ABSTRACT

Objectives:
1) Review the support structures of the nasal tip.
2) Discuss the outcome of columellar-septal necrosis.

Case Report:
A 55 year old male with longstanding nasal cocaine abuse experienced acute epistaxis. Examination revealed a saddle nose deformity with an absent columella and cartilaginous nasal septum. Diffuse septal crusting and sanguineous ooze was controlled with silver nitrate cautery.

Results:
Inherent nasal tip ptosis and instability were expected; however, on frontal and superolateral view, nasal tip depression was less than expected. On lateral and base view, the columella and anterior septum were notably absent.

Scar tissue bridging the lateral cartilages formed an arch, possibly providing strength to the nasal tip.

Functionally, the nasal tip was hypermobile with sluggish recoil. Absent anterior endonasal anatomy made the nasal valves inconsequent; however, laminar airflow was disrupted leading to excess dryness, crusting, and epistaxis.

Conclusion:
This case highlights the strength of the lateral cartilages and the role of tissue healing in maintaining nasal patency and aesthetic after cocaine induced columellar-septal necrosis.

CONTACT

Benjamin C. Paul, MD
Department of Otolaryngology - Head and Neck Surgery, New York University School of Medicine
Email: benjamin.paul@nyumc.org
Phone: 212-264-6344

INTRODUCTION

Adjusting the nasal tip is among the most difficult outcomes to predict in rhinoplasty.

Anderson first proposed the rhinoplasty tripod theory. The right and left lateral crura make up two legs of the tripod, with the two conjoined medial crura comprising the third leg. Like a tripod, alteration of one leg adjusts the rotation, projection, and location of the nasal tip.

Janke and Wright described the major and minor tip support mechanisms. Major tip support mechanisms include:

1. Aponeurotic telescoping juncture of the upper lateral and alar cartilages
2. Size, shape, strength, and direction of torque produced by the lateral crura
3. Apposition of the medial crural footplates to the caudal margin of the nasal septum
4. Sling of Pitanguy (a ligamentous connection from the undersurface of the nasal skin and dorsal septum to the posterior margins of the domes of the lower lateral cartilages) and interdomal ligamentous structures
5. Accessory cartilages and attachments to the piriform rim

Taken together, Anderson’s tripod theory and Janke and Wright’s tip support theory comprise the basic foundation by which nasal tip dynamics are understood.

The following case describes the aesthetic and functional consequences of an absent anterior quadrangular cartilage, absent medial crura, and absent columella.

CASE REPORT

The Otolaryngology Head and Neck Service was called to evaluate a 55 year old male with hepatitis C and renal failure on dialysis with longstanding nasal cocaine abuse suffering from acute epistaxis after nasal cañula placement. The patient had a history of longstanding nasoseptal perforation which due to infection years prior lead to a loss of his columella. The patient had continued cocaine abuse, and the defect remained unrepaired.

Examination revealed a saddle nose deformity with an absent columella and anterior cartilaginous nasal septum. Inherent nasal tip ptosis and instability were expected; however, on frontal and superolateral view, nasal tip depression was less than expected (Figure 1a). On lateral and base view, the columella and anterior septum were notably absent (Figure 1b and 1c). Scar tissue bridging the lateral cartilages formed an arch, possibly providing strength to the nasal tip, though the nasal tip was hypermobile with sluggish recoil (Figure 1c). Diffuse septal crusting and sanguineous ooze was controlled with minimal silver nitrate cautery.

DISCUSSION

Mechanism of Columellar-Septal Necrosis: Cocaine vasoconstriction leads to perforation through ischemic necrosis and is theorized to produce a hypoxic, microaerophilic environment suitable for anaerobic infection, causing adjacent soft tissue necrosis.

Tip Support Mechanisms:
Despite the absence of significant empiric support, tip projection was maintained. The fibrous scar band on the undersurface of the nasal tip potentially compensated for the defect in the native structure.

Fibrous attachments are known to play an important role in the strength and elasticity of the nose. Fibrous connections temper alteration to the nasal tripod. Important fibrous attachments include:

1. Fibrous tissues between the upper lateral and lower lateral cartilages
2. The lateral border of the lateral cartilages at the pyriform aperture
3. The interdomal ligament and anterior septal angle
4. The footplate of the medial crus and septal cartilage
5. The derostralingus ligament

Westreich and Lawson purport that the nasal tripod is not only flexible but also spring-loaded and that overall energy balance is the most important anatomical determinant of nasal tip position. To offset gravity, all upward forces are potential energy, rather than kinetic energy, as the tip is not in motion. Spring modeling suggests 1) the septum acts as a cantilever and 2) the strength and geometry of the lower lateral cartilages are most the significant determinants of nasal tip support. Spring modeling requires an understanding of arch engineering. Adamson et al described nasal tip dynamics through an M-arch model. Our patient has a common nostril, and a simplified single arch mechanics could be utilized. The patient’s scar band is theoretically providing significant contribution to the elastic modulus of the spring, in place of the septum.

CONCLUSIONS

If adjusting one leg of a tripod alters the apex, then the loss of one leg should dramatically impact the nasal tip. This case highlights the strength of the lateral cartilages and the role of tissue healing in maintaining nasal patency and aesthetic after cocaine induced columellar-septal necrosis. To prevent recurrent epistaxis and improve support, a complex repair is required. Ultimately, this reconstruction should be delayed until all destructive behavior has ceased.

REFERENCES

3. Punpta AB. Nasal Tip Tripod Theory. e-medicine. Article 1232716