CASE REPORT

Amniotic membrane graft to reconstruct divided nevi of eyelids

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Accepted 6 May 2015

SUMMARY

Two patients with congenital divided nevi of the eyelids presented with chief symptoms of cosmetic blemish (n=2) and epiphora (n=1). All the lesions were surgically excised with histological free margins and amniotic membrane graft (AMG) was used to cover the mucosal and eyelid marginal defects. Caruncular and punctal involvement was managed with complete excision and monocalicular stent insertion to prevent punctal stenosis. AMG provided an adequate scaffold for conjunctival regeneration and anatomic continuity was found within 6 weeks in both patients. None of them had any residual pigmentation or disease recurrence after a follow-up of more than 2.5 years. Local absence of eyelashes was the only drawback which patients masked with modern artificial eyelashes or make-up. This novel utility of AMG illustrates effective conjunctival regeneration and maintenance of mucocutaneous junction functionality.

BACKGROUND

In 1919, Fuchs first described this rare type of congenital nevi arising from the eyelid skin and called it 'divided nevi'.¹ These symmetrical pigmented lesions on both the upper and lower eyelids of one eye appear to be 'single' when the eyelids are closed, hence their popular name 'kissing nevi'. They are also known as 'paired nevi', 'panda nevi' or 'split ocular nevi'.² However, 'divided nevi' are a well-established entity in the lexicon. Similar lesion has been reported from other parts of body like phalanges and penis, which are relatively rarer than divided nevi of eyelids.^{3 4}

Divided nevi of the eyelids is a rare anomaly. Though these reports are predominantly from Caucasian population, the largest series published is from China, as a decade's experience.⁵ The morbidity caused by these lesions can either be a cosmetic blemish or a functional impairment (epiphora, ectropion, blepharoptosis and amblyopia).⁶

Morphological and histological classification states medium sized (1.5–2.0 cm) and melanocytic intradermal type to be the most commonly reported divided nevi of the eyelids.² The embryological development of this lesion occurs around the 12–14th week of gestation when the eyelids are still fused and migration of melanocytes from melanoblasts takes place. The lesion has a cutaneous visible component which is the primary site of pathology often overriding the mucocutaneous junction (MCJ) with conjunctival extension, usually sparing the orbicularis oculi muscle and tarsal plate.⁷

In the literature, the description of reconstruction has mainly been focused on the skin (cosmetic) and mucosa (functional), but the status of the eyelid margin (MCJ) has not been described specifically. Various techniques utilising numerous graft tissues have been reported in the reconstruction ladder of the divided nevi. However, none have mentioned any specific technique or detailed description for the reconstruction of MCJ.²

To fill this lacuna in the literature, the authors hereby describe another use of amniotic membrane in ophthalmology to restructure the conjunctival mucosa and MCJ after complete excision of the nevi. We utilised the idea of conjunctival regeneration as used by ocular surface surgeons in chemical burns, Steven Johnson syndrome, etc. The abundant availability and lack of immunogenicity of amniotic membrane directed us to use it as a scaffold for conjunctival growth.⁸ The cutaneous defect was covered by local skin advancement due to its analogous colour, texture and elasticity.

By reporting our surgical technique of using amniotic membrane graft (AMG) to reconstruct the excised congenital divided nevi of the eyelids in young adults for cosmetic and functional indications, we further highlight this innovative utility of AMG for conjunctival and eyelid margin reconstruction procedures.

CASE PRESENTATION

Two patients presenting with congenital unilateral divided nevi affecting the upper and lower eyelids underwent surgical excision and reconstruction as a single stage procedure at a tertiary ophthalmic care centre. All the lesions were unilateral, non-progressive and were present since birth. None had any history of local trauma or previous surgical intervention for the same pathology.

Both female patients had chief symptoms of cosmetic blemish while one had symptoms of coexisting epiphora. The presenting ages of patient 1 and patient 2 were 32 and 19 years, respectively. Left eyelid margins, palpebral conjunctiva, caruncle and punctum were involved in patient 1 while only the eyelid margin and palpebral conjunctiva of the right eyelids were affected in patient 2. Intact but disordered eyelashes along with hypertrophic, darkly pigmented and irregular overlying skin were observed in both patients (figures 1A and 2A, B). The maximum dimensions measured with Vernier's callipers for cutaneous lesions were 10 mm horizontally and 3 mm vertically. Palpebral conjunctival lesions measured 8×1.5 mm and none had any fornicial or bulbar conjunctival involvement (figure 1C).

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To cite: Bhattacharjee K, Singh M, Bhattacharjee H. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2014-209020

Figure 1 Patient 1. (A) (Primary gaze) A young female with congenital divided nevi of the left eyelids. Medial 1/3rd of the eyelids showing pigmented hypertrophy of the overlying skin with disorganised cilia. The medial canthus, eyelid margins and caruncle are also involved by the lesion. (B) Gross appearance after 6 weeks of surgery; no visible pigmentation is noticed over the eyelid skin, margin and caruncle. Eyelashes are absent from the operated region. (C) (Left gaze) Preoperatively, disorganised cilia and caruncular involvement is prominent with no bulbar conjunctival involvement. (D) Adequate healing of the overlying skin and eyelid margin. The caruncle is also free from pigmentation.

INVESTIGATIONS

Both patients were diagnosed on the basis of history and clinical presentation. However, the patient having caruncular involvement was further advised MRI to rule out any intraorbital extension and there was no impression of the same.

TREATMENT

Both surgeries were performed under local anaesthesia. Traction sutures (4-0 silk) were passed for eyelid stability. The

Figure 2 Patient 2. (A) Right central divided nevi involving the middle 1/3rd of both the upper and lower eyelids. (B) Hypertrophic skin, disorganised cilia and eyelid margin involvement are clearly seen. (C) Postoperative 1 week picture with amniotic membrane graft covering the upper and lower eyelid margins and overlying skin. The surrounding cutaneous sutures define the locally advanced skin margins. (D) Satisfactorily healed eyelids with local cilia loss from both upper and lower eyelids. A well-formed eyelid margin (arrow) and mucocutaneous junction are appreciated.

incisions were fashioned 2 mm away from the lesion over the skin and 1 mm over the conjunctiva, with a 15 number surgical blade. Lamellar dissection was performed to conserve maximum histologically normal tissue till a melanocyte free margin was obtained from all sides. On histopathology, a melanocytic intradermal type of nevus was reported for each specimen.

The eyelid marginal strip was also excised along with the eyelashes as both patients opted for the same after being informed about the possibility of regrowth or malignant transformation from the residual nevus (figures 1B, D and 2D). Moreover, both patients were counselled about the postoperative possibility of camouflaging the defect by modern glued artificial eyelashes or make-up.

Intraoperative precaution was observed by inserting a Bowman's lacrimal probe into the canaliculus while excising nevi from the caruncle and punctum (figure 1D). The overlying conjunctiva was dissected with Westcott's scissors and mild coagulation cautery was performed to ensure haemostasis. The monocanalicular stent was inserted in the lower canaliculi of the patient who retained it for 3 months in order to prevent possible punctal stenosis.

The processed and sterile AMG supplied by the 'Eye Bank' of our institute was used for the reconstruction of the conjunctiva and eyelid margin. It was fashioned according to the size and location of the overall defect. The designed AMG was kept approximately 30% larger than the defect to provide enough tissue for conjunctival and eyelid margin override (figure 2C). An 8-0 polyglactin 910 suture was used to secure the AMG at the edges, while fibrin glue was used at the medial most (curved) part of the caruncle. The glue was also helpful in the fixation of AMG into the medial upper and lower fornices. One patient developed intraoperative microperforations in the AMG but retained its continuity over the MCJ.

For the anterior lamellar reconstruction, the surrounding normal skin was undermined approximately 5 mm more than the skin defect and was mobilised till the MCJ of the eyelid. In both patients, the skin was sutured to the MCJ with an 8-0 polyglactin 910 suture.

OUTCOME AND FOLLOW-UP

The follow-up was 2.5 and 3 years for patients 1 and 2, respectively. Both patients were examined on days 1, 3, 7, 14 and 30, followed by 3-month and 6-month visits (figure 3). Postoperatively, careful dressing was done by the same person to ensure AMG security over the site. Topical antibiotic drops and ointment were administered to both patients for 2-3 weeks.

All AMG maintained its thickness, colour and texture during the follow-up period of 4-6 weeks. None had any graft infection, necrosis, suture related infection/granuloma, ectropion and scar dehiscence. Adequate conjunctival regeneration was observed in both by 6 weeks. Sharp MCJ was obtained for both patients (figure 3C and 4B).

Both patients had consented absence of eyelashes from the operated area (figure 3A). The morphology of MCJ and the caruncle was well maintained in both patients without any local recurrence of pigmentation until the last follow-up (figure 3B). Moreover, none had any scar hypertrophy, dry eye, ectropion, corneal abrasions and recurrence of the disease. Patient 2 had a trichiatric eyelash in the upper eyelid which was removed with electrolysis (figure 4A). Functional patency of the lower punctum was found in patient 1 after stent removal (figure 3B).

Figure 3 Patient 1 (30 months follow-up). (A) Well-healed surgical scar over eyelids and the medial canthus. Medial absence of eyelashes without residual or recurrence of pigmentation is noticed. (B) Both the upper and lower eyelid margins are well formed with a clear view of the caruncle showing no pigmentation. Well-formed and patent puncta visible (encircled). (C) Satisfactorily healed palpebral conjunctiva and naturally shaped mucocutaneous junction marked by arrows.

DISCUSSION

Any inappropriate graft material for the recipient site, if used for tissue reconstruction, can lead to a static and permanent local disfigurement. This is applicable most religiously to the eyelid which has the thinnest skin over the body. The palpebral conjunctival mucosa and MCJ of eyelid is a vital unit which demands appropriate graft material for reconstruction. This mucosal continuity and health has a major influence on the ocular surface and tear film integrity and function. These austere requirements make the eyelid reconstruction procedure a challenge in itself. Hence, various surgical procedures utilising different grafting techniques have evolved over a course of time even for a rare condition like divided nevus.²

The procedures mentioned in the literature constitute primary closure, skin grafts (split or full thickness), local or distant tissue flaps, mucous membranes (nasal, oral, etc.) and cultivated autologous grafts.^{5–9,12} Dermabrasion, cryotherapy and laser therapy have not been able to stand the test of time secondary to the higher reported recurrence of lesions.^{13–14} The components of the defect created after surgical excision of nevi need to be rebuilt with physiologically identical tissues. The skin grafts or advancement flaps can cause additional cutaneous scars and are obtained after technical difficulty which might have the limitation of excessive bulkiness or distal flap necrosis. The

surrounding eyelid skin provides similar colour, texture and elasticity and prevents the development of fine graft colour dissimilarities, a possible bulkiness and any chances of distal tip necrosis. Therefore, in the authors' experience, the local advancement of skin provided adequate cosmetic results.

Here, the most functionally vital part remains the reconstruction of the posterior mucosal surface of the conjunctiva and the MCJ which plays a major role in tear film dynamics. Various authors have utilised oral and nasal mucosa for the reconstruction of conjunctival defects with variable success.^{5–15} The main limitations of using alternative mucous membranes for the reconstruction of conjunctiva and MCJ are the additional surgical handling of the donor site (requiring special instrumentation, skill, extramorbidity) and fibrotic contracture. Hence, the ideal tissue for mucosal grafting should be anatomically and physiologically similar.

AMG has been utilised by ophthalmic surgeons in chemical burns, symblepharon release, after pterygium excision, fornix formation, contracted socket and repairing exposed orbital implants.^{16–19} There is a scarcity of published reports on the usage of AMG in the management of divided nevus. Our report hereby provides the additional use of amniotic membrane for ocular diseases.

The abundance and easy availability of amniotic membrane along with its easy surgical handling makes it a popular material of choice. Its biological property of anti-fibroblastic proliferation due to the downregulation of transforming growth factor β helps in the prevention of graft contracture during wound healing.²⁰ The basement membrane of amniotic membrane assists the surrounding healthy conjunctival cells to differentiate, proliferate and migrate over its surface. The additional antibacterial, anti-inflammatory and antiapoptotic (hepatocyte growth factor, transforming growth factor and basic fibroblastic growth factor) properties of amniotic membrane help successful epithelialisation. It also provides reinforced adhesion of epithelial cells to the basement membrane.²¹ AMG provides complete conjunctival continuity to the native conjunctiva of an average duration of 6 weeks.

This is a very rare disorder as the conceptual PubMed English literature review of the past 5 years showed only four articles. Overall, there are only four studies which enrolled more than 10 patients.² Hence, no guidelines for the reconstruction have been laid down which could be used primarily. On analysing our results, we found that the use of AMG is an effective alternative to mucosal grafts, the latter being less physiologically alike even after adequate uptake. Thus, the authors want to highlight that the freely available AMG is a potential option for reconstruction of the posterior lamella and MCJ in any patient with a localised defect and surrounding healthy conjunctiva.

Figure 4 Patient 2 (36 months follow-up). (A) Arrows marking the well healed eyelid margin and mucocutaneous junction of the upper eyelid. Central arrow pointing towards the trichiatric eyelash which was removed by electrolysis. (B) A well-formed and sharp-edged mucocutaneous junction with an adequately healed eyelid margin is appreciated. No signs of any residual disease or recurrence in this patient.

Learning points

- ▶ Congenital divided nevi of eyelids is a rare anomaly and there are no specific guidelines for its reconstruction after excision.
- ▶ Amniotic membrane graft (AMG) serves as a freely available graft tissue which helps in the restoration of normal anatomy and physiology for the mucosa and mucocutaneous junction.
- ▶ AMG lacks immunogenicity and has anti-inflammatory, antibacterial and antiapoptotic properties, hence acting as an optimum scaffold for conjunctival regeneration.

Contributors KB was involved in planning and conducting the study and was involved in reporting of the work. MS was involved in planning of the study and was involved in reporting of the work. HB was involved in for planning and conducting the study.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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