SURGICAL TECHNIQUES IN CORRECTION OF SADDLE NOSE DEFORMITY

Essay submitted for partial fulfillment of Master Degree in Otorhinolaryngology

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ABSTRACT

The septum is one of the preferred source in rhinoplasty because it requires no additional incisions, there is no significant donor site morbidity, and its harvest may correct septal deviations and improve the airway. Unfortunately, the quantity of septal cartilage available is frequently insufficient, which mandates the use of alternative donor sites.

KEY WORDES

SURGICAL

CORRECTION

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INTRODUCTION

Introduction

Collapse of the middle vault in relation to the tip and dorsum results in a characteristic saddle nose deformity which presents significant reconstructive challenges. First recognized in the midnineteenth century as resulting from nasal septal perforations ***(Lupo, 1997).***

Understanding of the pathophysiologic process producing the saddle nose deformity permits effective surgical intervention to reverse the mechanical forces responsible for middle vault collapse and to camouflage its associated cosmetic deformity ***(Pribitkin and Ezzat, 2009).***

The saddle nose deformity results from a depression caused by a decrease in the structural support of the cartilaginous or bony framework deep to the nasal soft tissue envelope ***(Emsen, 2008).***

The cause of saddle nose deformity falls into three etiologic categories: post-traumatic, iatrogenic and other rare causes**.** The most common cause of the saddle nose is trauma. Severe frontal blows to the dorsum and tip cause the nasal bones to fracture and splay. The upper lateral and septal cartilages also fracture, buckle, and disrupt. Hematomas between the cartilage and perichondrium can cause death of cartilage cells as the cells are robbed of their nutrient supply. Because the lower lateral cartilages have lost their cephalic support, there is nothing to

prevent upward rotation and deprojection of the tip. Indeed, as the contractile forces of scarring proceed over the ensuing weeks, the deformity worsens ***(Frodel, 1995).***

Surgical over-reduction of a nasal hump is another common cause of saddle nose deformities. In such cases, the dorsum and root may be over-reduced. Over-reduction of the nasal septum, leaving a flimsy dorsal strut, would cause the nasal bridge to collapse and the tip to rotate superiorly. Aggressive resection of the lateral crura not only weakens the cartilaginous integrity of the tip, but also deprives the tip of important fibrous connections between the lateral crura and upper lateral cartilages. Radical sub mucous resection of the septal cartilage may result in a saddling of the nasal dorsum, although such effects may be delayed for months or years following the procedure (***Yabe and Muraoka, 2004).***

Congenital saddle nose is unusual and other rare causes as median clefts of the face and Binder's syndrome which is a congenital abnormality associated with a short anteroposterior maxillary length (nasomaxillary hypoplasia), a convex lip, an absent anterior nasal spine, a vertical nose, absent frontonasal angle, limited nasal mucosa, and hypoplastic frontal sinuses. Binder postulated that the hypoplasia was due to a disturbance of the prosencephalic induction center at a critical phase in development (***Banks and Tanner, 1993).***

Another rare cause of nasal collapse is cocaine abuse. As a vasoconstrictive agent, cocaine promotes a localized rhinitis that leads to dryness, crusting, and bleeding. Focal necrosis of the perichondrium ensues and leads to exposure and death of chondrocytes. Eventually, the bulk of the septal cartilage is destroyed, causing collapse of the dorsum and upward rotation of the tip ***(Helie and Fournier, 1997).***

Other infectious and inflammatory conditions may cause similar destruction. An undiagnosed septal hematoma may become infected, leading to the destruction of the cartilaginous nasal skeleton. Rhinoscleroma, syphilis, and leprosy are less frequent infectious causes. Wegener's granulomatosis is an autoimmune disorder that is characterized by vasculitis, glomerulonephrosis, and pneumonitis. The vasculitis may cause erosion and collapse of the nasal septum ***(Tardy et al., 1989).***

Neoplasms such as esthesioneuroblastoma and squamous cell carcinoma may result in nasal deformity. Angiocentric immunoproliferative lesions represent another class of neoplasm that frequently destroys nasal tissue. These lesions represent a spectrum of entities known under various names, including polymorphic reticulosis, lymphomatoid granulomatosis, pseudolymphoma, lethal midline granuloma syndrome, nonhealing midline granuloma, and midline destructive granuloma. All may produce tissue destruction resulting in the short nose deformity ***(Dyer et al., 1999).***

A careful history should be obtained to rule out untreated, ongoing causes of nasal collapse. The patient should be carefully questioned for medical history of neoplastic, infectious, or autoimmune disorders, medication and illicit drug use, and prior surgery and trauma. A family history may be helpful in diagnosing conditions such as Binder's syndrome. On physical examination one should note the quality of the skin, the integrity of the underlying cartilages and bone, and the condition of the septum. Although sometimes difficult to do, the surgeon should try to assess the amount of septal cartilage available for grafting material and anticipate the need for auricular grafts ***(Gunter, 2002).***

Graft selection remains a problem in nasal reconstruction, Tissue properties of autogenous costal cartilage, such as consistency, flexibility, ease of sculpturing and resistance to absorption resemble those of septal cartilage, making costal cartilage particularly suitable for nasal augmentation. However, graft warping, difficult rib carving in older patients with calcifications, and donor site morbidity as the possibility of pneumothorax, postoperative pain, and chest wall or breast deformity are the major disadvantages of the rib cartilage ***(Bribitkin and Ezzat, 2009).***

Conchal cartilage can be obtained without postsurgical deformity when one maintains the antihelical integrity; however, it lacks structural rigidity ***(Daniel, 2007).*** Septal cartilage is

frequently preferred for reconstruction because of its structural rigidity and easy harvest, but often cannot be secured in saddle nose deformities without further compromising the integrity of the septal support wall. Furthermore, lack of enough cartilage is encountered in most cases of saddle nose deformities that occur secondary to aggressive sub mucous resection ***(Tardy et al., 1989).***

Septal bone has been advocated by ***Daniel (2007)*** for dorsal nasal augmentation. It is the lack of volume that limits its role especially in major deformities. Iliac bone crest graft can be used for reconstruction of the major defects as the bone chips are incorporated with both nasal bones, building a strong dorsal nasal bony monoblock. However, iliac bone harvesting results in significant donor site morbidity and pain ***(Karacaoglan and Uysal, 1998).***

Calvarial bone is known of its versatility for bone reconstruction. It showed a very low rate of resorption, compared to iliac bone. The flat nature and tedious harvesting technique may hinder its frequent use in nasal augmentation ***(Thomassin et al., 2001).***

Although, autologous tissue is known as the best material for reconstruction, synthetic implants may prove useful. Polyethylene sheets are commonly used as facial implants. The main problem in synthetic implants is the fear of extrusion ***(Thornton and Mendelsohn, 2006*)*.***

Aim of the study

Nasal septal saddling may imply different forms of structural deficiencies. This in turn, affects the design of the reconstructive block, the sources of which are multiple and diverse. The aim of this study is to review different modalities in correction of saddle nose deformities in an attempt to establish an algorithm that can help the reconstructive surgeon to choose the design and type of graft that suits a particular deformity in order to achieve predictable and satisfactory results.

ANATOMICAL & PATHOPHYSIOLOGICAL CONSIDERATION

Anatomical and pathophysiological considerations

Structural support of the nose:

Nasal structural integrity is maintained by a network of bony and cartilaginous structures connected to each other by dense fibrous tissue and lined internally by a flexible mucoperichondrium ***(Adamson, 1995).***

Considered from the viewpoint of a mechanical construction, the nasal foundation or skeletal base consists of the nasal bones, bony septum, pyriform aperture, and the nasal floor. The septal cartilage firmly inter locks with the nasal bones and bony septum to forma ‘‘support wall’’ for the middle vault and the nasal tip ***(Gunter, 2002).***

The upper lateral cartilages that make up the ‘‘roof’’ of the middle vault articulate firmly with this support wall and are primarily supported by this wall, although they receive secondary support from their articulations with the nasal bones and lower lateral cartilages. Similarly, despite collaboration from multiple forces, nasal tip projection relies ultimately on the septal support wall ***(Tardy et al., 1989).***

Although the inherent strength of the upper lateral cartilages and tip may temporarily prevent collapse of the middle

vault or roof, an inherent weakness or injury to the septal support wall results in progressive collapse of the middle vault and deformity of distal tip structures. The roof eventually falls in ***(Pribitkin and Ezzat, 2009).***

The cartilaginous septum's support of the middle vault and tip helps to define the cross-sectional areas critical for adequate nasal breathing. The internal nasal valve bounded by the junction of the upper lateral cartilages with the septum regulates nasal airflow. Accordingly, small changes in this angle result in significant perturbations of airflow ***(Kim and Mau, 2006).***

Loss of septal support may also influence the function of the external nasal valve by altering the relationships among the columella, soft triangle, and nasal ala. Progressive weakening of the septal support wall results not only in a cosmetic saddle nose deformity but also in a corresponding loss of nasal function ***(Pribitkin and Ezzat, 2009).***

The septum's articulation with the upper lateral cartilages of the nose and its contribution to tip support through the medial crura of the lower lateral cartilages play an integral part in the cause of the deformity and its correction ***(Dyer et al, 1999).***

Clinicians may use the septal support test (Fig.1) to indirectly gauge the strength and stability of the septum by applying force directly to the supratip area ***(Daniel, 2007).***