Acquired Defects of the Nose and Naso-orbitoethmoid (NOE) Region

Daniel J. Meara, MS, MD, DMD

KEYWORDS

• Acquired • Nose • Naso-orbitoethmoid • Fractures • Soft tissue defects • Reconstruction

KEY POINTS

- Because of the exposed and prominent position of the nasal complex, acquired hard and soft tissue defects of the nose are common.
- Nasal injuries coupled with midface fractures of the orbit and ethmoids constitutes a naso-orbitoethmoid (NOE) fracture pattern, which is typically the most challenging facial fracture to repair.
- For nasal fractures, important elements to minimizing revision surgery or secondary septorhinoplasty are timing of initial repair and septal position.
- NOE fracture patterns suggest the surgical treatment required and the access necessary.
- After NOE repair, a traditional adhesive-retained extranasal splint is often insufficient, and improved soft tissue outcomes are realized with padded hard splint compression plates, secured via transnasal wires.
- Correction of acquired soft tissue defects is best addressed via nasal subunits and requires a robust surgical armentarium, including rotational flaps, autogenous grafts, alloplastic implants, and implant support prostheses.
- Long-term clinical outcomes are typically excellent if surgical principles are followed and these surgical techniques used.

Because of the exposed and prominent position of the nasal complex, acquired hard and soft tissue defects of the nose are common. Traumatic injury, as well as the elements of nature, increase the risk of sun damage, with associated neoplasm, frostbite, and burns. For instance, nasal fractures occur more than any other facial fracture and are one of the most common anywhere in the body. Further, when nasal injuries are coupled with midface fractures of the orbit and ethmoids, the result is a naso-orbitoethmoid (NOE) fracture pattern, which is typically the most challenging facial fracture to repair. Hard and soft tissue defects of this region, caused by trauma, neoplasm, infection, and inflammatory disorders, may require advanced reconstruction techniques, including local rotational flaps, free tissue transfer, and even prosthetics. The restoration of form and function dictates treatment, and the success of primary repair is paramount, because secondary correction is challenging in this area of the midface. Because of the complex nature of this region, this discussion is divided into hard tissue defects, with a focus on trauma, and soft tissue defects, with a focus on oncology.

Department of Oral and Maxillofacial Surgery and Hospital Dentistry, Christiana Care Health System, 501 West 14th Street, Wilmington, DE 19899, USA
E-mail address: dmeara@christianacare.org

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HARD TISSUE DEFECTS

The Nose

The nasal complex is a prominent facial structure, and as a result, it is the most common facial fracture to occur in both children and adults. The force necessary to fracture the nose is less than for any other facial bone.[1] Further, it is a central facial feature, with considerable aesthetic importance and functional necessity for breathing and olfaction.

Examination

History should determine the mechanism of injury to focus the physical examination and ascertain if any difficulty in breathing is noted. The examination should immediately assess for hemorrhage and rule out the presence of a septal hematoma or other soft tissue abnormalities. Bony abnormalities can then be documented for changes in cosmesis, although final assessment may require resolution of perinasal edema, to determine the need for surgical intervention.

Imaging

Imaging for isolated nasal complex fractures is not necessary, because the clinical examination should determine the appropriate treatment. However, in conjunction with other facial or head injuries, computed tomography (CT) allows assessment of the nasal pyramid and the nasoseptal position and curvature. Plain films are typically of limited value. Han and colleagues[2] developed a system of radiographic correlation to clinical management and outcomes. Based on axial CT images, the nasal bone was marked from base to top of the nose and then divided into upper, middle, and lower levels. Analysis of 125 patients treated showed that fractures occurring at the upper level resulted in lower frequency of complication and reoperation than fractures at the other levels, whereas total level or fractures below the lower level showed the highest complication and reoperation rate (**Fig. 1**). Such information can be beneficial in regards to patient treatment and education.

Classification Schemes

In an attempt to categorize and create uniformity in the diagnosis of nasal complex injuries, numerous classification schemes have been suggested. Haug and Prather[3] in 1991, Ondik and colleagues[4] in 2009, and Lee and colleagues[5] in 2010 created newer classification schemes, improving on schemes by Gillies and Kilner[6] in 1929, Harrison[7] in 1979, and Murray and colleagues[8] in 1986.

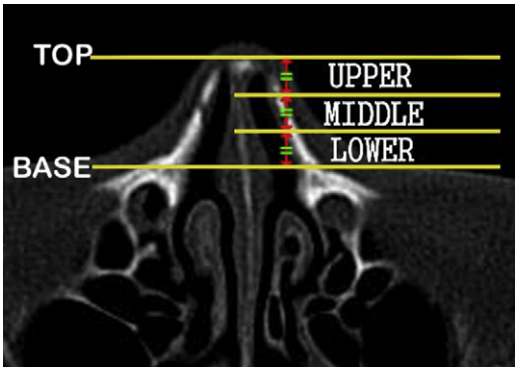

Fig. 1. Division of the nose for radiographic classification of nasal fractures and clinical application via axial CT. (*From* Han DS, Han YS, Park JH. A new approach to the treatment of nasal bone fracture: radiologic classification of nasal bone fractures and its clinical application. J Oral Maxillo Surg 2011;69(11):2841–47; with permission.)

Specifically, in 1991, Haug and Prather[3] created a study of nasal fractures solely for the purpose of providing a classification system of nasal bone fractures, with types I to IV and an S modification for fractures with septal involvement. Based on clinical evaluation, Ondik and colleagues[4] created criteria for evaluation of the nasal complex, including symmetry, septal status, and overall injury severity in the classification of nasal complex fractures (**Table 1**). Similarly, as a result of predictable fracture patterns of the nasal septum, in cadaver studies, Lee and colleagues[5] classified septal fractures into 3 types (types 1–3), with further detail as to whether the septum was intact on the nasal spine or if dislocation had occurred.

Treatment

Although not the focus of this article, appropriate acute nasal fracture management can minimize revision and reconstructive procedures. Reilly and Davidson[9] showed that an open approach can reduce potential revision rates in patients with an associated deformity of the septum. In an attempt to optimize clinical outcomes of nasal fracture management, Herford and colleagues[10] created an algorithm (**Fig. 2**). Fattahi and colleagues[1] reported that important elements to minimizing revision surgery or secondary septorhinoplasty are: (1) timing of initial repair and (2) septal position. Best results are achieved if closed reduction surgery is completed within the first 2 weeks, and the nasal septum must be positioned over the maxillary crest. Attention to these details results in a success rate of 89% to 91%, significantly higher than previous studies reporting success