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Case Report

A novel surgical procedure for medial canthal fistula closure in midline destructive lesions: two case reports

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ABSTRACT

Medial canthal fistula in the context of destructive processes poses a significant surgical challenge. We report the closure of the fistula using a novel Back-to-Back Sandwich Flap (B2BSF) in two patients. The surgery involves fashioning a paired inner layer inverted local skin flap covered by an outer layer skin glabellar to create a double layer back-to-back flap to cover the defect. It was used to close a 2.5 by 2.5 mm fistula in one patient with CIMDL and a 0.5 by 1 mm in a second patient with radiotherapy damage post-SCC. Three months post-surgery, the fistula remained closed in both patients. Medial canthal fistula can compromise the ocular surface and vision and is unsightly and uncomfortable. It is difficult to close the fistula, particularly in a destructive process with unhealthy and avascular surrounding tissue. The B2BSF appears to be an effective surgical reconstructive strategy for this challenging situation.

Keywords: Canthal fistula, CIMDL, Surgery, Flap

INTRODUCTION

Medial canthal fistula is an abnormal communication between the nasal cavity and the skin and/or caruncular area. They are typically congenital, deriving from defects in the developmental process.[1] Acquired medial canthal fistulas are rarely described in the literature but anecdotally are not infrequently encountered, typically with traumatic/post-surgery or a destructive or revascularizing process such as malignancy, radiotherapy, or cocaine abuse.[2,3–6]

Surgical correction of those fistulae can be very challenging, with different approaches described according to the location and size of the fistula.[3,4,7–11] Cocaine is among the oldest known and widely used recreational drugs. It is frequently inhaled powdered for its rapid-acting effect through the highly vascularized nasal mucosa. When used in a high-velocity insufflation process, the crystals and contaminants present in the drug may cause mucosal irritation and trauma to the mucous membranes. The vasoconstriction, irritation, inflammation, ulceration, and ultimately ischaemic necrosis of the drug and contaminants can cause cocaine-induced midline destructive lesions (CIMDLs) with destruction and perforation of osseocartilaginous structures in the midface.[12,13]

Squamous cell carcinoma is the most common sinonasal malignancy, and 75% to 89% of tumours of the nasal cavity are identified at an advanced stage.[14,15] They are usually treated with complete surgical resection followed by adjuvant radiotherapy (RT).[16,17] Avascular necrosis and fistula can complicate radiotherapy.[17] Authors present a novel surgical procedure using a back-to-back sandwich flap (B2BSF) to close a medial canthal fistula in two patients with different destructive aetiologies. The study was conducted in accordance with the amended

Declaration of Helsinki. Both patients signed consents for the use and publication of their photographs, and the consents are on file.

The surgical procedure

The surgery was done under general anaesthesia. The fistula area was marked with two halves of 2-4 mm skin flap squares on both sides. The double inverted full-thickness skin flaps are to be created and flipped over to cover the defect (Figure 2). Both flaps were sutured together, with the skin side facing the intra-nasal space, thereby closing the fistula as the first (internal) layer. The exposed side of the inverted flaps is then covered with another skin flap, such as the glabellar flap, thereby creating a double-layer flap with skin on the external sides of the flap. The surgical video was added as supplemental digital content.

CASE REPORTS

Case 1

A 46-year-old man with CIMDL had a large left medial canthal fistula. He had already lost the left eye secondary to corneal perforation presumed to result from chronic exposure and infection due to his fistula. He also had a further large nasal fistula, saddle nose deformity and destruction of the nasal cavity and sinuses (Figure 1).

Previous nasal mucosa biopsies showed non-specific ulceration and inflamed granulation tissue. Sinus and orbital computerized tomography (CT) scans demonstrated extensive destruction of the midline osseocartilaginous structures, with loss of the hard palate, nasal septum, lateral walls of the nasal cavity, medial walls of both orbits and ethmoid air cell complexes.

The patient's surgery used a B2BSF closure with the inner layer paired flaps formed from (1) inverted eyelid skin and (2) inverted nasal skin, and the external layer was a glabellar flap.

The postoperative recovery was uneventful, and the fistula remains closed at three months post-surgery. (Figure 3).

Case 2

A 54-year-old developed a left medial canthal fistula after routine endoscopic DCR surgery. She had previously had SCC and had lateral rhinotomy surgery with postoperative radiation therapy (RT). The patient developed a medial canthal fistula a few months after her DCR surgery (Figure 4). The fistula prevented her main hobby of swimming. In February 2024, the patient underwent medial canthal fistula closure surgery using a B2BSF with the inner layer paired flaps from inverted nasal skin and an external small glabellar flap. The fistula remains closed at three months, except for a very small hole. This hole does not affect the patient's quality of life; she has returned to swimming (Figure 4).

Figure 1: (A) A photograph of a patient's face depicts a severe saddle-nose deformity and a large medial canthal fistula through the nasal cavity. In this photo, the eyelids are not in contact with the cornea medially, and the eye is positioned in an adducted position pointing toward the exposed nasal cavity; (B) the medial canthal fistula: a closer look.

Figure 2: Theatre photos. (A) Photograph from the theatre of the markings on the double breast flaps (arrows) and the glabellar flap (star); (B) the superior flap is incised; (C) elevation of the superior flap; (D) the superior and inferior flaps are sutured together; (E) a glabellar flap is created & (F) the final result is the glabellar flap covering the double breast flaps.

Figure 3: Three months post-op photograph of case 1 in the clinic; the fistula completely closed.

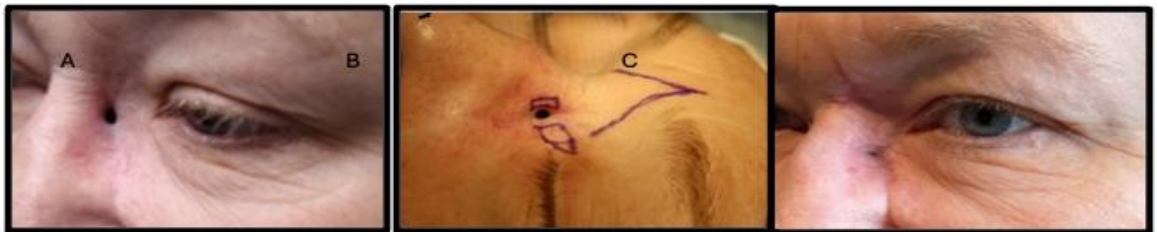

Figure 4: (A) An image of the patient's face demonstrating the medial canthal fistula; (B) an image of a theatre's double breast (arrows) and glabellar flap (stars); (C) a minor hole remained three months after the surgery, which had no adverse effect on the patient's quality of life.

DISCUSSION

Medial canthal fistula in the context of destructive and avascular tissue is an extremely challenging situation. The B2BSF is a promising and simple surgical technique that closes the fistula with multiple layers.

Problems with having a medial canthal fistula

Fistulas of the medial canthus are associated with both aesthetic and functional difficulties. Fistulas in this region may affect the function of the eyelids, the patency of the lacrimal drainage system, and ocular protection. They may also be uncomfortable and unsightly. Furthermore, medial fistulas can affect breathing and interfere with daily activities such as swimming or scuba diving.

Literature on medial canthal fistula closure

Some fistulas may close with time and conservative management, such as antibiotics, if there is evidence of infection or immunosuppression for inflammation.[10] There is a lack of literature on surgical strategies for fistula closure. Medial canthal fistula reconstruction surgery was first described by Putterman in 1989 using a nasolabial flap combined with a forehead flap to reconstruct a post-surgical fistula.[11] Other surgical methods described include myocutaneous flap, dermis fat graft, split-thickness skin graft, free flap, granulation, or a combination.[4]

Spontaneous closure is extremely unlikely in the setting of devascularised tissue and impaired healing and/or a fistula that has already been present for a significant period of time. Moreover, primary closure, skin grafts, and simple local flaps will likely have high failure rates. Therefore, two-layer closure with good vascularisation to both layers is vital.[18,19]

Nelson et al described a four-layer galeafrontalis and pericranial extension technique in four patients in 2014 with good functional and cosmetic results, and other papers have described a range of other double-layer closure techniques using galeapericranial, pericranial and nasolabial flaps.[11,20–22] A hard-palate graft and overlying skin flap have also been described, but we anticipate that the poor surrounding blood supply in the present cases may not support the graft.[23-29]

Our described method is based on the same principles. We aimed to create a double-layer closing solution for the fistula, using simple adjunct tissue harvesting while avoiding radical periosteal and skull-based intra-mouth procedures, with good aesthetic and functional results.

Potential benefits of the B2BSF

There are many advantages to using the B2BSF. This double internal flap facilitates flaps with a small length-to-width ratio, thereby improving vascularity and the likelihood of survival. The external flap (the glabellar flap in the present case) is also laid on a vascular bed (on the opposite side of the internal flaps), improving vascularity. It is a relatively straightforward surgical technique that does not require a steep learning curve. The surgery is short and can be performed under general or local anaesthesia.

Potential downsides to the B2BSF

There may be some downsides to the B2BSF. The flap places a small window of skin in the nasal cavity. This is not optimal compared to nasal mucosa as, theoretically, it could sweat, cause irritation or inflammation, and not effectively move debris secretions. However, the nasal cavity and mucosa in the present cases are so damaged and devitalized that a small area of skin is unlikely to have any consequences.

B2BSF elsewhere

Back-to-back flaps, or similar, have been described and used in other medical subspecialties. One of the most common uses is in cleft palate reconstruction surgery, which uses Bardach's two-flap palatoplasty technique.[30] Using this technique, the palatal cleft can be completely closed, with the hard palate closed in two layers and the soft palate closed in three. Similarly, a two-layer back-to-back technique has been described in the gynecological field for reconstructing vaginal septum or vesicovaginal fistulas.[31,32]

This paper reports only two cases, with follow-ups of 3-4 months, and further cases need to be conducted to get greater insight into the risk of failure and other complications and pitfalls.

CONCLUSION

This case describes a unique presentation of medial canthal fistulas in the context of CIMDL and postoperative RT, which has not been described in the literature before. The fistula caused ocular surface insult, delayed corneal surface healing, and caused great distress to our patients. Our cases illustrate a useful, straightforward surgical technique for closing large and complicated fistulas.

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REFERENCES

1. Tel A, Zeppieri M. Congenital Lacrimal Fistula. StatPearls. Published online December 15, 2022. Available at: https://www.ncbi.nlm.nih.gov/books/NBK582131/. Accessed on 18 December 2023.
2. Bothra N, Pattnaik M, Ali MJ. Acquired lacrimal fistula: classification and management. Orbit. 2022;41(4):476-9.
3. Pison A, Fau JL, Racy E, Fayet B. Acquired fistula of the lacrimal sac and laisser-faire approach. Description of the natural history of acquired fistulas between the lacrimal sac and the skin occurring before planned endonasal dacryocystorhinostomy (DCR) and without any treatment of the fistula. J Fr Ophtalmol. 2016;39(8):687-90.
4. Limawararut V, Leibovitch I, Davis G, Rees G, Goldberg RA, Selva D. Sino-orbital Fistula. A Complication of Exenteration. Ophthalmology. 2007;114(2):355-61.
5. Jain PV, Chavan SS, Deshmukh SD, Dhanakar P, Rai DK. Preventing Sino-orbital Cutaneous Fistula: A Novel Approach for Radical Maxillectomy. Clin Rhinol: An Int J. 2015;8(2):69-71.
6. Cianchetti M, Varvares MA, Deschler DG, Liebsch NJ, Wang JJ, Chan AW. Risk of sinonasal-cutaneous fistula after treatment for advanced sinonasal cancer. J Surg Oncol. 2012;105(3):261-5.
7. Ishikawa S, Shoji T, Nishiyama Y, Shinoda K. A case with acquired lacrimal fistula due to Sjögren's syndrome. Am J Ophthalmol Case Rep. 2019;15:100526.
8. Barrett RV, Meyer DR. Acquired lacrimal sac fistula after incision and drainage for dacryocystitis: A multicenter study. Ophthalmic Plast Reconstr Surg. 2009;25(6):455-7.
9. Irawati Y, Wardani RS, Natalia MER, Anggraini N. Sino-orbital cutaneous fistula with endoscopy guided technique: A case series. Int J Surg Case Rep. 2022;95:107196-107196.
10. Yeniad B, Kozer Bilgin L, Cagatay A, Aslan I. CASE REPORTS A Rare Complication After Transcanalicular Dacryocystorhinostomy: Tissue Necrosis and Nasal-Cutaneous Fistula. Published online 2011.
11. Putterman AM. Reconstruction of Nasal Fistulas of the Medial Canthus. Am J Ophthalmol. 1989;108(1):68-74.
12. Di Cosola M, Ambrosino M, Limongelli L. Cocaine-Induced Midline Destructive Lesions (CIMDL): A Real Challenge in Diagnosis. Int J Environ Res Public Health. 2021;18(15).
13. Seyer BA, Grist W, Muller S. Aggressive destructive midfacial lesion from cocaine abuse. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2002;94(4):465-70.
14. Lee CH, Hur DG, Roh HJ, et al. Survival Rates of Sinonasal Squamous Cell Carcinoma With the New AJCC Staging System. Arch Otolaryngol Head Neck Surg. 2007;133(2):131-4.
15. Elgart K, Faden DL. Sinonasal Squamous Cell Carcinoma: Etiology, Pathogenesis, and the Role of Human Papilloma Virus. Curr Otorhinolaryngol Rep. 2020;8(2):111-9.
16. Hoppe BS, Stegman LD, Zelefsky MJ. Treatment of nasal cavity and paranasal sinus cancer with modern radiotherapy techniques in the postoperative setting-the mskcc experience. Int J Radiat Oncol Biol Phys. 2007;67(3):691-702.
17. Thariat J, Carsuzaa F, Yves Marcy P. Cancers Precision Postoperative Radiotherapy in Sinonasal Carcinomas after Endonasal Endoscopic Surgery. Published online 2021.
18. Limawararut V, Leibovitch I, Davis G, Rees G, Goldberg RA, Selva D. Sino-orbital Fistula: A Complication of Exenteration. Ophthalmology. 2007;114(2):355-61.
19. Nelson L, Burke-Smith A, Kirkpatrick N. A novel approach for successful closure of sinonasal fistulae. J Plastic Reconstruct Aesthetic Surg. 2014;67:910-5.
20. Mehta V, Alon EE, Buchbinder D, Urken ML. Novel use of unilateral galeopericranial flaps for closure of sino-orbital cutaneous fistulas. Laryngoscope. 2011;121(4):777-81.
21. Leatherbarrow B, Watson A, Wilcsek G. Use of the pericranial flap in medial canthal reconstruction: Another application for this versatile flap. Ophthalmic Plast Reconstr Surg. 2006;22(6):414-9.
22. Smith JE, Ducic Y. The versatile extended pericranial flap for closure of skull base defects. Otolaryngol - Head Neck Surg. 2004;130(6):704-11.
23. Fujiwara M. Upper eyelid reconstruction with a hard palate mucosa-lined bipedicled myocutaneous flap. J Craniofacial Surg. 2006;17(5):1011-5.
24. Baltu Y. Posterior lamellar reconstruction of the lower eyelid with a gingivoalveolar mucosal graft. J Craniofacial Surg. 2018;29(4):1017-9.

25. Zhang Z, Yanjun S, Ye X. Correction of Cicatricial Lower Eyelid Retraction and Entropion With Combined Scar Release, Hard Palate Graft, and Lateral Canthal Suspension. J Craniofac Surg. 2024;35(2):622-5.
26. Ito R, Fujiwara M, Nagasako R. Hard palate mucoperiosteal graft for posterior lamellar reconstruction of the upper eyelid: Histologic rationale. J Craniofacial Surg. 2007;18(3):684-90.
27. Hendriks S, Bruant-Rodier C, Lupon E, Zink S, Bodin F, Dissaux C. The palatal mucosal graft: The adequate posterior lamellar reconstruction in extensive full-thickness eyelid reconstruction. Annales de Chirurgie Plastique Esthétique. 2020;65(1):61-9.
28. An Evaluation of Hard Palate Mucosa Graft as a Lining Materi.: Plastic and Reconstructive Surgery. Available at: https://journals.lww.com/plasreconsurg/abstract/2000/05000/an_evaluation_of_hard_palate_mucosa_graft_as_a.4.aspx. Accessed on 27 December 2023.
29. Lee YH, Liao YF. Hard palate-repair technique and facial growth in patients with cleft lip and palate: a systematic review. Br J Oral Maxillofac Surg. 2013;51(8):851-7.
30. Naidu P, Yao CA, Chong DK, Magee WP. Cleft Palate Repair: A History of Techniques and Variations. Plast Reconstr Surg Glob Open. 2022;10(3).
31. Lorber A, Bauman D, Chapchay K, Duvdevani M, Pode D, Gofrit ON, et al. Double mucosal flap for the reconstruction of transverse vaginal septum e A novel surgical approach using the vaginal septal tissue. Urol Case Rep. 2017:16:92-4.
32. Browning A. Prevention of residual urinary incontinence following successful repair of obstetric vesico-vaginal fistula using a fibro-muscular sling. BJOG. 2004;111(4):357-61.

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