

Essential Anatomy and Evaluation for Functional Rhinoplasty



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KEYWORDS

- Rhinoplasty • Functional • Nasal anatomy • Nasal obstruction • Subjective evaluation
- Objective measurements

KEY POINTS

- Successful correction of nasal obstruction requires identification of the precise anatomic cause and a comprehensive understanding of the relationships between surface aesthetics, underlying structural anatomy, and functional components of the nose.
- Subjective evaluation of a patient with nasal obstruction should include systematic examination of the nasal-facial aesthetics with external evaluation, including visual inspection, palpation, and photodocumentation, as well as intranasal examination, including an assessment of nasal valve function.
- Patient-specific quality of life instruments, such as the Nasal Obstruction Symptom Evaluation and visual analog scale, are useful tools to help quantify the degree of nasal obstruction both before and after surgery.
- Several tools have been developed for the objective assessment of nasal obstruction; however, most have not gained widespread use outside of the research setting.

INTRODUCTION

The primary responsibilities of the nose include heating, humidifying, and filtering inspired air before reaching the larynx, trachea, and lungs. This is accomplished via a balance of laminar and turbulent airflow. The laminar flow is responsible for the transmission of air toward the lungs and the turbulent flow, which is related directly to airway resistance, is responsible for the inspired air contacting the nasal mucosa and exchanging molecules to warm and humidify it.¹ When this normally unconscious action is compromised, nasal breathing may become a source of significant distress and decreased quality of life. Nasal obstruction, which may have

many different causes, is a common problem and results from a complex interaction of static and dynamic forces on the nasal mucosa and bony-cartilaginous structure of the nose.² Before surgically correcting nasal obstruction, the precise anatomic cause must be identified. The surgeon must have a comprehensive understanding of the surface aesthetics, underlying structural anatomy, and functional components of the nose and how they are all linked.³ The purpose of this article is to highlight the key anatomic structures involved in nasal obstruction and functional rhinoplasty, as well as discuss the diagnostic techniques at the surgeon's disposal to ensure the proper diagnosis is made.

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Facial Plast Surg Clin N Am 25 (2017) 141–160

<http://dx.doi.org/10.1016/j.fsc.2016.12.001>

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FUNCTIONAL ANATOMY

Bony Pyramid

The bony framework of the nose is pyramidal in shape. It is made up of paired nasal bones that articulate with the frontal bone cephalically and the paired upper lateral cartilages (ULCs) caudally. The confluence of nasal bones, ULCs, and the bony (perpendicular plate of the ethmoid bone) and cartilaginous nasal septum, appropriately known as the keystone area, is critical for midvault support and stability of the nose.^{4,5} The nasal bones articulate with the frontal process of the maxilla laterally, and fuse at the midline. They are approximately 25 mm in length, on average, and progressively thin as they approach their inferior confluence with the ULCs.⁶ The bony external opening of nasal cavity, the pyriform aperture, is made up of the nasal and frontal bones superiorly and laterally and the maxilla inferiorly. The maxillary crest articulates with the quadrangular cartilage anteriorly and the vomer posteriorly. The perpendicular plate of the ethmoid bone attaches to the cribriform plate cranially and the vomer caudally (**Fig. 1**).

Cartilaginous Pyramid

The cartilaginous nasal pyramid is made up of the cartilaginous nasal septum (or quadrangular cartilage) and the ULCs. They form a T-shape, with the angle formed between the septum and ULCs increasing with cephalad progression from approximately 15° at the internal nasal valve (INV) to 80° at the keystone area.⁷ The cartilaginous septum connects caudally with the anterior nasal spine, maxillary crest, and vomer, and freely connects with the columella. The connection with the anterior nasal spine involves collagenous decussating fibers. If these are disrupted during septoplasty, reconstruction is essential to prevent destabilization of the septum.⁷ Cranially, the cartilaginous septum connects with the ULCs and its dorsal attachment is the perpendicular plate of the ethmoid bone. The cartilaginous septum ranges from 2 to 4 mm in thickness, and is thicker anteriorly, posteriorly, and at its junction with the ULCs and maxillary crest.⁸

The ULCs are connected cranially with the nasal bones, underlapping them by 1 to 2 mm, and the cartilaginous septum medially along their cephalic

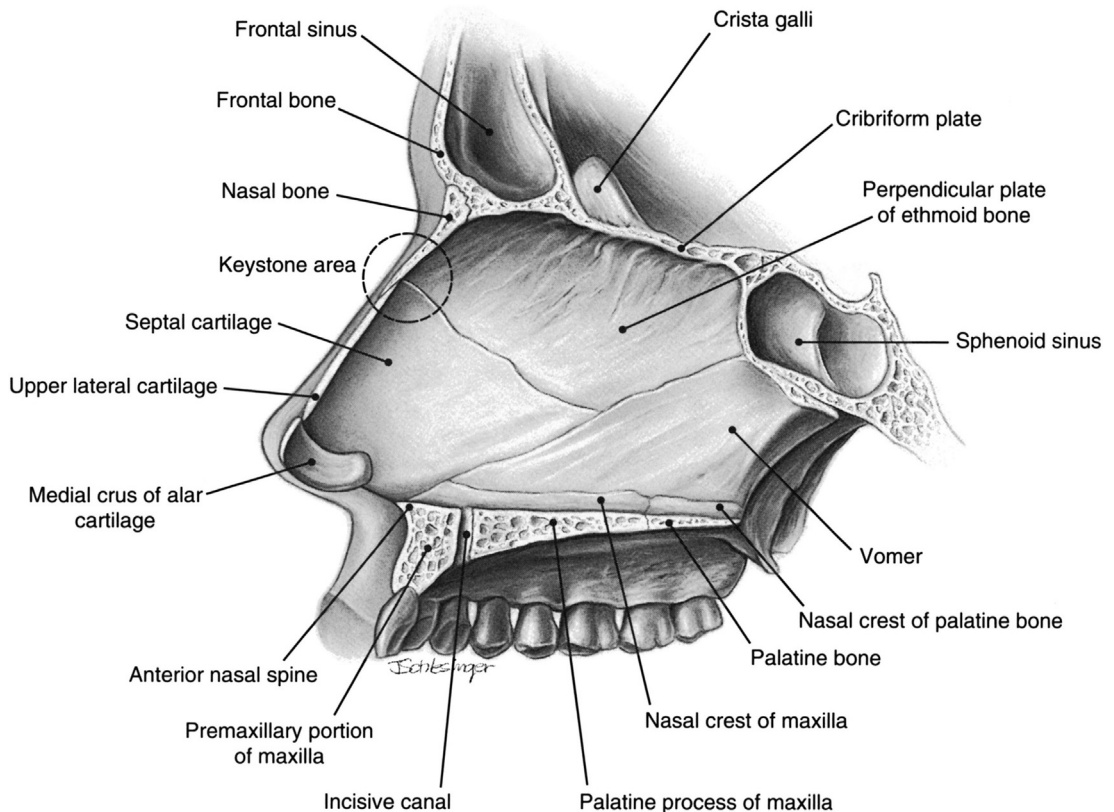


Fig. 1. Lateral view of the left side of the nasal septum. (From Oneal RM, Beil RJ. Surgical anatomy of the nose. Clin Plast Surg 2010;37:206; with permission.)

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