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INNOVATIVE METHOD FOR THE CORRECTION OF UNILATERAL COMPLETE OBLITERATION OF NARES AND NASAL VESTIBULAR STENOSIS

Plastic Surgery

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ABSTRACT

Introduction- The stenosis developing after surgical excision or electro-cauterization of the lesions of nasal vestibule is not an uncommon complication. Numerous methods are available for the correction of cicatrical nasal vestibular stenosis and obliterated nares like- skin grafting, local flaps, naso-labial flap, forehead flap etc.. In this study we had combined three procedures viz. scar based flap, split skin graft and regenerated respiratory epithelium in situ for the completely obliterated nares.

Materials and methods: This is a prospective study carried out at Dr BRAM Hospital, Raipur between year 2013 to 2017. It comprised of total 11 patients, out of which four patients presented with unilateral complete obliteration of nares and seven patients came with vestibular stenosis following surgical treatment of rhinosporidiosis. They were treated by combined three procedures viz. scar based flap, split skin graft and/or regenerated respiratory epithelium in situ.

Results- The results were judged by improvement in the breathing, correction of nasal blockage and long term patency of the nasal passages, with complete recovery from the symptom.

Conclusion- This procedure having an excellent outcome and no complication for the treatment of unilateral complete obliteration of nares and nasal vestibular stenosis.

KEYWORDS

obliteration of nares, nasal vestibular stenosis, Custom made collagen scaffold stent in -situ tissue engineering

INTRODUCTION

The stenosis developing after surgical excision or electro-cauterization of the lesions of nasal vestibule is not an uncommon complication. But complete obliteration of the nares following wound contraction is pretty rare. Various methods are available for the correction of cicatrical nasal vestibular stenosis and obliterated nares like- skin grafting, local flaps, naso-labial flap, forehead flap etc. As Post correction complications like re-contracture, re-stenosis may occur and are difficult to manage subsequently. Many a times long lasting good results are difficult to achieve. The role of multi modality treatment has not been sufficiently explored. In this study we had combined three procedures viz. scar based flap, split skin graft and regenerated respiratory epithelium in situ for the completely obliterated nares. Custom made collagen scaffold stent was used to regenerate thin respiratory mucosal lining beyond the vestibule. The scar flap was placed dorsally in intermediate region to prevent re-contracture. The regenerated respiratory epithelium behind limen nasi using in -situ tissue engineering resulted into the moist environment of the vestibule found to be the key advantage of this procedure. Thus the combined procedure was helpful to us in achieving an aesthetic and functional outcome simultaneously preventing the re-contracture.

MATERIALS AND METHODS:

The study was done in the Department of Plastic Surgery of Pt. JNM Medical College Hospital, Raipur. In last 5 years total 11 patients were treated, out of which four patients presented with unilateral complete obliteration of nares and seven patients came with vestibular stenosis following surgical treatment of rhinosporidiosis (Table:1). Scar was completely excised followed by reconstruction of nasal lining using scar based flap in intermediate region, split skin graft to provide cover to the vestibule and collagen scaffold to regenerate nasal epithelium using in situ tissue engineering posterior to limen nasi. Prospectively, collected clinical records and data of all patients were reviewed to obtain the results.

Representative Case

19 year old male habitual pond bather, contacted rhinosporidiosis of nasal region 3 years back and was treated for that at some hospital at Durg. Now, since last few months he experienced difficulty in breathing with gradual obliteration of right nasal vestibule by a mass. Recurrence leads to secondary surgery, for that he was subjected to excision and fulguration. Patient was lost in follow up, till he presented with complete obliteration of the nares. He was directed to the Department of Plastic Surgery. On examination it was found that the scar has completely obliterated the right nasal opening (Fig.1). He was subjected for corrective surgery under general anaesthesia. The lazy 'W' shape incision (Fig.2). was given around ala of nose. One prong of 'W' elevates the right ala of nose and the second prong incision elevates dorsally based scar flap. The scar based flap pedicled dorsally. The right nasal ala was completely made free from the scar (Fig.2). The fibrous tissue was thoroughly excised creating a wide room. (Fig.3). Adequate haemostasis was achieved using electro-coagulation. Scar based flap was sutured to the raw area dorsally in the vestibule by using 5-0 polyglactin 910 suture. Now, the challenge was to provide skin cover to the remaining nasal vestibule anteriorly, and to provide good respiratory mucosal epithelium at and beyond limen nasi and to provide good shape to the deformed ala in a single sitting. First, we customized a nasal splint using 2.5 cm of distal most end of Foleys catheter along with proximal rigid end of collection bag to prevent it from collapse. The stent was covered with bovine collagen impregnated with recombinant human epidermal growth factor in the proximal half and covered with split thickness skin auto graft in distal half, harvested from thigh, keeping the raw area of the skin graft up so as to be applied to the wound surface. The collagen and split skin graft was snuggly fixed over the stent using 5-0 polyglactin 910 suture. (Fig.4).The stent was placed into the defect under vision and the stay sutures were applied to prevent accidental expulsion of the stent. The ala was sutured over the stent to the incision margin. Good alar shape was achieved on table (Fig.5). Post operative dressing was done and the stent was removed after 7 days. Good skin graft take-up and regeneration of nasal mucosa was evident on anterior nasal endoscopy. Stent was replaced and intermittent dressings were done. Regular nasal dilatations were advised to the patient for about 4 months. 20 month follow up of the patient shows satisfactory result in term of air flow, aesthetics, skin and mucosal lining, free from contracture (Fig.6).

RESULTS:

All patients achieved good functional and aesthetic outcome. All patients who had unilateral complete obliteration of nares or vestibular stenosis preoperatively had very good improvement in the breathing, correction of nasal blockage and long term patency of the nasal passages, with complete recovery from the symptoms. The patients were entirely satisfied with the functional recovery.

DISCUSSION

For the plastic surgeon, nasal reconstruction is the most frequent and most challenging referral. A prominent and defining feature of the face, the nose is a composite structure composed of skin, lining, cartilage, muscular subcutaneous tissue, septum, and bone. All components, including cover, support, and lining, must be restored appropriately to provide an aesthetic and a functionally sound reconstruction. Operative decisions must be made keeping in mind the effects of late scar healing. From the outset, a well-tailored and thorough plan is paramount; however, the surgeon and patient should allow for flexibility, including additional stages if necessary[1].

The disease Rhinosporidiosis usually presents as multiple granulomatous bleeding polyps. Recurrence following excision and cauterization, dissemination in anatomically close sites and local secondary bacterial infections are the most frequent complications[2]. over zealous excision and fulguration can lead to stenosis or complete obliteration of the nares. The least known presentation is iatrogenic complete nares obliteration for which the patients were referred to our outpatient department. Fibrous tissue has a tendency to contract concentrically, leading to constriction ring, collapse of the dome and stenosis. Any stenosis which occurs in tubular cavities tends to be resistant to treatment[3].

Congenital stenosis of anterior nares is rare condition which results from failure of canalization of epithelial plug between lateral and medial nasal processes. Various other causes 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 electro cauterization 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[4]. Thus the list of nasal trauma that can cause stenosis or obliteration of the nares is long, the referral patient compare to these are less.

In literature various methods has been describe to cover the skin defect but there is paucity of methods depicting the reconstruction of nasal lining. Failure to provide adequate lining or failure of adequate reconstruction of cartilaginous support frequently results in unsatisfactory nasal reconstructions. Symptomatic iatrogenic vestibular stenosis may be treated successfully with endoscopic lysis of synechiae and nasal stenting in infant[5]. But not providing any nasal lining and relying completely on natural process of epithelialization may produce variable results.

The common treatment strategy is to focus on correction with local flaps or skin grafts. A local flap from nasolabial sulcus or perialar tissue using Zplasty can be useful to correct nasal stenosis. This procedure is helpful in preventing re-contracture but the perialar flap is little bulkier to suite the thin nasal lining of the nasal vestibule and the nasolabial sulcus flap is insufficient to provide complete lining for the released obliterated nares. The scar based flap with random blood supply was elevated in our patients to suit the situation. It was placed dorsally in intermediate region of the vestibule to prevent re-contracture in future once the skin graft contracts after 'take'. This flap breaks the continuity of the skin graft and avoids the concentric contracture beautifully Split and full thickness skin grafts 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. 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.

According to some author use of nasal stents made from nasopharyngeal airway tubes is a safe, convenient, and economic treatment for the prevention of contracture after surgical correction of nostril stenosis or nasal valve insufficiency[6]. some advocated balanced opinion, management appears to a good solution to a very difficult problem. But continual use of the stent and patient compliance can be a drawback[7]. Similarly some suggest, use of soft silicone stent fashioned as inverted V when placed bilaterally may be helpful in making remarkable recovery with no evidence of vestibular stenosis or nasal valve abnormalities[8]. So, as with our previous experience we and our patients are very comfortable with the custom made stents we provide them. We still continue the practice of using stents with due precautions explained to the patients and their relatives.

The nasal lining beyond anterior nasal valve is pseudo stratified columnar ciliated epithelium and in all of our cases it was damaged due to previous surgery. This lining is important in keeping nasal vestibule wet by the secretion of mucus by goblet cells and the lymphoid tissue present in this layer is helpful in inducing protective immune response[9]. We planned to grow the pseudo stratified columnar ciliated epithelium in situ by using custom made collagen scaffold stent which not only provided support to the reconstructed nose but also protected the vital regenerated epithelium. It also prevented scar contraction on long follow up and also was confirmed by our previous experience in correction of tracheal stenosis[10]. The regenerated respiratory epithelium behind limen nasi using in -situ tissue engineering resulted into the moist environment of the vestibule found to be the key advantage of this procedure along with intermediate scar based flap. Thus this multimodality procedure helped us in achieving an aesthetic and functional outcome simultaneously preventing the re-contracture on long follow up.

CONCLUSIONS:

The reliability and versatility of this procedure shown in above patients will reveal the new way for the treatment of complete obliteration of the nares or in even nasal vestibular stenosis. The regenerated respiratory mucosa is helpful in keeping the vestibule wet post operatively and prevent subsequent infections and contracture. Its utility to treat stenotic conditions of the nose will definitely add to surgeon's understanding of the condition, prevention of the entity and proper management of complete obliteration of the nares or nasal vestibular stenosis.

Declaration of interest

The authors reports no conflicts of interest. The authors are responsible for the content and writing of the paper.

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Figure 1 Right nasal vestibular stenosis following surgical treatment of nasal rhinosporodiosis

Figure 2 Lazy 'W' incision

Figure 3 Complete resection of scar tissue after elevation of right ala and scar based flap

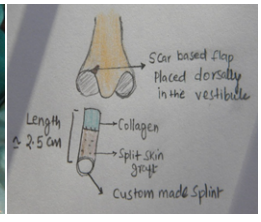

Figure 4. Making of custom made collagen Scaffold splint with split skin graft and collagen

Figure 5 On completion of operation with placement of Scaffold stent with split skin graft and collagen impregnated with growth factors

Figure 6 On follow up good shape of the nostril is evident on removal of splint

Table:1, Pre and Post- operative details of the patients.

s.no.	Age	sex	Uni/Bilateral	Stenosis/obliteration	Air flow obstruction	Post op cosmesis	Vestibule size	Regeneration	Moisture	remarks
1	19	M	uni	obliteration	complete	satisfactory	adequate	complete	Good	-
2	25	M	uni	stenosis	moderate	satisfactory	adequate	complete	Good	-
3	20	F	bi	Stenosis+stenosis	mild+mild	satisfactory	mild narrowing	complete	Good	HIV Bleeded on dilatation
4	21	M	Uni	obliteration	mild	satisfactory	adequate	complete	Good	-
5	32	M	Uni	stenosis	mild	satisfactory	adequate	complete	Good	-
6	39	M	Uni	obliteration	complete	satisfactory	adequate	complete	Good	-
7	57	M	Uni	stenosis	mild	satisfactory	adequate	complete	Good	diabetic
8	22	M	uni	stenosis	moderate	satisfactory	adequate	complete	Good	-
9	55	M	uni	obliteration	complete	satisfactory	mild narrowing	complete	Good	Lost in follow up
10	42	F	Uni	stenosis	mild	satisfactory	adequate	complete	Good	-
11	29	M	uni	stenosis	mild	satisfactory	adequate	complete	Good	-

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