction with external plates and splint

Fig. 4 Preoperative photographs

Fig. 5 Postoperative photographs

fixation. Closed reduction and external splint fixation has been recommended by many investigators [2, 5, 6]. Those investigators discussed closed treatment using external nasal plates following intranasal and extranasal

Fig. 6 Postoperative photographs

manipulation. For instance, Adams [7] refers briefly to this injury, which was occasionally explored through a pre-existing laceration: “After replacing the bony cartilaginous nasal septum in the midline, a small stainless steel wire was threaded through and through the nose over a lead plate on each side”.

In their article on midfacial fractures, Converse and Smith [8] deal with early treatment of naso-orbital fractures in one paragraph: “It is often possible to manipulate the comminuted fragments with the thumb and index fingers, placing them as far back as possible in the medial canthal region. This manipulation, together with the forward pressure exerted by an instrument placed under the dorsum of the nose, corrects the deformity. Fixation of the fragments is best obtained by through-and-through wiring over a perforated plate.

With development of craniofacial surgical techniques, computed tomography (CT), miniaturized plate and screw fixation devices, more emphasis is given to direct exploration and fixation. The most important advancement in the treatment of such fractures came in 1964, when both Mustarde and Dingman [9, 10] demonstrated superior results with open reduction and internal fixation using interfragmental wiring. Later, in 1970, Stranc [11] highlighted the incidence of the medial canthal tendon avulsion and advocated exploration through existing lacerations or local incisions and treatment with anterior transnasal wires.

Authors stated that closed techniques were inadequate in treating such fractures. With severe comminution and

posterior, lateral and inferior displacement and dislocation of the medial orbital rim and wall, it was virtually impossible, without direct exploration and inspection of the fracture pattern and fragment situation, to adequately include these fragments in the transnasal wiring and hold them in their “elevated” position for any length of time [5]. The use of lead plates often results in an unnatural appearance of the nose with characteristic flattening, collapse, and inward telescoping of the nasal bones [6]. It also became apparent that lead plates and transnasal wires could not correct the medial canthal displacement or disinsertion.

Undoubtedly, direct fixation of the fractures yield predictable results, but is associated with morbidity of the approaches used to explore the region, requires the expertise and time and patience by the surgeon for the procedure. On the contrary, we find it convenient to use this closed technique and the results are reasonably fair as against overstated earlier disadvantages with the closed technique. The materials used for the technique are easily available as compared to lead plates, buttons etc. This technique avoids morbidity and unaesthetic scar associated with incisions for direct exploration. In present situation with newer surgical techniques of open reduction and fixation with plates, we need to rethink of older techniques which can give equally good results. In our centre this technique is used with modification for nasal bone fractures associated with other midface fractures.

Competing interests None declared.

References

1. Bartkiw TP, Pynn BR, Brown DH (1995) Diagnosis and management of nasal fractures. *Int J Trauma Nurs* 1:11–18
2. Cox AJI (2000) Nasal fractures—the details. *Facial Plastic Surg* 16:87–94
3. Papadopoulos H, Salib NK (2009) Management of naso-orbital-ethmoidal fractures. *Oral Maxillofac Surg Clin N Am* 21: 221–225
4. Marciani RD, Gonty AA (1993) Principles of management of complex craniofacial trauma. *J Oral Maxillofac Surg* 51:535–542
5. Ellis E (1993) Sequencing treatment for naso-orbito-ethmoid fractures. *J Oral Maxillofac Surg* 51:543–558
6. Gruss JS (1985) Naso-ethmoid-orbital fractures: classification and role of primary bone grafting. *Plast Reconstr Surg* 75:303
7. Adams M (1942) Internal wiring fixation of facial fractures. *Surgery* 12:523
8. Converse JM, Smith B (1963) Naso-orbital fractures. *Trans Am Acad Ophthalmol Otolaryngol* 67:622
9. Mustarde JC (1964) Epicanthus and telecanthus. *Int Ophthalmol Clin* 4:59–76
10. Dingman RO, Grabb WC, Oneal RM (1969) Management of injuries of naso-orbital complex. *Arch Surg* 98:566–571
11. Stranc MF (1970) Primary treatment of naso-ethmoid injuries with increased intercanthal distance. *Br J Plast Surg* 23:8