

Chapter 174:
Management of the Post-Traumatic
Nasal Deformity

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Background

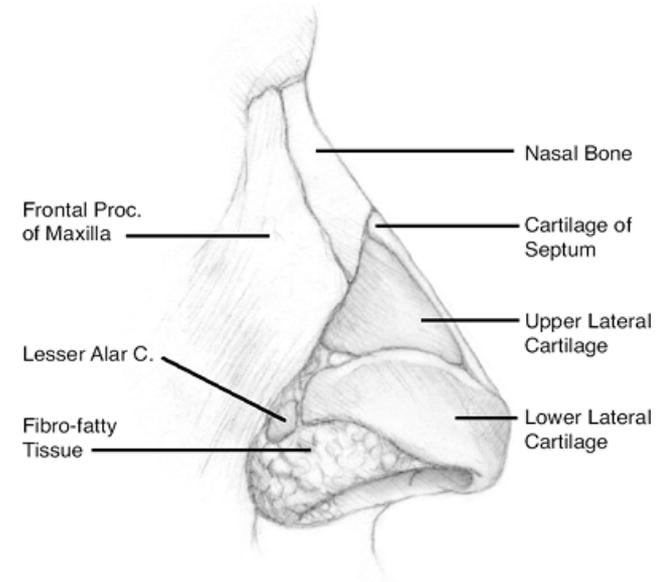
- The nose is the most commonly injured aspect of the face in all maxillofacial injuries due to its prominence and minimal force required to induce fracture.
- Traumatic nasal injury alters both the cosmetic nasal appearance and can significantly alter nasal function as well
 - When assessing blunt nasal trauma, both functional and aesthetic consequences must be considered
- Males suffer nasal trauma about twice as often as females; highest incidence between 15 to 30 years.
- Most commonly, nasal fractures occur during altercations, sports, motor vehicle and other accidents. Recent studies have shown that airbags do not reduce the incidence of nasal injuries.
- Pediatric and elderly facial injuries are most often accidental.

Anatomy

Bony, cartilaginous, and soft tissue elements.

1. Bony framework is pyramidal

- Paired nasal bones articulate with the nasal process of the frontal bone superiorly and ascending process of the maxilla laterally.
- Nasal bone complex is thickest at its caudal border and thinner cephalically.



2. Paired nasal cartilages include the upper and lower laterals

- The upper lateral/triangular cartilages articulate with the caudal edge of the nasal bones and with the septum medially.
→ Their integrity is partly responsible for the patency of the internal nasal valve.
- The lower lateral/alar cartilage is responsible for the size and shape of the nasal tip.

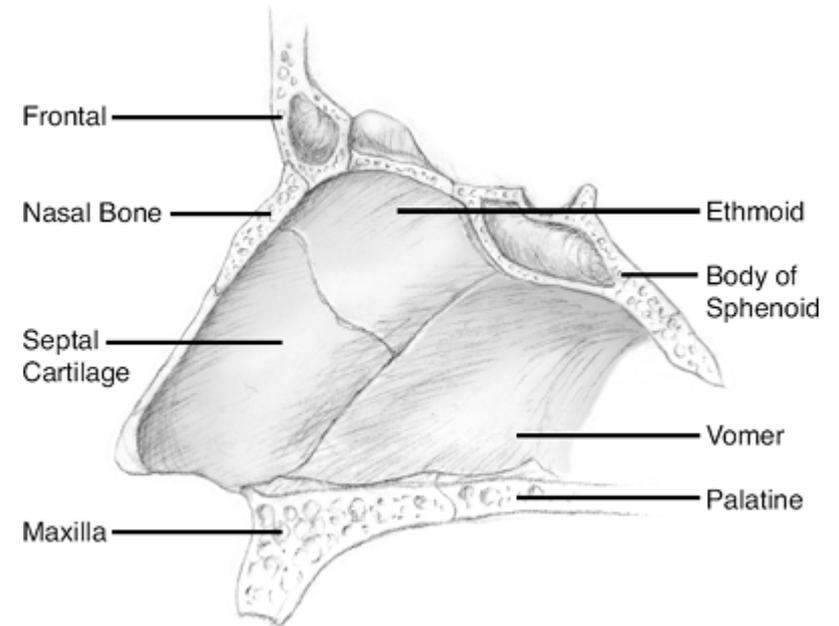
3. The soft tissue envelope of the nose is loosely attached to the cartilaginous and bony scaffold.

All arterial, venous, and nervous structures lie in the superficial plane.

Anatomy

The nasal septum has cartilaginous and bony components.

- Anterior component consists of quadrangular cartilage and the membranous septum.
- Inferior septum articulates with the maxillary crest.
- Posteriorly, the cartilaginous septum articulates inferiorly with the vomer superiorly with perpendicular plate of the ethmoid.



Anatomy

Nasal septum

- Blood supply: sphenopalantine, anterior and posterior ethmoidal, and facial arteries.
- Sensory innervation: anterior ethmoidal nerve and maxillary branches of the sphenopalantine ganglion.

External Nose

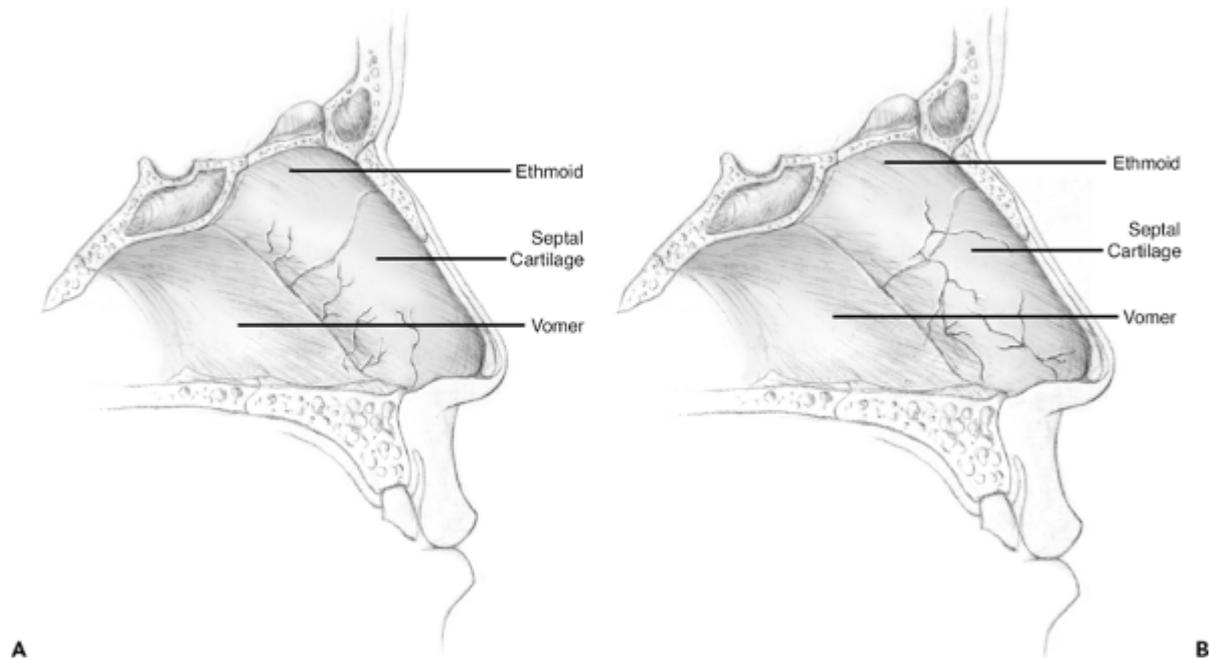
- Blood supply: lateral branch of the angular artery, the dorsal nasal artery, the external nasal artery, and the infraorbital artery.
- Venous drainage: angular and ophthalmic veins.
- Sensory innervation: supratrochlear, infratrochlear, and infraorbital nerves.

Pathogenesis

- The mandible and frontal bar absorb large degrees of force, but the midface and nose are much weaker.
 - To prevent transmission of force from nasal region to skull base, nasal bones and septum have “crumple zones” □ that absorb most of the force.
- In addition to damage to nasal bones, midface injury also results in septal injury.
 - Septum is stabilized in three-point fixation via its attachments to the nasal dorsum, the bony septum, and maxillary crest.
- Differences in cartilage thickness also result in areas of differential strength.
 - Central portion of the quadrangular cartilage is the thinnest.
 - Dorsal posterior, inferior, and caudal segments of the septum have the thickest cartilage → thus, structural support is based on posterior septum.
- After nasal trauma, septal fractures are most commonly seen at the caudal-inferior, cephalic-dorsal, and central septum.
- Specific vectors of force produce predictable septal fracture patterns.
 - Lateral blow to the nasal pyramid produces a C-shaped fracture displaced to the contralateral side.
 - Force directed in the anterior-posterior axis creates a septal spur at the inferior caudal septum.

Pathogenesis

- The supporting forces on the cartilaginous septum are normally counterbalanced.
- After fracture, the internal stresses on the quadrangular cartilage are unlocked and unbalanced; Non-repaired septal fractures will continue to distract the nasal bones in the direction of the septal injury



Patient Assessment

Take thorough history of the injury:

- Injury mechanism – High-energy midface trauma evaluated in a different fashion from isolated nasal trauma; magnitude and nature of force imparted to the midface helps predict the extent of injury to the nasal bones.
- Post-injury symptoms – New onset nasal obstruction can represent multiple postinjury pathologies, including septal hematoma, septal fracture, or an internal nasal valve injury. Epistaxis can indicate a loss of mucosal integrity.
- Injury to adjacent structures – visual changes warrants an ophthalmologic evaluation. Malocclusion or intraoral lacerations promotes a more thorough evaluation for more extensive midfacial fractures. Any neurologic symptoms (e.g., loss of consciousness) suggest possible intracranial pathology.

Patient Assessment

Full medical history should be obtained:

- Pertinent findings – history of seasonal or perennial rhinitis, chronic sinusitis, nasal polyposis, hyposmia.
- Previous nasal surgery
- Medication history – drugs with an anticoagulation profile (e.g., aspirin, warfarin, and clopidogrel); nasal steroids and nasal decongestants (e.g., pseudoephedrine).

Physical examination:

- Pre-injury photograph (driver's license)
- Pre-existing lateral displacement of the nasal dorsum, dorsal humps, facial asymmetry.
- Full head and neck exam – other trauma.

External Nose

- Lacerations
- Upper third examined for altered bony anatomy
- Middle and lower vaults inspected for deviation from the midline
- External palpation - evaluate for depressed bony fragments and integrity of the upper lateral cartilages. Palpation of the tip may reveal deviation of the caudal septum and indicate degree of remaining tip support.

Patient Assessment

Internal Nose

- Initial examination without topical decongestants and anesthesia to understand baseline mucosal status.
 - Preliminary anterior rhinoscopy is started with a Vienna nasal speculum.
- Subsequent internal examination requires anesthesia.
 - Authors use topical application of 4% cocaine with nasal pledgets; can be combined with bilateral infraorbital nerve blocks.
- Either a 2.7-mm rigid or a 3-mm flexible endoscope.
- Examination is systematically carried out in an anterior to posterior, caudal to cephalic manner
- Exam can be completed in three passes of the endoscope: 1. enter the nasal vestibule and proceed posterior to the choanae (inferior turbinate, the inferior cartilaginous septum, maxillary crest, and the bony cartilaginous septal junction); 2. start at the caudal septum and proceed posterior and cephalic (internal nasal valve, main body of the quadrangular cartilage, middle meatus); 3. proceed posterior along the dorsal border of the septum (high dorsal septal deflection)

Authors do not routinely obtain plain film studies, except in patients with severe midface or pan-facial trauma. In these patients, the clinical examination can be obscured by the associated injuries.

Classification

A number of classification systems for blunt nasal trauma exist.

Some examples:

- Nasal injuries categorized into three distinct nasal zones. Injuries classified by lower, middle, and upper nasal vaults. (Pollock et al)
- Another grading system based on CT findings for both nasal bone and septal injuries. Bony injuries are graded from 1 to 3. This represents a spectrum from nondisplaced to comminuted fractures. The septal grading system stretches between grades 0 to 4. (Rhee et al)

Management

- ❑ Initial patient contact - emergency department.
 - ❑ Treat acute epistaxis. If possible, try not to pack nose so that it can be examined.
 - ❑ I&D septal hematoma

- ❑ Immediate post-injury edema and ecchymosis often mask important anatomic deformities. Use PO steroids to reduce edema. Then, re-examine pt. 3 to 5 days later.

- ❑ If the patient is to have a closed reduction, the authors prefer to wait until the patient is approximately 3 to 5 days postinjury. This allows for decrease in swelling but easily mobile bony fracture segments.
 - ❑ Early interventions give better results
 - ❑ If the patient presents 10 days after injury (or is scheduled to get closed reduction after 10 days), you're better off doing a SRP 12 weeks later.

Management (2)

- ❖ If nasal bone fx is open or has exposed cartilage, then give Abx
- ❖ If pt. has septal hematoma, then give broad spectrum Abx initially after I&D (to prevent septal abscess)

- ❖ Can do closed reduction in the Clinic (local), ER (local), or OR (general).
 - ❖ For patients < 16yo, authors recommend OR
 - ❖ For pts who p/w significant epistaxis initially, go to OR for closed reduction

- ❖ Closed reduction is not pleasant for the patient
 - ❖ Most people who undergo closed reduction would prefer any future reductions for nasal fractures to be done under general
 - ❖ Patients who had closed reduction under local anesthesia were more likely to go to the OR for secondary revision w/ SRP than those who had closed reduction under general (*not statistically significant)
 - ❖ No difference in patient satisfaction between local and general

Management (3)

- ❖ Up to 90% patient satisfaction w/ closed reduction alone
- ❖ However in a series of 52 pts w/ simple nasal bone fractures, 96% also had septal cartilage fractures (most of which were severe and thus required repair)
 - ❖ 41% of patients are dissatisfied after getting a closed reduction only when they have both nasal bone fractures and septal cartilage fracture (Murray et al. Case series of 756 patients)
- ❖ Aggressive post-trauma nasal correction (advocated by Staffel, in a step-wise approach)
 - ❖ Closed reduction, septoplasty, completion osteotomies (median, lateral), detach upper lateral cartilage from septum, fracture perpendicular plate of the ethmoid, camouflage grafts if necessary

Pediatric Management

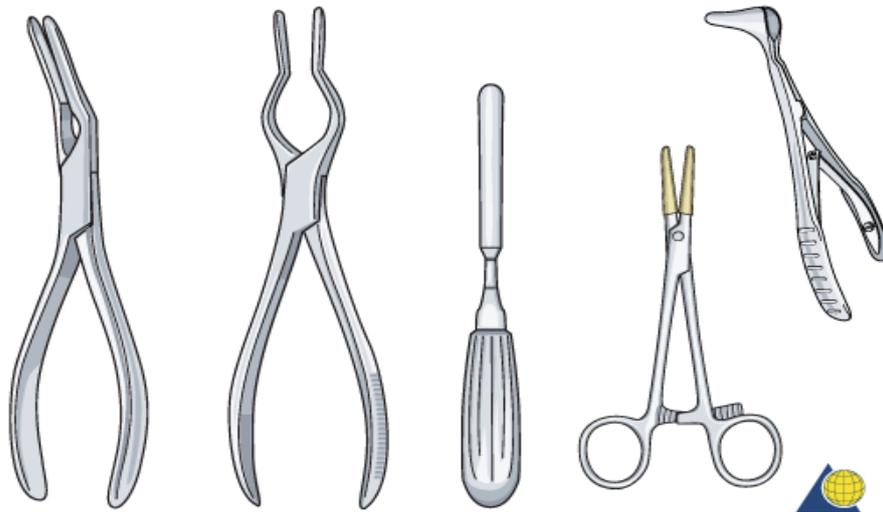
- ❖ Blunt nasal trauma most often due to sports related injuries
- ❖ Can ask the ER to give sedation for thorough nasal examination
- ❖ If needs reduction, go to the OR under general anesthesia
- ❖ If septum deviated, then reposition the nasal septum and minimize resecting septal cartilage.
- ❖ For septal hematoma, go to the OR for I&D and packing (better chance of success than doing it at the bedside)

Technique

1) Prep the nose

- Afrin, Cocaine pledgets
- Lido w/ epi injxn (bilateral infraorbital nerve block.
 - Further injxn of septum, dorsum, and tip can be done if you expect to do any work on those areas.
 - If you inject too much, you're post-reduction exam will be skewed since the nose may look too swollen

2) Disimpaction of the in-fractured segments



From left to right:
Walsham forceps
Asch Forceps
Boies Elevator

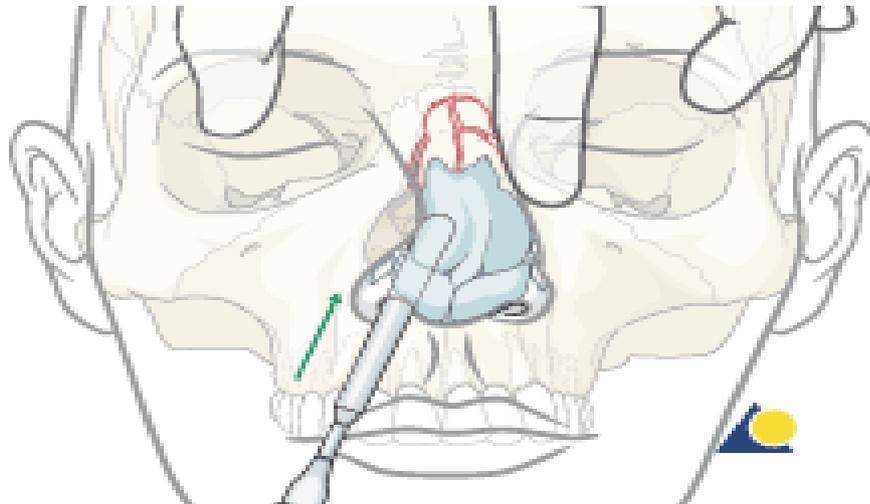
Technique

In laterally displaced fractures

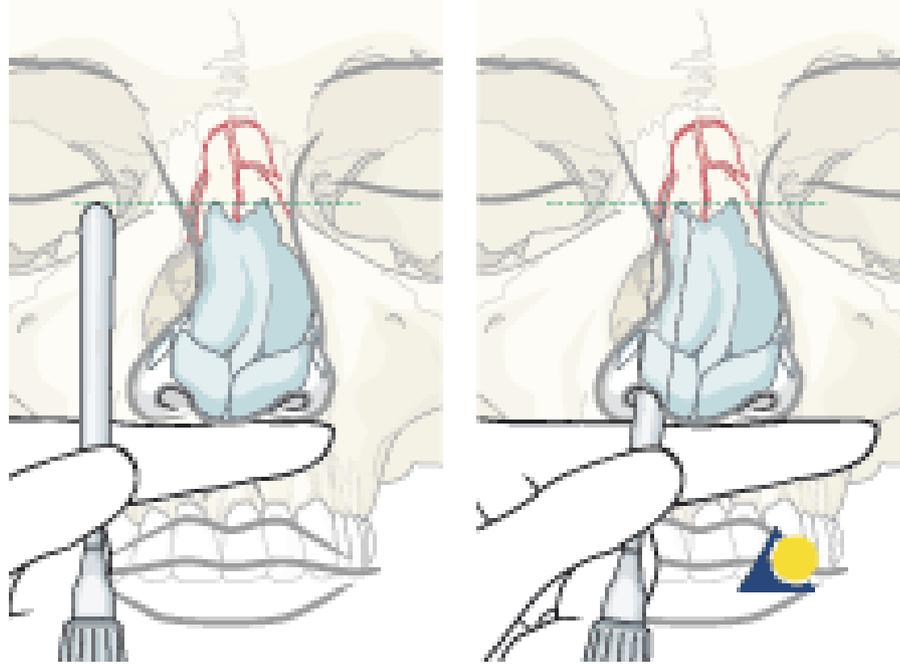
Commonly laterally displaced fractures on one side are medially depressed on the other side.

Place an instrument (eg, Boies elevator) in the depressed side along the lateral wall of the nose to a point below the nasal frontal angle.

Place a finger along the lateral side of the nose above the depressed area.



Technique

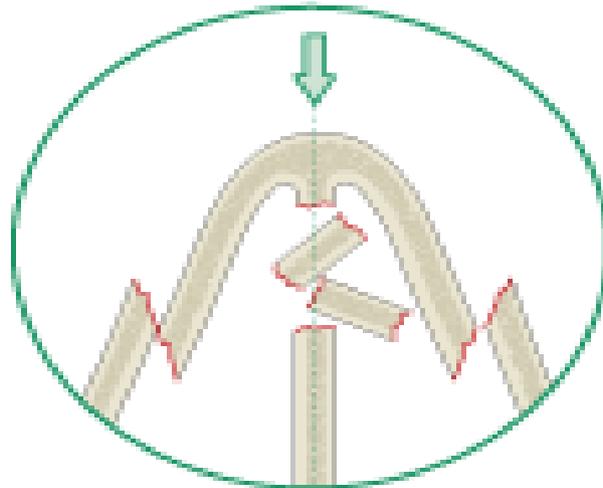


Pearl: correct instrument placement
Prior to the endonasal placement of the elevator, it is placed against the outside of the nose to the level of the medial canthus. The index finger is then placed against the edge of the elevator and is used as a stop when the elevator is placed intranasally to ensure that it can not be advanced too far superiorly.

Technique

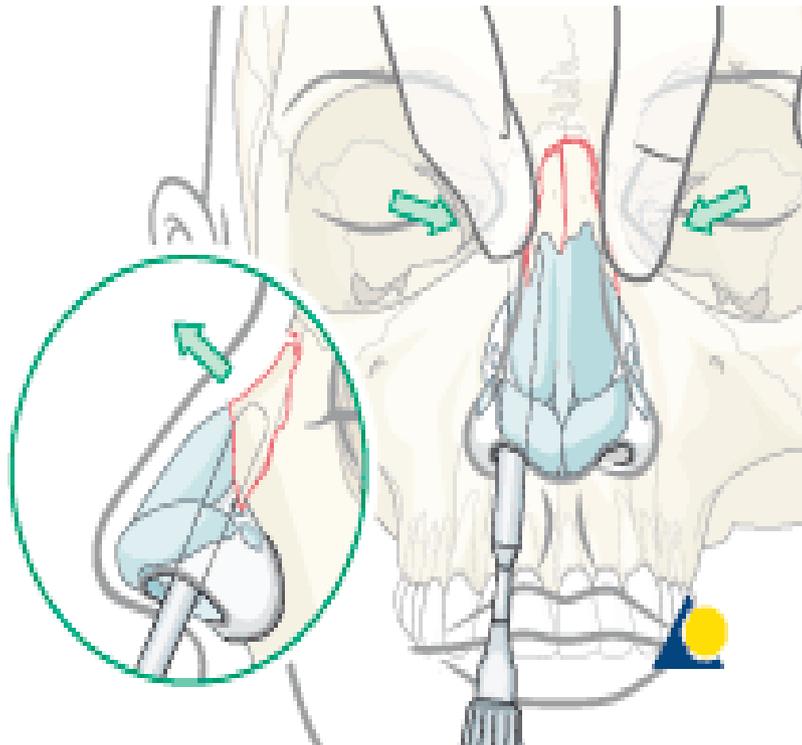
In centrally depressed fractures

Sometimes the frontal processes of the maxillae are displaced laterally with the nasal bones impacted inside them.



Technique

Reduction requires elevation of the nasal bones anteriorly and repositioning of the frontal processes medially. The elevator must not be inserted too far into the nasal cavity. In this case the elevator is placed in the nose and lifts the nasal dorsal pyramid anteriorly, while simultaneously the thumb and index finger put medial pressure on the displaced frontal processes of the maxillae.



Complications of Blunt Nasal Trauma

❖ Septal Hematoma

- ❖ Presents w/ nasal obstruction, pain, and fever
- ❖ Septum width > 2-4mm
- ❖ Deep red or blue discoloration of nasal septum

- ❖ Treatment: I and D and pack the nose.
 - ❖ If it's bilateral, then do b/l mucoperichondrial incisions but do not have them overlap (risk perforation)

- ❖ Untreated hematoma can lead to devitalization of septal cartilage, necrosis, and saddle-deformity

- ❖ Untreated hematoma can lead to septal abscess (staph aureus, strep pneumo)
 - ❖ Can lead to meningitis from spread via emissary veins
 - ❖ Treat w/ I and D, nasal packing and broad spectrum Abx