Case Report

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Dentistry Section

Membrane Assisted Palatal Fistula Closure in a Cleft Palate Patient: A Novel Technique

G. SIVA PRASAD REDDY[1], G. VENKATESHWARA REDDY[2], P. KARUNA SREE[3], K. SRAVAN KUMAR REDDY[4], P. AMARNATH REDDY[5]

ABSTRACT

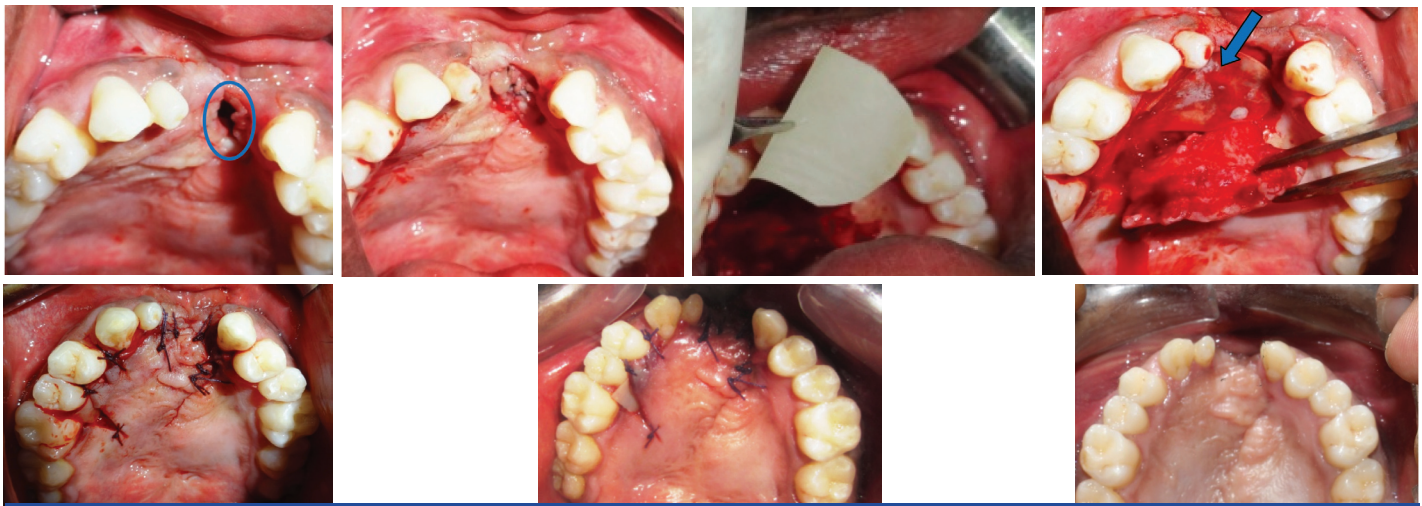
Palatal fistula following cleft palate repair, is one of the considerable complications and remains a challenging problem to the surgeons. The reported recurrence rate of the fistula is between 33% to 37%. Due to fibrosis and poor vascularity of adjacent tissues, high recurrence rates are typical. Closure of palatal fistulas can be achieved by different surgical techniques like local, regional and distant flaps. Local turnover flaps, pedicled flaps from oral mucosa, buccal fat pad flaps, inter-positional cartilage grafts can be utilized for management of small fistulas. For larger fistualas, tongue flaps, temporalis muscle flaps, musculomucosal flaps, nasal septal flaps and free flaps can be used. These procedures are often cumbersome and leave a raw nasal or oral surface, which may increase the incidence of postoperative problems or some flaps can be bulky and may require a second-stage procedure. Different synthetic materials such as alloderm, Poly-D and L-Lactic Acid or "PdLLA" and collagen membrane are used in multilayer repair represented by the nasal mucosa, the inter-positional graft and oral mucosa. These interpositional grafts provide a scaffold for in growth of tissues, revascularization and mucosal epithelialization. We present a case of closure of an oronasal fistula, using resorbable collagen membrane in three layered repair to avoid recurrence.

Keywords: Collagen membrane, Guided tissue regeneration, Interpositional grafts, Oronasal fistula

CASE REPORT

A 27-year-old male patient reported to Department of Oral & Maxillofacial Surgery, Panineeya Institute of Dental Sciences and Research Centre, Hyderabad with a chief complaint of nasal regurgitation of fluids. Patient's history revealed left unilateral complete cleft lip and palate. Cleft lip repair was done at the age of 2 years, Cleft palate repair was done at the age of 18 years and secondary alveolar bone grafting at the age of 26 years for closure of alveolar cleft and oronasal fistula. Fistula recurred in the anterior palate. On clinical examination,11,21,22 teeth were missing, peg shaped 12 was present. Palatal fistula was present in the anterior region towards the alveolus [Table/Fig-1]. Scarring was present on the hard palate.

The standard surgical technique used for fistula management was based on the known technique of multilayer closure. Surgery was performed under local anaesthesia. After injection of local anaesthetic solution containing adrenaline, incisions were placed surrounding the fistula in circular manner and turn over flaps raised and sutured to form nasal layer exposing raw surface towards oral side [Table/Fig-2]. Then palatal crevicular incision along with a relieving incision at mesial end of the first molar on the right side was placed. A full thickness palatal flap was raised and mobilized sufficiently without any tension in the flap. A resorbable collagen membrane (Healiguide) was placed over the already reconstructed nasal layer [Table/Fig-3,4]. This ensures covering of the defect with a second layer to which a third layer is added by rotating and advancing the palatal flap and closing to rebuild the oral mucosa [Table/Fig-5]. A resorbable suture material is used (Vicryl 3-0) for the closure of oral mucosa. Postoperatively antibiotics and analgesics were prescribed. Instructions were given and soft diet was advised for a week. Patient was followed up for 6 months [Table/Fig-6,7]. No adverse events, related to the use of the membranes were encountered and there was no evidence of infection, signs of rejection or dehiscence. There was no fistula recurrence.



[Table/Fig-1]: Preoperative photograph showing oronasal fistula in the anterior palate. **[Table/Fig-2]:** Intraoperative photograph showing the repaired nasal layer using turnover flaps. **[Table/Fig-3,4]:** Intraoperative photographs showing resorbable collagen membrane placed over the repaired nasal layer. **[Table/Fig-5]:** Intraoperative photograph showing palatal flap closure after medial rotation. **[Table/Fig-6]:** Postoperative photograph after 3 days. **[Table/Fig-7]:** Postoperative photograph after 6 months.

DISCUSSION

Oronasal fistula (ONF) following cleft palate repair is one of the considerable complications with the recurrence rate of 33% to 37% [1] and remains a challenging problem to the surgeons. Oronasal fistula is defined as a persistent opening between the nasal and oral cavities that was intended to be closed, that is to say, a complication, or, as defined by Cohen and colleagues, a failure of healing or a breakdown of the primary surgical repairs [2]. Significant functional consequences of palatal fistula can includie fetor oris, nasal regurgitation of liquid/food, chronic inflammation, hypernasality, velopharyngeal incompetence as well as hearing loss. Multiple etiologies have been proposed for the formation of fistula, which include tension along the palate repair, haemorrhage, absent multilayer closure, upper respiratory infection and increasing cleft severity [2,3]. Various factors have been reported to influence the occurence of such fistulas like experience of the operating surgeon, the age of the patient and type of palate repair used [1,4]. Due to scarring and poor vascularity of adjacent tissues from prior surgical procedures, recurrence rates increases in second or further procedures.

The techniques used for fistula repair include local palatal flaps, modified palatoplasty techniques, regional flaps, vascularized tissue transfers and recently inter-positional barriers have been used as an adjunct to repair fistulas [5,6]. Small fistulas can be managed by local turnover flaps, pedicled flaps from oral mucosa, buccal fat pad flaps, inter-positional cartilage grafts and the larger fistualas can be treated by tongue flaps, temporalis muscle flaps, musculomucosal flaps, nasal septal flaps and free flaps. These procedures are often cumbersome and leave a raw nasal or oral surface, which may increase the incidence of postoperative problems or some flaps can be bulky and may require a second-stage procedure.

Over the past 30 years Guided Tissue Regeneration (GTR) therapy has been practiced in dentistry, after Melcher, Karring *et al*., and Nyman *et al.,* reported the basic principles of GTR [7]. In periodontal and implant therapy, collagen barriers may be particularly useful due to their cell occlusiveness, biocompatibility, weak immunogenicity, and resorbability (with the advantage of avoiding a second-stage surgery for their removal) [8]. Collagen membranes are also chemotactic for regenerative cells. Collagen implantation in skin was found to reduce scar formation in animals and to decrease wound contraction in a human wound model [9]. Collagen scaffolds, seem to be promising for tissue engineering purposes in the oral cavity and in cleft palate surgeries.

Inter-position grafts of bone, cartilage, fascia, dermis and fat have been used successfully in fistulas. Different synthetic materials had been used in repair such as alloderm [5,6], Poly-D and L-Lactic Acid or “PdLLA” [10], collagen membrane [11,12]. This technique is based on the principle of guided tissue regeneration. In the event of mucoperiosteal breakdown due to tension in flap closure or inadequate tissue for the closure of fistula, the inter-position material acts as an additional layer of closure and may act as a scaffold for mucosal spreading across the fistula site.

Luo and co-workers were the first to propose a technique whereby a PdLLA sheet is used as an additional layer in hard palate closure in conjunction with closure of the soft palate [10]. They utilised a 0.5mm sheet during the closure of complete unilateral clefts, as a secondary procedure following the closure of the lip. Sader and co-workers published a series of 14 cases of ONF, treated successfully by means of a technique very similar to a Von Langenbeck palatal repair [11], but with the addition of a resorbable collagen membrane (Geistlich Bio-Gide) as an inter-positional graft inserted onto the repaired nasal mucosal layer.

Considering the importance of a tension-free closure, closure efforts are greatly hampered in the setting of recalcitrant oro-nasal fistula, given the significant palatal scarring and healing contracture present secondary to failed initial surgical management.

In our case, we used inter-positional material to treat palatal fistula-Pittsburgh Fistula Classification type-V [13]. The procedure used was simple, without excessive time consumption and no donor site morbidities. As recorded in literature, the inter-positional materials added a new layer which both acted as scaffold for epithelization, strengthened the fistula site and reduced the tension on the fistula site.

Resorbable collagen membrane has good biocompatible and biodegradable properties, as the membrane resorbs in 4 to 12 weeks, replacing the space occupied by the membrane by appropriate tissue and only elicited a mild and transient inflammatory response to bioresorption process [14]. Because of high sequence homology between bovine and human collagen, bovine collagen is weakly antigenic [9]. It has acceptable handling properties and has the ability to be customized for each situation.

We believe that our technique which adopt the idea of using three layer repair represented by the nasal mucosa, the inter-positional bioresorbable collagen membrane and the rotational turn over oral flap has a higher success rate, as it resulted into more competent repair and stronger healing site. In our case, collagen membrane was firmly secured over the repaired nasal layer. That success might be attributed to the well wrapping of the collagen membrane to the repaired nasal layer that fixed it in place until integration of the graft takes place. Collagen membrane selectively guides the regeneration of oral mucosa or nasal mucosa in case of dehiscence, as it selectively guides tissue regeneration in the periodontium following periodontal disease in “guided tissue regeneration.

CONCLUSION

The technique is easy to perform and less time consuming. Additional layer of resorbable material between the nasal and oral layers, bridges the bone gap and may facilitate guided tissue regeneration by providing a barrier or resistance to wound breakdown.

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PARTICULARS OF CONTRIBUTORS:
1. Professor, Department of Oral and Maxillofacial Surgery, Panineeya Mahavidyalaya Institute of Dental Sciences and Research Centre, Dr. N.T.R. University of Health Sciences, India.
2. Professor and Head of the Department of OMFS, Department of Oral and Maxillofacial Surgery, Panineeya Mahavidyalaya Institute of Dental Sciences and Research Centre, Dr. N.T.R. University of Health Sciences, India.
3. Post Graduate Student, Department of Oral and Maxillofacial Surgery, Panineeya Mahavidyalaya Institute of Dental Sciences and Research Centre, Dr. N.T.R. University of Health Sciences, India.
4. Post Graduate Student, Department of Oral and Maxillofacial Surgery, Panineeya Mahavidyalaya Institute of Dental Sciences and Research Centre, Dr. N.T.R. University of Health Sciences, India.
5. Post Graduate Student, Department of Oral and Maxillofacial Surgery, Panineeya Mahavidyalaya Institute of Dental Sciences and Research Centre, Dr. N.T.R. University of Health Sciences, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. P. Karuna Sree,
H-No: 4-8-304, Gowliguda, Hyderabad, Telangana, India.
E-mail: karunasreependyala@gmail.com

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