

Nasal Injury: Efficacy of Primary Reduction- A Retrospective Study

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Abstract

Aim of the Study:

1. This study was undertaken to evaluate the efficacy of primary reduction of nasal fractures and to study the need for secondary septorhinoplasty for the management of residual nasal deformity.
2. To study the demography of the nasal trauma.

Materials and Methods: Medical records of all patients with nasal fractures were collected and plan of management by the department of surgery and ENT were evaluated and post OP follow up done for one year. Cases between June 2016 to 2017 were collected.

Inclusion Criteria: All cases of Nasal trauma.

Exclusion Criteria: Facial trauma associated with head injury and those associated with comorbidities like DM, immunosuppression. *Results:* Out of total 100 patients, 10 patients met the inclusion criteria. Four patients underwent closed reduction of nasal bones and septum within 1 week of injury. Six patients could not be included because of multisystem injury or comorbidities. All 10 cases were followed up to determine the efficacy of the initial treatment modality as well as the need for secondary septorhinoplasty. All 4 cases who underwent closed reduction had no residual deformity or the need for secondary septorhinoplasty. Out of 6 untreated cases, 1 case underwent secondary septorhinoplasty.

Follow up period ranged from 1 month to 10

months. All patients who were treated primarily were pleased with the results and one patient who underwent secondary septorhinoplasty also had satisfaction. *Conclusion:* Closed reduction of nasal fractures appears to be an effective method of treatment with good patient compliance, reduced hospital stay and good cosmetic outcome. Best results are obtained if the surgery is done within 1 week of injury and the factors that affect the outcome are timing of surgery, status of the nasal septum, delay in treatment and associated injuries.

Keywords: Nasal Trauma; Nasal Bone Fractures; Septorhinoplasty.

Introduction

Nasal fractures account for greater than 50% of all facial fractures in adults [8]. The most common mechanism of injury is blunt trauma to the midface, usually the result of motor vehicle collisions, sports-related injury, or physical altercations. The natural projection and the fragility of distal structures in the nose contribute to its propensity for injury [9]. The bones and cartilage of the nose provide both aesthetic and structural support for the midface and airway; therefore, proper evaluation and management is necessary to prevent nasal deformity and nasal airway compromise.

Problems with the classical approach are many. First, even to the skilled surgeon, most nasal fractures are not clearly delineated immediately secondary to edema.

Second, though closed treatment for septal deformities and collapsed internal nasal structures (often seen in significant nasal injuries) is adequate to achieve temporary repositioning of structures, high

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recurrence rates and the need for reoperative rhinoplasty are common. Posttraumatic nasal deformities requiring reoperation have been reported to be as high as 50% [10,11,12,13]. The current consensus is that secondary collapse is caused by failure of the severely comminuted nasal bones and the disrupted septum to provide adequate structural support against the contractile forces of scarring. The contemporary approach to nasal fractures now requires that these injuries be approached on an individual basis, as no one procedure or technique is satisfactory for all patients.

Initial History and Treatment

The diagnosis of nasal trauma is based on clinical evaluation. A detailed patient history and examination is critical for proper patient selection and timing of repair. The mechanism of injury, time since injury, and patient age may all weigh heavily when differentiating patients needing acute reduction. Further, it is helpful to differentiate acute trauma-induced deformities from chronic or preexisting defects.

The precise mechanism of injury should be determined (i.e., motor vehicle, physical altercation with/without a weapon, fall, etc.). Different agents result in various types of trauma that mimics the direction and velocity of the force. Altercations resulting in assault-related nasal trauma typically generate low-energy lateral force transmission to the nose. These common injuries incur an in-fracture on the ipsilateral nasal bone, out-fracture on the contralateral side, and typically involve septal deformation. Frontal impact injuries are common in motor vehicle and projectile-induced trauma. These are typically high-energy insults resulting in greater nasal bone comminution and septal deformation. Crush injuries are also more common with frontal trauma.

The timing of injury is important as the optimal management differs if patients present within hours or weeks after injuries. In the initial hours after injury, prior to significant edema, it is possible to visualize new deformities fully. In these cases, a closed reduction is ideal. However, few patients present within this small window. After the onset of swelling, the physical details of the nose become obscured, and proper diagnosis becomes limited. In these instances, reduction should be delayed until the injury can be properly assessed (usually 3 to 5 days) [16].

Finally, history should address previous nasal trauma or procedures. It is important to compare the posttraumatic nose with a previous photograph (driver's license or wallet photo are useful in the acute

setting). A further historical exploration of breathing difficulties, nasal congestion, snoring, sleep apnea, and nasal drainage will also allude to previous irregularities. Frequent use of over-the-counter allergy medications or inhalers may also be significant. Finally, the patient should be aware that any surgical treatment attempted will reflect only the best possible outcomes given previous deformities with the goal to minimize deformation and nasal airway obstruction.

The physical examination should incorporate both internal and external components. External exam should focus on obvious nasal defects, malposition, and other apparent soft tissue injuries including lacerations, hemorrhage, or edema (Figure 2). Palpation of the nose is critical. Physical findings of crepitus, tenderness, depression, step-offs, nasal shortening, or widening of the nasal base are indicative of fracture; however, any injury without some degree of bleeding is unlikely to be a severe fracture. Inter-canthal measurements are useful in ruling out associated naso-orbital ethmoid fractures, especially in high-velocity frontal or inferior injuries [16]. The finding of significant rhinorrhea should be evaluated for cerebrospinal fluid (CSF) leak by testing fluid levels of either glucose or 2-transferrin [17]. If a CSF leak is suspected, a neurosurgical consultation is advised. Patients should at the least be counseled on keeping the head elevated and avoiding supine

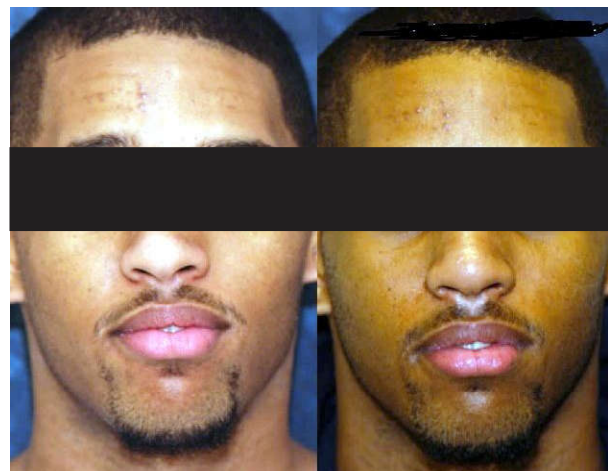


Fig. 1:

positioning to allow healing. Leaks persisting longer than 2 weeks may necessitate lumbar drainage.

Management of Nasal Fractures

Common findings associated with nasal bone fractures include loss of nasal dorsum projection, distortion of the dorsal aesthetic lines, and periorbital ecchymoses.

Internal examination of the nose requires minimal preparation and equipment. Patients are typically

prepared with decongestant spray and/or topical vasoconstrictive medication. Frazier-tipped suction, a head lamp, a nasal speculum, and cotton-tipped applicators are necessary with or without rigid or flexed endoscope (3 mm, 30 degree) to facilitate complete internal visualization [16,18]. Commonly used topical anesthetics include 4% lidocaine with oxymetazoline or phenylephrine hydrochloride. The method of examination is standard with the patient in the seated position, and if used, the endoscope is advanced beneath the inferior turbinate under direct vision. Attention should be made to the inferior meatus, turbinates, septum, and posteroinferior septal junction with the ethmoid plate. Inspect the septal mucosa for laceration or tearing.

The presence of a septal hematoma should prompt immediate attention to prevent pressure necrosis of cartilage and further deformation [19,20]. Hematomas may be treated by drainage followed by packing with local and systemic antibiotic coverage. Smaller hematomas may be aspirated with close follow-up. The examination of pediatric patients may present additional challenges. Though less likely to suffer nasal fractures, septal injuries are frequently missed in this population [21,22]. Attention to trauma in children is critical in that septal necrosis may lead to problems with growth centers and predisposition to future deformities [23,24].

Imaging is seldom necessary and has been found to be cost prohibitive as the diagnosis of nasal fracture is largely clinical [8,25]. However, a computed tomography (CT) scan is indicated when NOE fracture is suspected to rule out intracranial injuries and other associated periorbital fractures. CT scans may also be helpful for characterization of septal deviation, especially of the posterior ethmoid.

Treatment

Pre-Operative Management of Nasal Fractures

Management of a nasal trauma is dependent upon multiple factors including (1) age of the patient, (2) time since injury, (3) necessity for acute versus delayed reduction, (4) choice of anesthesia, and (5) approach (open vs. closed reduction). It should be noted, however, that the fracture should be carefully classified and diagnosed prior to any management attempt.

Age-Specific Concerns

Nasal surgery in the very young or very old may pose additional difficulties. The elderly may present with brittle, short nasal bones, and subsequently

conservative reduction and osteotomy with use of spreader grafts is prudent. However, the patient should be preoperatively counseled to remain realistic about the final appearance.

Rhinoplasty in children should be approached with special care, as age-specific variations in anatomy, interference with facial growth centers, and age-related effects on wound healing may apply [26]. Children cannot simply be regarded as "small adults," as a safe and effective surgery in adults is not necessarily wise in children [23]. The best timing for septal surgery in children is after 13 to 14 years of age when growth in this region is complete. Surgery may be prudent in patients if the septum is completely malpositioned and will prevent normal growth without intervention. Simple nasal surgeries are often approached with careful reduction of fractured segments, with postoperative nasal packing. Younger children tend to be obligate nasal breathers and should be carefully observed.

Considerations for Anesthesia

Many studies have examined the use of local versus general anesthesia for the reduction of nasal fractures [12,25,28]. Overriding concerns for patient safety and cooperativeness should be assessed preoperatively. Other considerations include differences in cost, variation in outcomes, and patient overall health. Pediatric patients pose additional challenges and should typically be reduced under general anesthesia, whereas most adults with type IIa through type IV fractures can be reduced with a combination of topical and infiltrative local anesthetic if properly selected [32]. Infiltrative anesthesia may be used externally to the nasal dorsum and can be better tolerated over bilateral internal blocks [33].

Administration of Topical and Infiltrative Anesthesia

Local anesthesia is typically divided into topical and infiltrative. In general, 4% lidocaine and either oxymetazoline (Afrin, Schering-Plough Healthcare Products, Inc., Berkeley Heights, NJ) or phenylephrine hydrochloride (Neo-Synephrine, Pittsburgh, PA) can be used and applied via pledgets [16,17]. Administration of three pledgets per nostril for 8 to 10 minutes is usually sufficient. Specific focus areas should be along the dorsal septum near the anterior ethmoid nerve and artery, the middle turbinate proximal to the pterygopalatine ganglion, and the nasal floor adjacent to the nasopalatine nerve and sphenopalatine artery [17]. Infiltrative anesthesia is administered with epinephrine both internally and externally. The volume of infiltrative anesthesia

should be minimized to prevent obscuring nasal anatomy and interfering with the planned reduction. The septal submucosa should be infiltrated bilaterally, as well as the undersurface of nasal bones. If necessary, infiltrative blocks may also be applied at the level of the dorsal nasal and infraorbital nerves.

Closed Reduction

Closed reduction is usually reserved for simple, noncomminuted nasal fractures, although exceptions can be made (Figure 3). The key principal is to apply a force opposite to the vector of trauma to achieve fracture reduction. After anesthesia, attention should be paid to the bony nasal pyramid. A Goldman elevator can be inserted to aid in manual repositioning of bones. Care should be used with this technique over the cribriform plate if injury is suspected. The Goldman elevator is applied with upward/outward force with bimanual manipulation of the external nasal bones.

Attention to the nasal septum is particularly important as nasal bone deformities will typically recur if a septal injury is missed. Straightening of the septum is accomplished by blunt pressure from the Goldman elevator opposite to the direction of deviation with concurrent elevation of the nasal pyramid [8,13,18]. A Boies elevator may alternatively be used for blunt septal repositioning [16]. Ultimately, the septal base should be repositioned into the vomerian groove if possible.

Closed reduction can be an effective tool in the appropriately selected patient.

However, the closed approach may necessitate further postoperative attention in certain areas. Partial nasal fractures may require osteotomy for mobilization and appropriate reduction [8,29,18]. Again, preoperative discussion with the patient should be realistic. It is unlikely that the patient will have a "perfect" result, and the primary goal is to minimize deformity and functional impairment. Further, patients should be prepared for the possibility that a future open septorhinoplasty may be necessary as reoperation rates range between 9 and 17% for closed reductions [16,27].

Open Reduction

A key point of rhinosurgery is that certain nasal injuries cannot be sufficiently managed with a closed reduction. Comminuted fractures with severe loss of nasal support, severe septal injuries, and injuries with considerable soft tissue damage should be addressed with full exposure as the advantages of open

reduction are many (Figure 4).

The greater exposure allows for direct visualization and precise reapproximation of dislocated structures, especially in cases of nasal tip distortion. Also, the traditional transfixion or hemitransfixion incision in the membranous septum allows for drastically improved caudal, inferior, and posterior septal visualization [30,31].

Surgery should occur early enough that secondary healing and remodeling has not drastically distorted the preinjury form. However, it is critical that edema be allowed to subside prior to any procedure, usually after 5 to 7 days if proper postinjury care is used.

Consideration after Successful Reduction

General Consideration

It is important to re-evaluate the patient after successful repair of nasal fractures for splinting and packing. Primary concern is adequate patency of the airway. Any narrowing or obstruction should be fixed at this time. The external contour and aesthetics of the nose should be evaluated both visually and physically.

Splinting and Packing

All reduction whether open or closed be splinted post operatively. This includes internal as well as external splinting [34]. Intranasal packing is done to provide internal septal stabilisation and to prevent synchiae after substantial manipulation[35]. Extra nasal splinting provides support and limited protection to reduced bones and cartilage and may aid in skin adherence to the underlying structures of the nose especially after open procedure.

Packing is justified by the belief that it decreases the post OP complications like bleeding, adhesion formation and septal hematomas [36]. However, research has suggested that it is associated with post OP pain, discomfort, soft palate laceration, septal perforation, naso-pulmonary reflex (life threatening vagal response that may lead to hypoxia and bradycardia) and even toxic shock [4]. Packing should be placed directly under areas of severely comminuted bone and maintained no longer than 72 hours.

Results

Nasal fractures can be treated with good outcome in majority of the patients. Obvious outlines to simple procedure includes the elderly, adolescents and

children. Further, the classification and timing of any nasal injury will greatly influence the approach and outcome of the intervention.

Many surgeons miss valuable opportunities in the nasal repair and post traumatic nasal reduction may be handled inappropriately. Proper treatment of any nasal injury begins with excellent pre-operative screening and appropriate diagnosis. Surgeons expect long term aesthetic and functional results but may fail to support damaged septal and cartilaginous structures adequately. Considering the frequency and difficulty of these reconstructions, surgeons must begin considering these injuries as seriously as other severe entities in facial trauma.

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