Management of Naso-orbital Fistula following Maxillectomy: a Case Report

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Background

Naso-orbital fistulas can occur following surgeries of the orbit and adjacent structures (paranasal sinuses) for malignant tumours. Aggressive local therapy of the malignancies of nose and paranasal sinuses is essential as they lie adjacent to the vital structures like orbit and the cranial cavity. Fistulas generally occur when bony orbital and nasal walls are resected or penetrated to achieve local tumour clearance. Various methods have been described to manage post-operative naso/sino-orbital fistulas including primary closure, split skin or full thickness grafts, local, distant and free flaps. We describe a case of naso-orbital fistula following extended maxillectomy and radiotherapy for maxillary sinus malignancy which was treated with scalp advancement flap.

Case Report

A 40 year old woman had undergone extended maxillectomy for a stage IV (T4 N0 M0) adenoid cystic carcinoma of left maxillary sinus in the Head and Neck Oncology division of our hospital. The histopathology report of the tumour specimen demonstrated peri-neural invasion of the infra-orbital nerve and involvement of the nasal bone. The patient underwent 35 fractions of orbit preserving radiotherapy which was completed 3 months post surgery. Six months post treatment she presented to our out-patient clinic with

complaints of a defect in the left naso-orbital region of 2 weeks duration. She also complained of crusting in and around the defect and foul smelling discharge from the defect. At examination, patient was found to have chemosis and edema of left eyeball. A fistula measuring 4×3 cm was present in the left naso-orbital region which was covered with crusts and foul smelling discharge (Fig. 1). General condition and nutritional status of the patient was good. Hemogram and serum protein levels were within normal limits.

Patient was started on alkaline nasal douches to maintain local hygiene. She was counselled for orbital exenteration and an informed consent was obtained. Informed consent for fiberoptic intubation and tracheostomy (if required) was also taken. An elective repair of the fistula using scalp advancement flap was planned. Intra-operative biopsy was taken from margins of the fistula and sent for frozen section. Once the frozen section report was reported as negative for residual tumour, superior and inferior sub-conjunctival incisions were placed. Eye-ball and extra-ocular muscles were separated from the periosteum. Optic nerve and retinal artery were clamped and eye-ball excised. Margins of upper and lower eyelids were excised and sent for biopsy (the final histopathology report confirmed the margins to be free of tumour). Flaps were raised after placing an incision on the fore-head between the two eye-brows and extended superiorly over the scalp. Minimal cautery was used in raising the flap and it was raised completely till the edges were adequately everted. This flap was advanced into the defect and sutured with 4–0 nylon in a single layer.

The post-operative period was uneventful. Sutures were removed on 10th post-operative day and she was kept on regular follow-up (Fig. 2). The flap healed well and the patient is disease free 2 years following surgery.

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Fig. 1 Fistula in the left naso-orbital region

Discussion

The various factors responsible for the development of a naso-orbital fistula (following surgery of this region) include poor surgical technique, post-operative radiotherapy [1], concomitant immuno-compromized state, diabetes mellitus and hypoproteinemia [2]. In our case, the patient had undergone 35 fractions of post-operative radiotherapy which could be the cause for formation of the fistula.

Before starting the treatment of these fistulas, it is important to rule out the recurrence of the malignancy especially if the fistula has occurred late [2]. In our case, fistula had occurred 6 months after the primary surgery, therefore a biopsy was taken from the margins of the fistula and fistula was repaired after the confirmation of a negative biopsy.

Among non surgical treatment options, prostheses have been suggested to close fistulas developing after ablative therapy of paranasal sinus tumours [3]. However, prostheses

do not offer permanent resolution and require long term care.

Small asymptomatic fistulas can be managed with conservative approach by maintaining the local hygiene with alkaline nasal douches. The size of these fistulas should be less than 5 mm in the greatest dimension since larger fistulas have minimal chances of healing spontaneously. The inherent disadvantage of this method is the longer duration (2–3 years) taken for the fistula to heal.

If the patient has symptoms of the fistula like foul smelling discharge, crusting, difficulty in blowing the nose and rhinolalia aperta, the management is essentially surgical. The various surgical techniques described in the literature to repair these fistulas, ranging from direct closure to free flaps, including grafts, flaps from orbit and nose.

Direct closure and grafts can be used for small symptomatic fistulas. Direct wound approximation has the advantages of being a one stage and rapid procedure with absence of additional scars [4]. However, small fistulas with bone loss may not heal with direct closure and require grafts for appropriate repair. Also, direct closure is difficult for defects close to the eyebrows [4]. Various graft materials which have been used to repair these fistulas include split skin graft, full thickness skin graft, mucous membrane, temporalis fascia, fascia lata, dura and periosteum [2]. Mucous membrane grafts can be obtained from nasal mucosa (inferior turbinate and the nasal septum) because nasal mucous membrane is thick, available in abundant quantity, highly vascular and thus a reliable graft material. These grafts, though reliable tend to take a longer time (5–6 weeks) to heal as compared to the flaps. Also, grafts have a tendency to contract postoperatively which makes them unsuitable to be used for larger (>5 mm in diameter) symptomatic fistulas. However, skin if used as a graft material causes minimal distortion of the surrounding tissues but leaves a scar at the donor site [4].

Local or distant flaps can be used for larger defects and also have the advantage of excellent take up and good cosmetic result. Flaps can be taken from the orbital and/or nasal sides. The types of orbital side flaps are rotational mucous membrane [5, 6], cutaneous [6], myocutaneous [7] or mucocutaneous [6] flaps. The various flaps from the orbital side include temperoparietal fascial flap [8, 9], median forehead flap [7] and scalp advancement flap. These flaps have an excellent blood supply and so can be used for repair of large fistulas with excellent results. Local flaps can also be harvested from the nasal side which include uncinata based and middle turbinate based flaps [2]. These flaps derive blood supply from anterior ethmoidal and sphenopalatine vessels. However, the blood supply for these flaps is not as good and adequate as the flaps from the orbital side. So, these flaps should be used only for medium sized defects (maximum diameter of 1 cm) with minimal bone loss.

Fig. 2 Post-operative picture showing the scalp advancement flap

A 2 layered closure of these fistulas has been suggested using flaps from both the sides (orbital and nasal) to ensure the good blood supply and excellent take up [6]. This technique is essentially important where blood supply of the local tissues is compromised and may be worthwhile considering in patients who have already received radiotherapy.

Finally, very large defects with large amounts of bone loss can be repaired with free flaps but these flaps can mask tumour recurrence because of their bulk [10, 11]. These flaps include radial fore-arm fascio-cutaneous or osseocutaneous and latissimus dorsi myo-cutaneous flaps.

In our case, we used a scalp advancement flap for the repair of orbital cavity and naso-orbital fistula. There were two main reasons for choosing this flap. Firstly, the scalp has abundant loose tissue which can be advanced easily into larger defects of this size. Secondly, the scalp has abundant random blood supply which is essential in the reconstruction of post-irradiated tissue because of the extensive vascular damage and fibrosis in these tissues. Nasal mucosal flaps were not chosen because of the larger size of the defect and the fact that these flaps have an inherent poor blood supply.

Conclusion

Naso-orbital fistulas are rare complications following treatment of malignant tumours of the paranasal sinuses. Treatment of these fistulas can be challenging and this is evident from the various methods used to treat them. When undertaking surgical management it is very important to use proper surgical technique to prevent the recurrence of fistula. The technique should be atraumatic including minimal use of the cautery, complete de-epithelization and eversion of the flap edges, and adequate closure without tension at

the suture site. It is also very important to prevent the creation of dead space and hematoma under the flap lest the flap gets infected and fistula recurs.

Conflict of Interest None.

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