The Inferior Turbinate in Rhinoplasty

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KEYWORDS

• Inferior turbinate hypertrophy • Nasal obstruction • Rhinoplasty
• Submucous resection of inferior turbinate • Septoplasty

KEY POINTS

- There is controversy regarding optimum treatment of the hypertrophied inferior turbinate.
- Patients undergoing rhinoplasty will likely need treatment of bony hypertrophy as well as possibly soft tissue hypertrophy.
- Although inferior turbinate hypertrophy is a heterogeneous entity, future studies should standardize outcome measures and compare treatment methods with rigorous clinical trials.

INTRODUCTION

Initially, surgery for the nose addressed only the external component. The efforts of surgeons in India to reconstruct nasal defects thousands of years ago are well documented, and Tagliacozzi illustrated dramatic methods of nasal flap reconstruction. The syphilis epidemic of the 1600s and later the First World War provided numerous patients who needed nasal reconstruction as a result of infection and trauma, respectively. Purely aesthetic rhinoplasty was pioneered by Jacques Joseph, who performed surgery on his first patient in 1898.[1] Concurrently, interest in the internal nose also developed. For example, there are reports of inserting a hot poker in the nose to treat nasal obstruction.[2] Then, in the latter part of the nineteenth century, Jones is reported to have had the first description of turbinate surgery (1895).[3] Several years later, Holmes[4] outlined his experience with more than 1500 cases of turbinate resection.

In the early-mid 1900s, inferior turbinate surgery was marked by a period of controversy. Many surgeons thought that turbinate resection resulted in atrophic rhinitis and ozena. As a result, total inferior turbinate resection fell out of favor. A more conservative procedure emerged featuring preservation of anatomy, suggested first by Spielberg,[5] who advocated for submucous resection in 1924.

Flashing forward to today, we have realized the importance of treating both the internal and the external nose at the same time. In a recent survey from the American Society of Plastic Surgeons, 87% of respondents indicated that they would like to see additional instructional courses on the nasal airway.[6] For the nose, function follows form. Inferior turbinate hypertrophy continues to be a clinical focus when evaluating nasal obstruction, and nasal function should be considered for any patient undergoing rhinoplasty surgery. To the extent that septal abnormality is often present in rhinoplasty patients (functional or cosmetic), the author herein also considers articles that discuss the inferior turbinate and septoplasty—often using septoplasty as a proxy for rhinoplasty—as one considers the role of the inferior turbinate in rhinoplasty surgery. Given that the vast majority of rhinoplasty surgeries are performed on adults, studies areconsidered that look at the inferior turbinate in adults only—even though large pediatric studies have been published.[7]

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ANATOMY AND PHYSIOLOGY OF THE INFERIOR TURBINATE

The inferior turbinate is situated as a composite protrusion extending from the internal aspect of the lateral nasal sidewall. Its anterior aspect forms the inferior border of the nasal valve, which is the flow-limiting segment of the nasal airway. The inferior turbinate (conchal) bone is situated superiorly and angled to some degree both medially and inferiorly toward the airway. It has a rough texture to which soft tissue is tightly adherent. The soft tissue of the turbinate is composed of arterial and venous vascular channels as well as smooth muscle.[8] In this way, the turbinate acts as a dynamic erectile organ. Structurally, the inferior turbinate is often seen "curling" around an ipsilateral septal deviation, adopting a lateralized position at the apex of the spur and then becoming more medial anterior and posterior to it (**Fig. 1**A). A curled configuration may suggest some adaptation in shape to the space allotted or to the airflow pattern in the pathologic airway. Conversely, the inferior turbinate contralateral to a septal deviation often becomes hypertrophied, again suggesting an ultrastructural adaptation to available space (**Fig. 1**B). Indeed, Jun and colleagues[9] found that the hypertrophied turbinate on the concave side of a septal deviation features a change in orientation of the conchal bone relative to the lateral nasal sidewall. Specifically, they found that the angle at which the turbinate protrudes from the lateral nasal sidewall demonstrated a statistically significant increase relative to the other side. In other words, the angle of attachment of the turbinate to the nasal is more obtuse on the more open side. It stands to reason that a space-occupying inferior turbinate that juts out in the airway more could impair subjective airflow.

The blood supply to the inferior turbinate is composed of anterior and posterior contributions. The anterior ethmoid artery and lateral nasal artery provide anterior blood supply, whereas the sphenopalatine artery provides posterior blood supply.[10–12] One anatomic study emphasized the position of the posterior blood supply and its intimate association with the turbinate bone, finding that 2 primary branches supply blood to the turbinate, and that both remain in bony canals or lie in close approximation to the bone for a significant distance. The anterior and posterior blood supply anastamose along the midportion of the turbinate, forming the inferior turbinate artery.[11] The caliber of the blood vessels along this middle aspect of the turbinate has been noted to increase. Larger vessels in this area may represent an anastomosis phenomenon related to the anterior blood supply or could include contribution from the facial artery.[11,13] This robust inferior turbinate blood supply allows for use of the inferior turbinate flap in various reconstructive procedures.[12,14]

The function of the inferior turbinate is to warm and humidify the air that is breathed. As air passes through the nasal valve, it is directed toward the surface of the inferior turbinate, underscoring the importance of both structures for nasal breathing. Laminar airflow passing over the turbinate creates resistance, which causes nasal mucus production, thereby providing humidification.[8] The normal nose can increase humidity of respired air from zero externally to near 100% at the level of the nasopharynx.[15] Increased humidity in the nasopharynx would explain significant upper airway dryness symptoms typically associated with total turbinectomy.

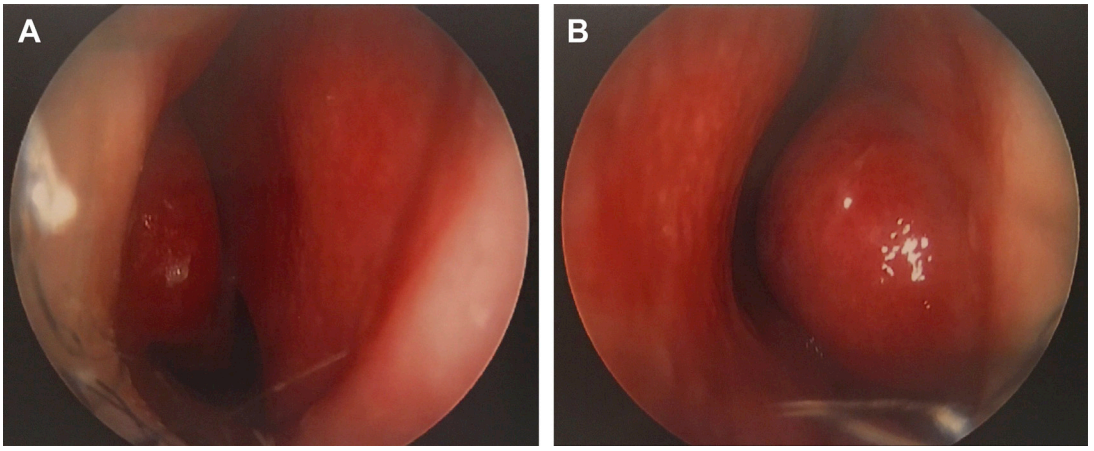

Fig. 1. (*A*) Inferior turbinate position ipsilateral to septal deviation. (*B*) Compensatory inferior turbinate position contralateral to septal deviation.