



The nasal bones are the most commonly fractured bones in the body, and account for more than half of facial fractures in adults.¹ Patients who sustain nasal fractures are usually male (68%), with a median age of 38 years.² Most often nasal fractures are a result of blunt facial trauma including motor vehicle collisions, assault, and sports injuries. Open nasal fractures, defined as fractures in which bone penetrates through the soft tissue, occur in approximately 5% of nasal fractures.² While several classification systems have been proposed for nasal fractures, none are widely used in practice to guide management.

Anatomy of External Nose

The 2 *nasal bones* are small bones of variable dimensions (Figures 1, 2). They are joined in the centre and together constitute the *nasal bridge*. Each articulates with 4 bones: the frontal bone above; the perpendicular plate of the ethmoid bone posteriorly; the opposite nasal bone in the midline, and the frontal process of the maxilla laterally (Figures 1-4).

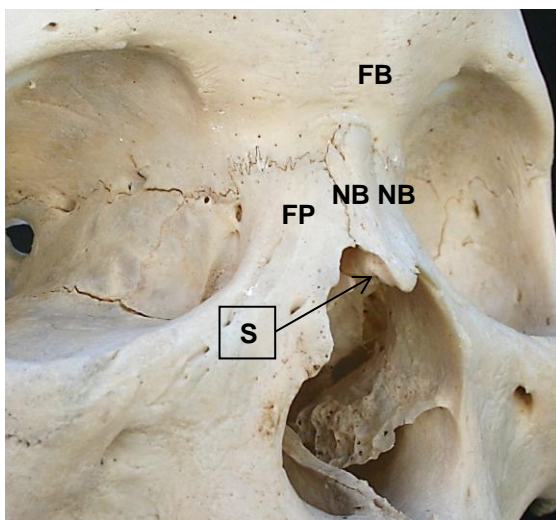


Figure 1: View of external nose: nasal bones (NB); frontal bone (FB); frontal process of maxilla, bony septum (S)

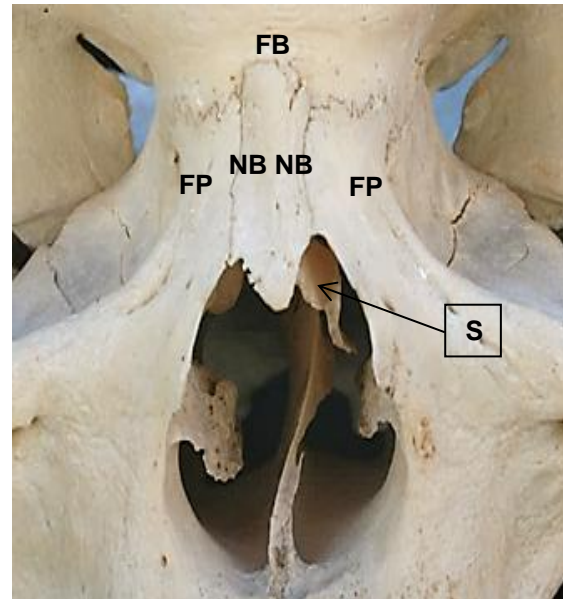


Figure 2: Anterior view of external nose: nasal bones (NB); frontal bone (FB); frontal process of maxilla (FP), bony septum (S)

The nasal bones are covered externally by the *procerus* and *nasalis* muscles (Figure 3).

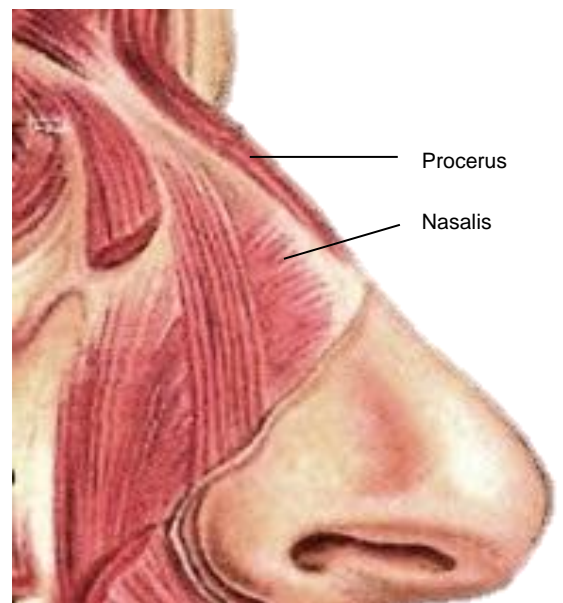


Figure 3: Procerus and nasalis muscles

Presentation and Workup

History

Evaluation of a patient with a suspected nasal fracture begins with a thorough history. Important aspects in the history include timing and mechanism of injury; symptoms such as nasal obstruction, epistaxis, and rhinorrhoea; and a history of nasal surgery. A history of clear rhinorrhoea suggests a possibility of a skull base injury and CSF leak, which is an important consideration in surgical repair.³

Patient positioning and preparation

- Sit the patient in a chair (if possible)
- Ask the patient to hold a kidney dish under the chin to catch nasal bleeding
- Clear blood clots from the nose by asking the patient to gently blow the nose, and suction with a suction cannula
- Spray local topical anaesthetic and nasal decongestant, or insert ribbon gauze soaked in topical anaesthetic and nasal decongestant, into the nose
- Use a headlight and nasal speculum to examine the nose and nasal septum

Physical Examination

Perform a thorough **head and neck examination** for all patients who present with facial trauma, including those with suspected isolated nasal fractures.

Visually inspect the nose for lacerations, ecchymosis, oedema, and deformities or asymmetry of contours. In particular, the upper third of the nose should be inspected for evidence of deviation or collapse of the nasal bones.

Palpate the nose to identify bony step-offs, mobility of the nasal bones, and crepitus.

Sensory loss over the lower midface, upper teeth and gums indicate injury to the infra-orbital nerve and/or its branches (*Figure 13*).

Do **anterior rhinoscopy** with a nasal speculum and a headlight, with a focus on the septum to determine the presence of a septal haematoma and septal fracture (*Figures 4, 5*).

Nasal endoscopy with a rigid endoscope, if available, may also be performed to further assess the presence of septal fractures.



Figure 4: Thudicum nasal speculum



Figure 5: Kilian nasal speculum

CSF rhinorrhoea indicates an injury that has breached dura. The most common clinical presentation of CSF rhinorrhoea is intermittent bloodstained, or clear watery anterior nasal discharge, salty postnasal drainage, and headache. If rhinorrhoea is present, it can be evaluated with a “halo test,” whereby fluid is dropped onto fabric or filter paper. If CSF is present, it will diffuse faster than blood and result in a clear halo around the blood (*Figure 6*). However, this sign has

low sensitivity and specificity as blood mixed with tears or tap water shows a similar pattern.

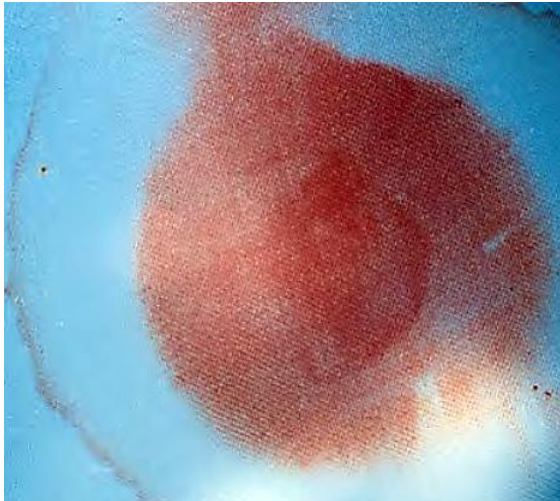


Figure 6: Halo sign of CSF mixed with blood

Radiology and Laboratory Studies

Diagnosis of nasal fractures is based on history and physical exam alone. **Imaging is not required for suspected isolated nasal fractures.**^{3,4} However, imaging such as CT is indicated for multiple suspected facial fractures and may aid surgical planning.

Similarly, laboratory studies are not indicated for most nasal fractures. An exception is patients with clear rhinorrhoea for whom beta-2-transferrin should be requested to confirm or exclude a suspected CSF leak.³ It has a high sensitivity (99%) and specificity (97%) and is the gold standard for diagnosing CSF rhinorrhoea. However, it is expensive, has a long waiting period (3-5 days minimum), and is not available in much of the world.^{5,6}

Management of Nasal Fractures

Epistaxis

Patients with nasal fractures commonly present with epistaxis. In many patients, trauma to **Kiesselbach's plexus** of the septum results in anterior bleeding (Figure 7). This is usually easily controlled with bedside cautery using silver nitrate and packing. Occasionally trauma to the nasal bones may result in transection of the **anterior ethmoid artery**. This can cause brisk bleeding that may stop after fracture reduction but may require surgical intervention to control the bleeding (Figure 8).

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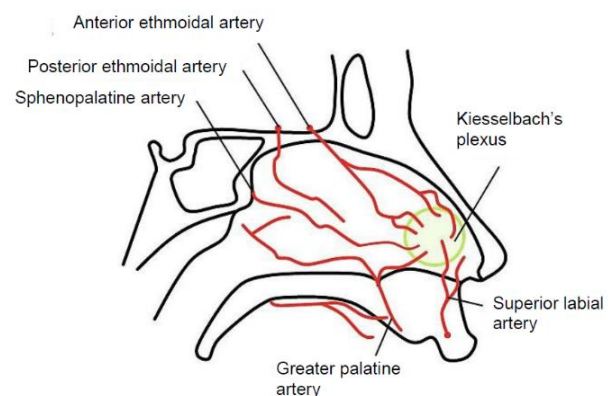


Figure 7: Blood supply to nasal septum

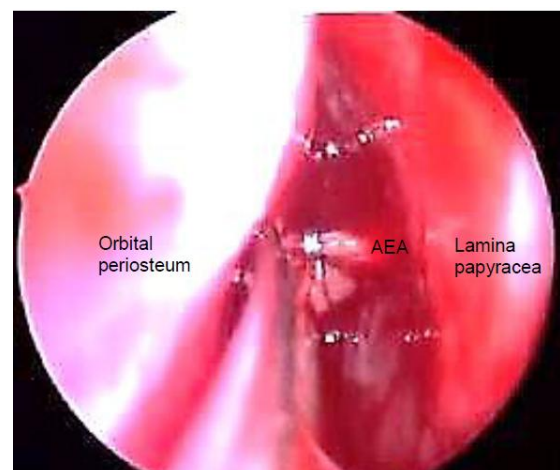


Figure 8: Liga clips being applied to the anterior ethmoidal artery (AEA) (right side)

Readers are referred to the **Open Access Atlas** chapter on [Epistaxis](#) for more detailed information.

Septal Haematoma

Care should be taken to identify and treat a septal haematoma (Figure 9).



Figure 9: Septal haematoma

Left untreated, it may cause a septal abscess and septal cartilage necrosis that may result in a saddle nose deformity. A septal haematoma should therefore be **incised and drained without delay**:

- In adults, incision and drainage of septal haematoma can be performed under local anaesthesia
- Make a generous mucosal incision into the haematoma over its most fluctuant area in an anterior-posterior direction in a dependent (inferior) area (Figure 10)
- Evacuate the haematoma with a suction cannula

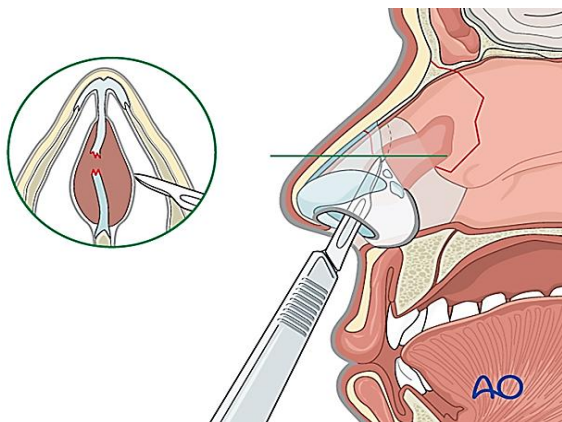


Figure 10: Drainage of septal haematoma (AO Foundation)

- Internal nasal splints or nasal packing may be placed to prevent reaccumulation of blood (Figures 11, 12)



Figure 11a: Internal silicone splints

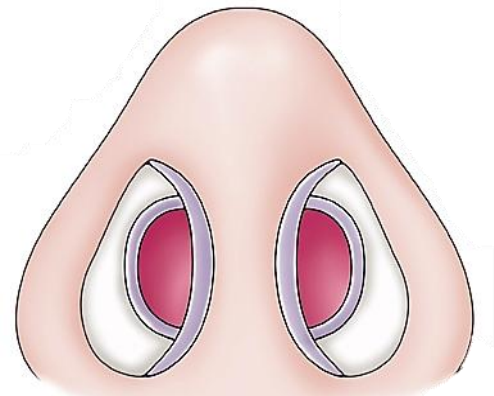


Figure 11b: Internal silicone splints positioned in the nose

- Cheaper alternatives include fashioning splints from plastic e.g. X-ray film, or inserting nasal packing or cut-off fingers of surgical gloves filled with ribbon gauze into each nasal passage (Figures 12a, b)
- Prescribe prophylactic antibiotics while packing or splints remain in place
- Remove packing or splints in 3-5 days and reassess the nose⁷



Figures 12 a, b: Glove finger filled with gauze

Lacerations

The nose is a focal point of the face and important for facial aesthetics and symmetry. Therefore, lacerations must be carefully repaired in layers.⁸ Tissues must be meticulously approximated to minimise scarring, contracture, and deformity.

- Repair internal nasal mucosal lacerations with 4-0 or 5-0 chromic sutures
- Reapproximate cartilage with 4.0 or 5.0 absorbable sutures
- Avoid aggressive debridement of nasal cartilage as loss of even a small amount of cartilage can significantly affect cosmetic outcomes
- Repair skin meticulously with 5-0 or 6-0 monofilament sutures

Reduction of Fractures

- *Many nasal fractures don't need operative intervention*
- *Primary indications* for reduction of fractures are *nasal obstruction* and *cosmetic deformity*⁴
- *Wait 3-4 days* from the time of injury to allow oedema to settle and the cosmetic and functional impact of the injury to become fully apparent⁹
- If a patient reports ongoing dissatisfaction with nasal appearance or breathing, reduction is pursued
- Either an *open or closed approach* may be used
- *Closed reduction* should be done *within 2 weeks of an injury in adults and within 7 days in children*
- Patients who present later require *open reduction or delayed rhinoplasty* >3 months after the injury as the fractured segments become adherent and difficult to manipulate
- Patients who *present early* are candidates for *either an open or closed approach*. The surgeon and patient should engage in shared decision making about a closed vs. open approach. The time windows vary based on a surgeon's preference and the individual case.

Closed reduction

- Most displaced nasal bone fractures are treated by closed reduction
- Quick, simple, and may be performed under local or general anaesthesia
- Contraindications to closed reduction
 - Open nasal fractures
 - Severely comminuted fractures
 - Associated LeFort or naso-orbital-ethmoid (NOE) fractures
 - Septal fractures are not an absolute contraindication to closed reduction, but closed reduction is associated

with increased risk of failure requiring secondary rhinoplasty¹²

- Success rates of closed reduction range between 50-85%^{12,13}
- Because closed reduction may have an unsatisfactory cosmetic outcome
 - Counsel patients preoperatively that closed reduction may fail to achieve premorbid symmetry
 - Additional functional or aesthetic surgery may be required in the future

Closed reduction: Anaesthesia

Depending on the patient and the setting, closed reduction may be performed under **local or general anaesthesia**. Results of in-office reductions are similar to those performed under general anaesthesia.^{14,15} The main advantage of general anaesthesia is avoiding discomfort and allowing more aggressive manipulation of the nasal bones. However, adequate reduction can still be achieved with local anaesthesia in an office or emergency room setting.

Closed reduction: Local anaesthesia

- Closed reduction can be performed under local anaesthesia in most patients
- Prepare the nasal cavity with cotton pledgets moistened in a solution of topical 1-2% lidocaine and a vasoconstrictor
- Inject local anaesthetic to block the infraorbital (*Figure 13*), nasopalatine, and infra-trochlear nerves¹⁰
- IV sedation can be added for comfort

Closed reduction technique

Use a nasal speculum (*Figures 4,5*) and bayonet forceps (*Figure 14*) to gently insert 2 cotton pledgets soaked with a vasoconstrictive solution e.g. oxymetazoline or cocaine into each naris.

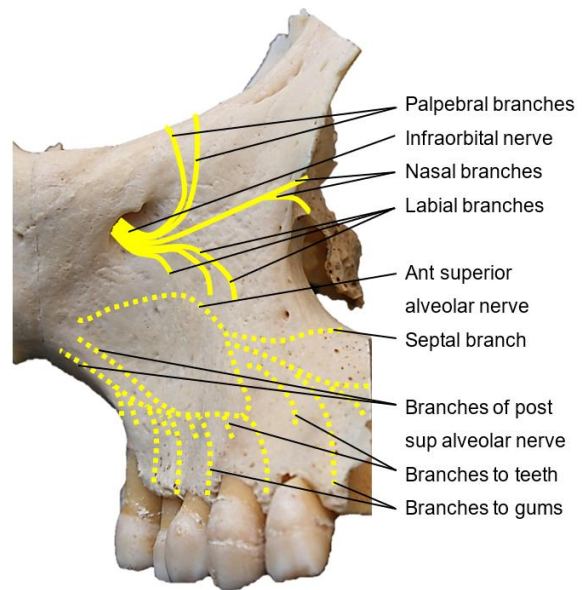


Figure 13: Anatomy of infraorbital nerve



Figure 14: Bayonet forceps assists visualizing the nasal cavity

- Once adequate time has been allowed for vasoconstriction, remove the pledgets from nose
- Carefully examine the nose
- Identify the position of the nasal bones relative to their normal anatomic position, taking note of where the nasal bone is depressed
- Place a Boies elevator (*Figures 15, 16*) externally along the nasal sidewall in an inferior-superior orientation, with the tip of the instrument just reaching the medial canthus



Figure 15: Boies nasal fracture elevator

- With the instrument in this position, grasp the elevator where it meets the alar base to prevent advancement of the elevator too far superiorly when it is inserted intranasally

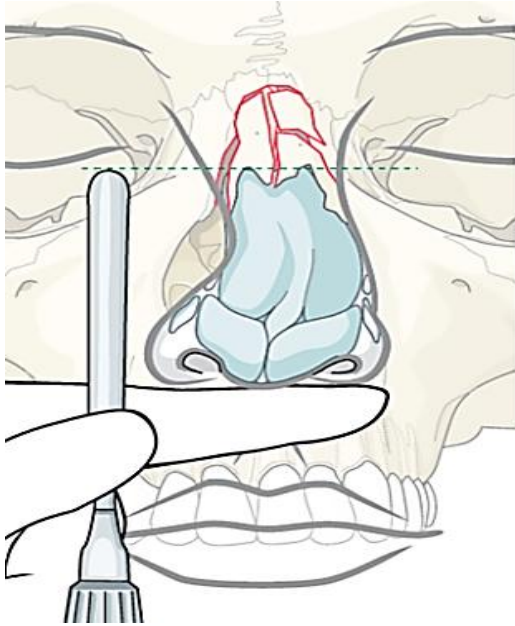


Figure 16: Boies elevator positioned along nasal sidewall with tip just reaching medial canthus (AO Foundation)

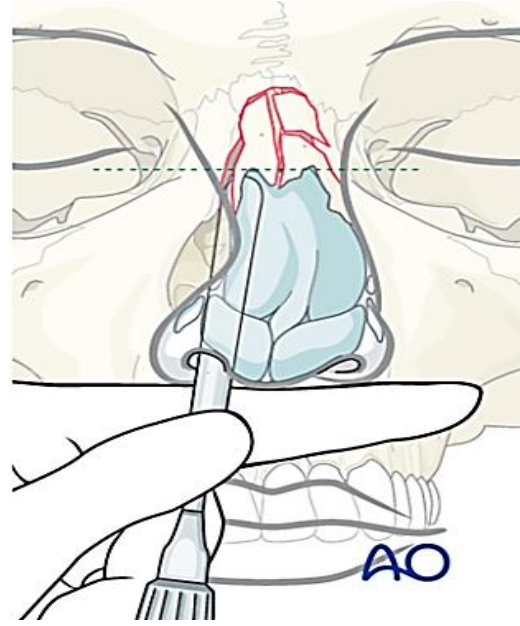


Figure 17: While maintaining the grasp of the Boies elevator at that point, carefully insert it into the naris on the side with the depressed nasal bone (AO Foundation)

- While maintaining a grasp of the Boies elevator at that point, carefully insert the elevator into the naris on the side with the depressed nasal bone (Figure 17)
- Align the Boies elevator with the nasal bone and apply pressure to the bone by lifting laterally and anteriorly to reduce the bone (Figure 18)
- For centrally depressed fractures, lift anteriorly to elevate the bones (Figure 19)
- If a fragment is collapsing into the nasal cavity, consider using absorbable or non-absorbable intranasal packing to reduce it
- With septal displacement, use the Asch or Walsham forceps (Figure 20), with one tong inserted into each naris
- Grasp and gently grasp and guide the septum back to its anatomic position (Figure 21)

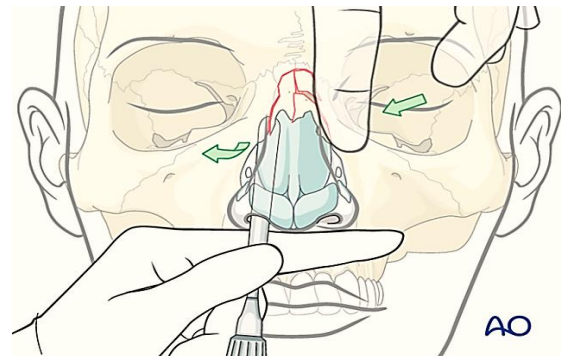


Figure 18: Closed reduction of laterally displaced fractures (AO Foundation)

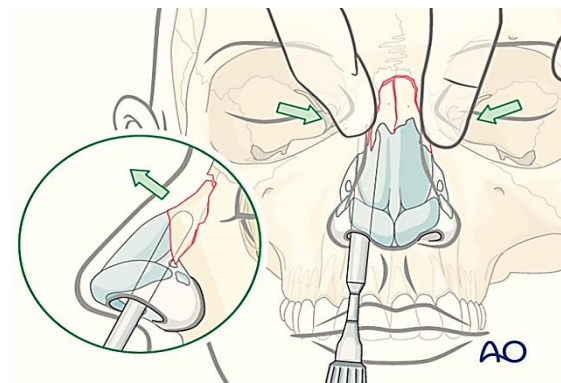


Figure 19: Closed reduction of centrally depressed fracture (AO Foundation)



Figure 20: Asch forceps

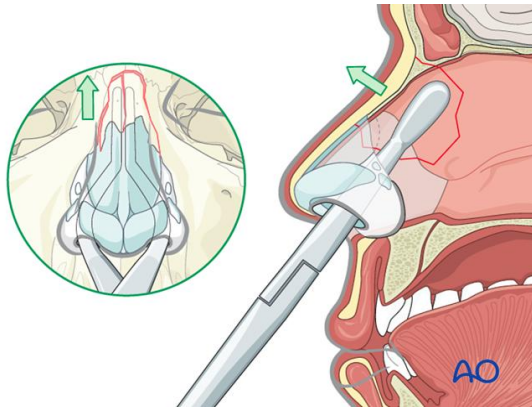


Figure 21: Septal reduction using Asch forceps (AO Foundation)

- **Internal splints** are placed on either side of the septum following reduction of the septum to ensure healing in the corrected position, to prevent a septal haematoma and to maintain a patent airway
- Splints are secured with transseptal sutures and left in situ for 5-10 days
- Alternatives to splints include nasal packing, Xray film, gauze placed within a cut-off finger from a surgical glove, or quilting sutures to obliterate the dead space
- Antibiotic prophylaxis is continued for as long as packing or splints are in situ
- Haemostatic packing is removed the following day
- **External splints** are placed once the nasal bones have been satisfactorily reduced, primarily to prevent further trauma during the recovery period
- Sutured lacerations are not a contraindication for external splinting
- Apply the splint after drying the nasal skin, cleaning it with alcohol to remove skin oils so that the protective tape can adhere to the skin

- Place steristrips or other protective tape over the dorsum of the nose
- Mould a malleable thermoplastic material (Figure 22) or plaster of Paris to the nose as an external splint
- Remove the splint after 7 – 10 days



Figure 22: Thermoplastic external splint

Open reduction

Open reduction is indicated for:

- Open nasal fractures
- Severely comminuted fractures
- Associated naso-orbital-ethmoid (NOE) or LeFort fractures
- Delayed presentation making closed reduction impossible
- Patients who find higher risk of suboptimal cosmetic outcome of closed reduction and possible need for reoperation unacceptable

Open Reduction

- Timing
 - Initial weeks following fracture
 - Many prefer a delayed procedure by allowing 3-6 months for nasal bones to heal; osteotomies allow nasal bones to be manipulated into their proper position
- Performed under general anaesthesia
- Multiple approaches
 - Most authors advocate a limited rhinoplasty or intranasal approach for optimal exposure^{4,11,12,16}

- Overlying scars from healed lacerations may be utilised and combined with scar revision

Readers are referred to the **Open Access Atlas** chapters on [Rhinoplasty](#), [Septoplasty](#) and [Repair of septal perforations](#) for detailed surgical techniques

Post fracture reduction care

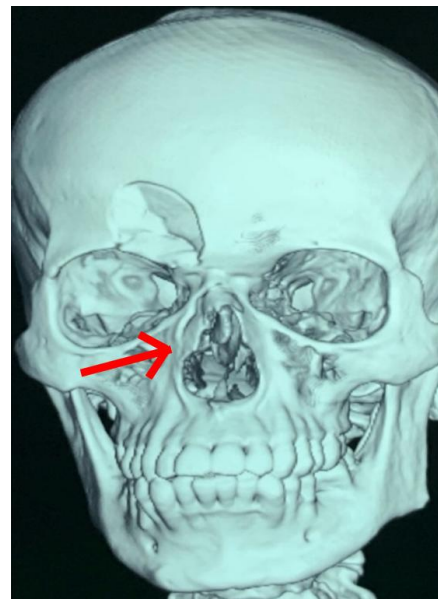
- Analgesia
- Avoid trauma that may displace the nasal bones during the healing period
- Internal and external splints may be removed in approximately one week¹⁷
- Adhere to sinus precautions (no nose blowing, straining, heavy lifting, flying or deep-water submersion) in the first 1-2 weeks following surgery to prevent epistaxis and orbital emphysema
- Refrain from contact sports for 6 weeks following reduction¹⁸

Illustrative cases of open reductions

Case 1: 18-year-old man struck in the face by a high-speed ball, diagnosed with a severely displaced, open nasal bone fracture. He underwent repair of the laceration and open reduction under general anaesthesia. Postoperative image at 6 months shows good adequate symmetry.



Case 2: 42-year-old man was involved in a motorcycle accident and was not wearing a helmet. 3D CT shows a laterally displaced nasal bone fracture (red arrow) and a displaced anterior table fracture of the frontal sinus. He underwent open reduction and internal fixation of the frontal bone fracture and closed reduction of the nasal bone fracture. The postoperative photograph at 7 days shows reasonable nasal symmetry.



References

1. Dong SX, Shah N, Gupta A. Epidemiology of Nasal Bone Fractures. *Facial Plast Surg Aesthet Med*. 2022;24(1):27-33
2. Allareddy V, Allareddy V, Nalliah RP. Epidemiology of facial fracture injuries. *J Oral Maxillofac Surg*. 2011;69 (10): 2613-8
3. Alvi, S. & Patel, B. C. Nasal Fracture Reduction. in *StatPearls* (StatPearls Publishing, 2023)
4. Mondin V, Rinaldo A, Ferlito A. Management of nasal bone fractures. *Am J Otolaryngol*. 2005;26(3):181-5
5. Meco C, Oberascher G, Arrer E, Moser G, Albegger K. Beta-trace protein test: new guidelines for the reliable diagnosis of cerebrospinal fluid fistula. *Otolaryngol Head Neck Surg*. 2003; 129(5):508-17
6. Warnecke A, Averbach T, Wurster U, et al. Diagnostic relevance of beta2-transferrin for the detection of cerebrospinal fluid fistulas. *Arch Otolaryngol Head Neck Surg*. 2004;130(10):1178-84
7. Gupta, G. & Mahajan, K. Nasal Septal Hematoma. in *StatPearls* (StatPearls Publishing, 2023)
8. Brown DJ, Jaffe JE, Henson JK. Advanced laceration management. *Emerg Med Clin North Am*. 2007;25(1):83-99
9. Rubinstein B, Strong EB. Management of nasal fractures. *Arch Fam Med*. 2000; 9(8):738-42
10. Ridder GJ, Boedeker CC, Fradis M, Schipper J. Technique and timing for closed reduction of isolated nasal fractures: a retrospective study. *Ear Nose Throat J*. 2002;81(1):49-54
11. James JG, Izam AS, Nabil S, et al. Closed and Open Reduction of Nasal Fractures. *J Craniofac Surg*. 2020;31 (1): e22-e26
12. Rohrich RJ, Adams WP Jr. Nasal fracture management: minimizing secondary nasal deformities. *Plast Reconstr Surg*. 2000;106(2):266-73
13. Murray JA, Maran AG. The treatment of nasal injuries by manipulation. *J Laryngol Otol*. 1980;94(12):1405-10
14. Khwaja S, Pahade AV, Luff D, et al. Nasal fracture reduction: local versus general anaesthesia. *Rhinology*. 2007; 45(1):83-8
15. Green KM. Reduction of nasal fractures under local anaesthetic. *Rhinology*. 2001;39(1):43-6
16. Fernandes SV. Nasal fractures: the taming of the shrewd. *Laryngoscope*. 2004; 114(3):587-92
17. Fattahi T, Salman S. Management of Nasal Fractures. *Atlas Oral Maxillofac Surg Clin North Am*. 2019;27(2):93-98
18. Cannon CR, Cannon R, Young K, et al. Characteristics of nasal injuries incurred during sports activities: analysis of 91 patients. *Ear Nose Throat J*. 2011 Aug;90(8):E8-12

How to cite this chapter

Warinner C, Shaye DA. (2025). Management of Nasal Fractures. In *The Open Access Atlas of Otolaryngology, Head & Neck Operative Surgery*. Retrieved from <https://vula.uct.ac.za/access/content/group/ba5fb1bd-be95-48e5-81be-586fbaeba29d/Management%20of%20nasal%20fractures.pdf>

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