Bilateral nasal vestibular stenosis: a case of rhinoscleroma and review of surgical techniques

Manish Gupta · A. K. Rai

Abstract Vestibular stenosis is an uncommon but debilitating cause of nasal obstruction. It is caused by disruption of the nasal vestibular lining with secondary proliferation of granulation and fibrous tissue. A number of techniques have been described for repair of the stenotic segment. Correction can be difficult because of the tendency of wound contracture and recurrence. We present a surgical technique that employs the concept of excision of the stenotic segment, enlargement of the vestibule and placement of a full thickness skin flap. Its ability to resist contracture obviates the need for post-operative stenting and gives good result.

Keywords Nasal obstruction · Vestibular stenosis

Introduction

The nasal vestibule [1] is located caudal to the nasal valve area and just posterior to the external nares. It seems as the entrance to the valve area, and although the valve is the narrowest portion of the nasal cavity, significant stenosis of the vestibule can cause debilitating nasal obstruction. Collapse of the nasal valve may or may not be present when vestibular stenosis is causing nasal obstruction.

Various causes [1] accounts for the development of nasal vestibular stenosis, including trauma, infection and iatrogenic injury to the vestibular skin. Traumatic injury as a result of burns, fractures and lacerations can precede stenosis. Infection and inflammation, including chicken pox, tuberculosis, leprosy, syphilis, rhinoscleroma and atrophic rhinitis can result in nasal vestibular stenosis. However, the most common etiologic agent by far is iatrogenic injury. Previous surgery including septoplasty and rhinoplasty, overzealous use of chemical and electrocauterization and traumatic placement of nasal packing to control epistaxis contribute significantly to the development of vestibular stenosis. Infrequently, nasal vestibular stenosis is seen in the child as a result of cleft lip/nose deformity correction.

We present a case of bilateral nasal vestibular stenosis following rhinoscleroma. The patient was operated using simple 'Z' plasty i.e nasolabial alar crease flap being transposed with ala. Thus achieving correction of nostril stenosis and alar base malposition simultaneously.

Case report

A 25-year-old male presented in our OPD with complaint of bilateral nasal obstruction for 4 years. Nasal obstruction was gradual in onset, progressive in nature, simultaneous on both sides and complete since last 3.5 years. History of passage of crusts through nose, occasional nasal bleed and presence of foul smell with recurrent muco-purulent bilateral nasal discharge was present 4 years back, lasting for 6 months approximately. Had used nasal drops locally with no relief. Patient also gave history of taking oral capsules and intra-muscular injections for same problem 4 years back with relief in symptoms. Details and old papers revealed him to be a case of rhinoscleroma, who has responded well to oral tetracycline and Inj. Streptomycin. The two consecutive cultures from the biopsy material were negative.

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On external examination patient had right alar collapse. Anterior rhinoscopy revealed bilateral vestibules to be completely blocked by thick fibrous tissue (Fig. 1). Posterior rhinoscopy and other ENT examination were normal. VDRL test was non-reactive. Non-contrast computed tomogram was asked for to assess the thickness of atretic segment and any other associated abnormality of nasal cavity and sinuses. It was found to be normal except 1mm thick atretic segment limited to bilateral vestibule.

The patient was taken up for surgical correction under local anaesthesia. Bilateral 1 × 0.5cm nasolabial flap was elevated in the alar crease based inferiorly and ala lateral attachment detached. The triangular flap (Fig. 2) was transposed inside the floor of the nasal cavity after excision of the fibroic tissue and sutured. The alar cartilage was pulled laterally and stitched to the wound formed due to flap elevation. Mitomycin C² was applied in concentration of 0.4mg/ml locally on the raw area left in vestibule. Bilateral vestibule was packed lightly with BIPP (Bismuth iodoform

Fig. 1 .Pre-operative anterior rhinoscopy photo showing bilateral vestibular stenosis

Fig. 2 Intra-operative photograph showing triangular flap elevated from alar crease

Fig. 3 Post-operative photo at 1 month showing bilateral nasal cavity patent

paraffin paste) impregnated ribbon gauze. Antibiotics and analgesics were given. The tissue excised and sent for histopathology revealed only fibrous tissue, no evidence of Mikulicz cells or Russell body and tissue culture was negative.

Pack removal was done after 48hrs and patient advised to keep lubricated cotton in bilateral vestibule during night only for following week. Patient was followed for a month on weekly basis to remove any crusts and then on monthly basis. After 6 month of follow-up bilateral vestibule are patent with no sign of re-stenosis (Fig. 3).

Discussion

Nasal vestibular stenosis usually begins in the upper and lateral aspects of the nasal vestibule because of the lack of support of the alae compared with the more rigid septal and lower lateral cartilages. The inciting event in nasal vestibular stenosis is injury to the vestibular lining [3]. If the defect or damage to the tissue is extensive, primary healing is hindered. As in the case of subglottic stenosis, healing then occurs by second intention with proliferation of granulation tissue in the superficial layer and deposition of fibrous tissue in the deeper layers. With continued healing the scar tissue contracts, further narrowing the vestibule.

The diagnosis of vestibular stenosis is clinical. Patients complain of constant unilateral or bilateral nasal obstruction. Physical examination confirms an area of stenosis in the vestibule. Associated nasal valve collapse may also be seen on some occasions. No accepted grading or classification system for vestibular stenosis exists in the literature. Adamson proposed three categories:

- 1) Mild- 10-20% narrowing
- 2) Moderate- 20-50% narrowing
- 3) Severe >50% narrowing.

Determination of the degree of narrowing was made on the basis of physical examination only. While this classification system is arbitrary it assists in description of the degree of stenosis present. As in our case obstruction being complete was graded severe.

To correct this difficult problem, the surgeon must address the 2 factors most responsible for development of nasal vestibular stenosis: scar contracture and loss of vestibular lining.

The literature contains descriptions of five surgical treatments:

- 1) Vestibular Z- and/or W- plasties [4], lysis of the stenotic segment is followed by routine transposition of soft tissues. In general, these transpositions are easy to perform, however, the vestibule is an extremely small region, and tissue for rotation is sparse. Thus insufficient for major stenosis and often end up leaving only additional scar tissue.
- 2) Split and full thickness skin grafts [1], where 'take' is often unpredictable and, in any case, require the use of an endonasal splint for a long time to secure the graft in place and to keep vestibule over expanded. Poor compliance with the use of these stents by most patients attests to the physical discomfort and the social embarrassment associated with the use of such stents. In addition, the long-term placement of these stents often causes a fetid odor in some patients, further diminishing patient compliance. There is also the question of whether the pressure of the stent on the healing tissues induces hypertrophic scar formation. Furthermore, skin grafts often contract after stent removal and therefore fail in correcting the original stenosis.
- 3) Composite chondro-cutaneous grafts [5] taken from the ear, a technique leading to good and lasting results. It involves the transfer of a 0.5 to 1cm full thickness wedge of auricle. The cartilage stiffens the repair so that stenting is not needed. But it is better suited to cases of greater tissue loss or a full thickness defect of the alar base or columella. Further such composite grafts often have a partial 'take' and the further disadvantage of an additional surgical site and external scar.
- 4) Intraoral tunneling of oral mucosa [6]. In this mucosal flap was taken from vestibular side of the homolateral lip close to the fornix and tunneled through a paramedian incision in the nasal vestibule where it was sutured to the tissue loss. There was no visible scars, the flap is thin, pliable, well vascularized and has very little tendency to retract. But it is technically challenging. It involves extensive dissection of deep tissues with development of postoperative edema and the added risk of forming postoperative naso-oral fistula.

- 5) Local flaps taken from the nasolabial sulcus and/or the perialar tissue with or without the 'turn-in' flaps. When the alar base malposition accompanies the nostril stenosis, composite grafting will enlarge the nostril but not correct the alar base displacement. Constantian [7] described an alar base flap designed as a crescent adjacent to the alar base, elevated and transposed on subcutaneous and musculocutaneous perforators corrects the nostril stenosis and repositions the alar base simultaneously. He also added that the treating surgeon must diagnose and adequately treat coexistent valvular, septal, turbinate and lining deficiency causes of obstruction in order to achieve optimally functioning nasal airways.

Similar but triangular nasolabial flap was used by us which was pedicled inferiorly instead of island flap. Sood [8] recommended it for correction of pinched nares. In this ala is detached while a flap from the nasolabial fold is swung medially and the ala stitched to the raw area laterally created by the flap. Thus, the ala and nasolabial flap exchange the positions i.e. simple Z-plasty.

Mitomycin C is an antibiotic-antineoplastic agent isolated from *Streptomyces caespitosus*. It acts as an alkylating agent by selectively inhibiting deoxyribonucleic acid (DNA) synthesis and cross-linking DNA. At higher concentrations, cellular ribonucleic acid (RNA) and protein synthesis are also suppressed. Mitomycin C has been used for many years in oncology. Mitomycin C has been shown to have an antiproliferative action on human fibroblasts [2].

The author had good experience of using MMC in reducing adhesion formation following endoscopic sinus surgery [9]. The concentration recommended for local application is 0.4mg/ml.

Rhinoscleroma is a chronic granulomatous disease caused by Gram-negative bacillus called *Klebsiella rhinoscleromatis* or *Frisch bacillus*. It has three stages:

- 1) Atrophic- resembles atrophic rhinitis
- 2) Granulomatous- nodules are formed by subdermal infiltration, painless and non-ulcerative.
- 3) Cicatricial stage- stenosis of nares seen.

Diagnosis is by biopsy, which shows infiltration of submucosa with plasma cells, lymphocytes, eosinophils, Mikulicz cells and Russell bodies. Latter two are diagnostic but only seen in active disease.

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