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Original Research Article

Corneal Neurotization and Ipsilateral Temporalis Transfer for the Management of Insensate Cornea with Lagophthalmos: A Single Stage Procedure

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Abstract:

Introduction and importance: Insensate cornea is a difficult and challenging problem to manage throughout the world. Impaired sensations of cornea results in reduced reflex tearing, increase risk of corneal surface injuries and poor healing. All these factors lead to epithelial defects that ulcerate and perforate if not treated appropriately. Patients who had facial palsy along with insensate cornea are at even greater risk for corneal disease.

Insensate cornea can be managed by transfer of healthy donor nerve tissue to the cornea to restore sensation. We report a case of insensate cornea with lagophthalmos, managed successfully with corneal neurotisation and ipsilateral temporalis transfer for eye closure.

Method & Surgical Technique: Our patient presented with lagophthalmos insensate cornea that was unresponsive to medical management. He had reduced vision in right eye and opacity in inferior quadrant of cornea.

The cornea was reinnervated via the ipsilateral supraorbital nerve using an autologous sural nerve graft and ipsilateral temporalis transfer was done for right eye closure.

Results: At 3 months, there was partial resolution of corneal stromal opacification and partially improved corneal sensation by testing with a wisp of cotton in all 4 quadrants. Right eye closure was near complete. At 9 months follow up, there was complete resolution of corneal stromal opacification and greatly improved corneal sensation in all 4 quadrants. Right eye closure was complete, best corrected visual acuity in right eye improved to 6/9.

Conclusion: Corneal neurotization is a novel technique to restores the corneal sensation. This method showed excellent results in corneal reinnervation, healing of corneal epithelium, vision improvement and quality of life improvement.

Keywords: Insensate Cornea, Corneal Neurotization, Lagophthalmos, Temporalis Transfer.

Introduction

Insensate cornea is a difficult and challenging problem to manage throughout the world. Sensations are required to initiate blink reflex, maintain integrity of corneal epithelium and limbal stem cell function [1].

Corneal sensations are provided by ophthalmic division of trigeminal nerve. Reduced corneal sensation results in reduced reflex tearing, increase risk of corneal surface injuries and poor healing [2]. All these factors lead to epithelial defects that ulcerate and perforate if not treated appropriately. Lack of corneal sensation leads to a clinical condition known as neurotropic keratopathy.

Patients who had facial palsy along with insensate cornea are at even greater risk for corneal disease. Facial nerve palsy results in lid laxity and the inability to completely close the eyelids leading to chronic exposure, dry eye, loss of corneal clarity and keratitis. Treatment options are limited and most of them target to protect the cornea, instead of

addressing the corneal denervation leading to recalcitrant progression and vision loss.

Reinnervation of the cornea can be achieved by transfer of a healthy donor nerve into the cornea. [4,5,6] Corneal reinnervation /neurotisation restores the corneal sensation and corneal healing thus preventing vision loss.

Here we present a novel technique for management of insensate cornea with lagophthalmos with corneal neurotization and ipsilateral temporalis transfer for eye closure.

Material and Methods:

Patient with absent corneal sensations and/or lagophthalmos was evaluated with MRI Face, visual acuity, slit lamp examination, corneal staining and blink test.

Findings in our case: Best corrected visual acuity in right eye was 6/12. He had absented corneal sensation and blink in all four quadrants tested with a wisp of cotton. On Slit lamp examination, he had macular type corneal opacity in inferior quadrant (Figure 1A). Corneal Rose Bengal staining was suggestive of epithelial breakdown with epithelial deficits (Figure 1B).

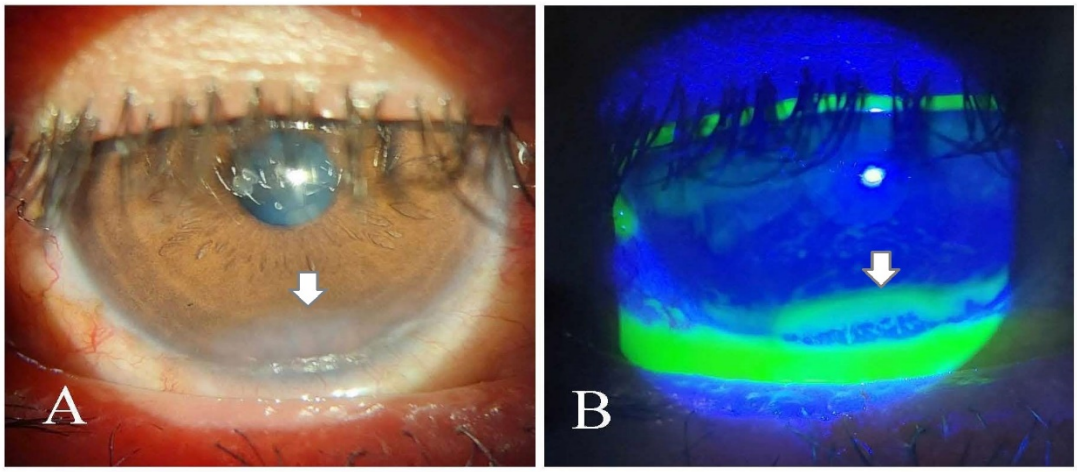

Figure 1 (A) Corneal opacity in inferior quadrant on slit lamp examination. (B) Epithelial breakdown with epithelial deficits on Corneal Rose Bengal staining.

External exam revealed right sided lagophthalmos along with other features of facial nerve palsy on right side of face (Figure 2). Sensations were intact over entire face except right cornea. MRI Face was suggestive of facial nerve palsy.

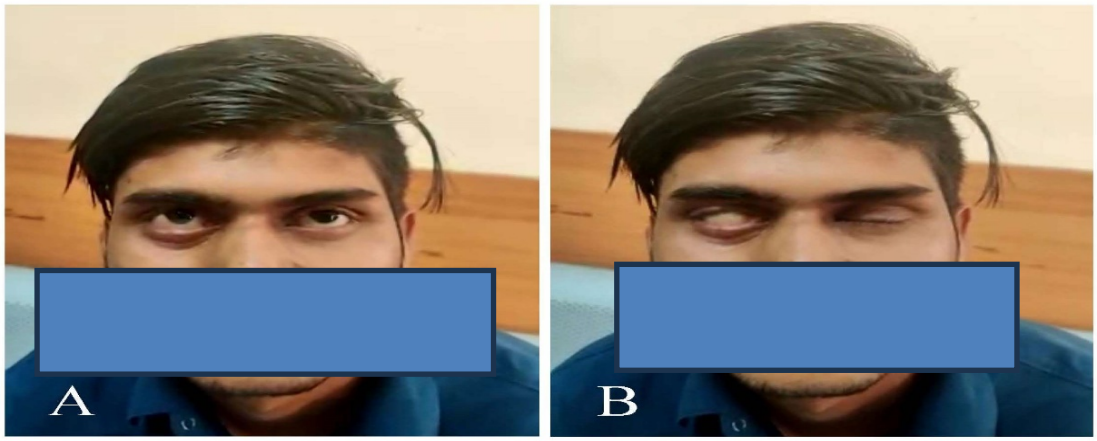

Figure 2 (A, B) – Incomplete right eye closure

After evaluation, he was planned for corneal neurotization by ipsilateral supraorbital nerve transfer using sural nerve graft and temporalis transfer for right eye closure.

Surgical Technique

Corneal Neurotisation

Right sub brow skin incision was made and dissection was carried down to the periosteum of orbital rim. Supraorbital nerve is identified at supraorbital notch and its deep branch was dissected. 8cm sural graft was harvested from right leg (Figure 3). A tunnel was made from the sub

brow incision to the superior medial fornix and the sural nerve graft was passed through the tunnel into upper fornix (Figure 4A).

Perilimbal conjunctival and Tenon's layer incisions were made at 12, 3, and 9 o' clock, 5 mm away from the limbus to accommodate the nerve fascicles. Blunt dissection was done to create a sub tenon space from 9'o clock to 3'o clock and from 12'o clock position to upper fornix. Sural nerve graft was brought out at 12'o clock perilimbal incision.

The sural nerve is separated into 2 fascicles (Figure 4B). Both fascicles were passed around the limbus in the Sub Tenon's space and sutured to the sclera at the limbus with 10-0 nylon sutures at 9'o and 3'o clock position (Figure 4C). The conjunctiva was closed to cover the nerve-corneal union. The deep branch of the supraorbital nerve was coaptated with sural nerve graft with 9-0 nylon in end-to-end fashion (Figure 4D).

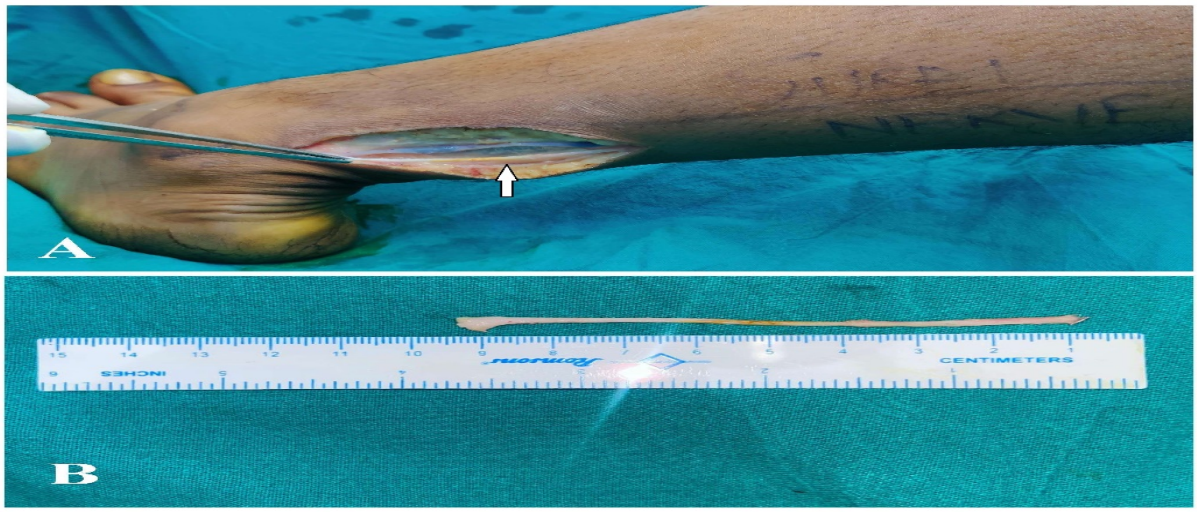

Figure 3 (A, B) Harvested Sural Nerve Graft

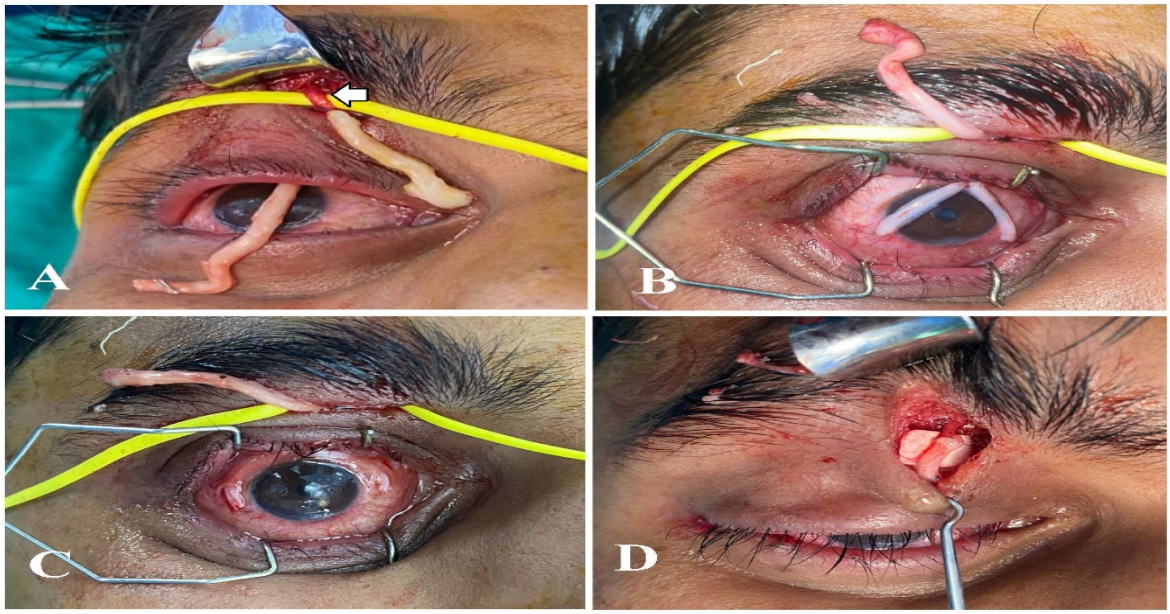

Figure 4 (A) Arrow indicate deep branch of supraorbital nerve. (B) Two separated fascicles of sural nerve at 12'O clock position (C) Sural nerve fascicles suture to sclera at 3'O and 9'O clock position. (D) Sural nerve graft coaptated with supraorbital nerve in end-end fashion.

Temporalis Transfer: A curvilinear incision was made in temporal hairline as shown in figure 5A. Deep temporalis fascia. A 15mm wide strip of deep temporal fascia along with 20 mm tongue of temporalis muscle is harvested keeping fascia attached at the upper end. Temporalis fascia is then divided into 2 strips. Another curvilinear incision was made at lateral margin of orbit temporalis

muscle along with two fascial slings brought out from the lateral orbital incision via subcutaneous tunnel, Figure 5B). Third incision was made at medial canthus and medial canthal tendon was dissected.

The upper fascial strip was passed through upper eye lid in a plane above the tarsal plate and approx. 5mm above the lid margin and brought out at medial canthal incision. Similarly lower strip was passed from the lower lid.

The two strips were sutured with each other and to the medial canthal tendon, creating an overlap of lower lid by upper lip by 2mm (Figure 5C). There were no intra op and post op complications.

Figure 5 (A) Temporal hairline incision to harvest temporalis muscle with deep temporal fascia. (B) Two temporal fascial slings brought out at lateral orbital margin. (C) Both slips passed through eyelid and sutured to medial canthal tendon.

Results:

At 3 months follow up, there was partial resolution of corneal stromal opacification (Figure 6B) and partially improved corneal sensation by testing with a wisp of cotton in all 4 quadrants. Right eye closure was near complete (Figure 7B). At 9 months follow up; there was complete resolution of corneal stromal opacification (Figure 6C) and greatly improved corneal sensation in all 4 quadrants.

Right eye closure was complete (Figure 7C), best corrected visual acuity in right eye improved to 6/9.

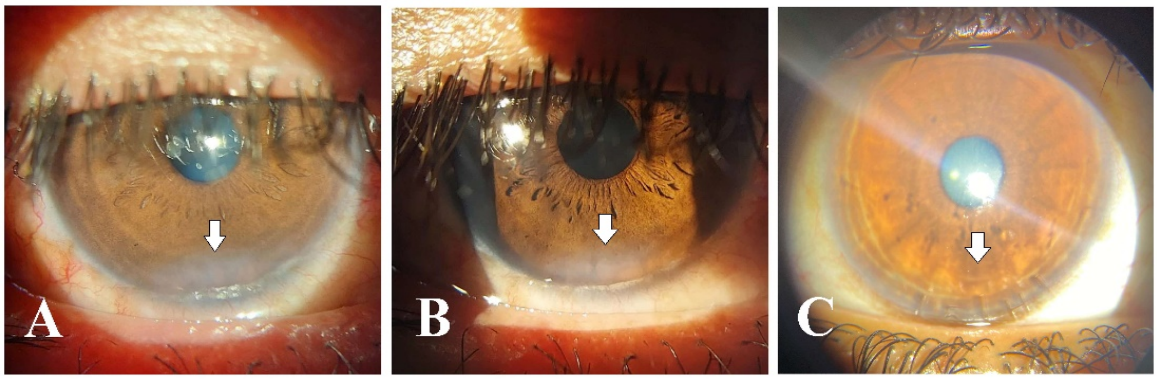

Figure 6: (A) – Pre op Corneal opacity in inferior quadrant on slit lamp examination. (B) Partial resolution of opacity at 3 months. (C) Complete resolution of opacity at 9 months.

Figure 7: (A) Incomplete right eye closure prior to surgery. (B) Near complete eye closure at 3 months. (C) Complete eye closure at 9 months.

Discussion

The insensate cornea is a devastating condition that affects the quality of life and leads to permanent blindness. It remains a challenge to treat insensate cornea. Majority of treatments provide only temporary relief and do not address the underlying cause of denervation.

The first report of corneal neurotisation was described by Terzis et al. [5] in 2009, where direct neurotization of the cornea was done using the contralateral supraorbital and supratrochlear nerve. The average time to restore corneal sensations was 2.8 years. [5]

Elbaz et al. reported the use of sural nerve segment for end-to-side coaptation with contralateral supratrochlear nerve. [4] Marked improvement in corneal sensation was noted at 6 months. [4]

In contrast to previous reports, our patient had congenital palsy of long ciliary nerves and facial nerve leading to corneal anesthesia and lagophthalmos respectively. Sensations in ipsilateral supraorbital and supratrochlear nerve territory were normal, so we utilized his ipsilateral supraorbital nerve to neurotize the cornea using sural nerve interpositional graft.

In addition, we did temporalis transfer for right eye closure. This procedure corrects the lid gap and also helps in restoration of corneal sensation by reversing the exposure keratitis.

Conclusion

Corneal neurotization is a novel technique to restores the corneal sensation. This method showed excellent results in corneal reinnervation, healing of corneal epithelium, vision improvement and quality of life improvement.

References

1. Garcia-Hirschfeld J, Lopez-Briones LG, Belmonte C. Neurotrophic influences on corneal epithelial cells. Exp Eye Res. 1994; 59(5):597-605.
2. Gallar J, PozoMA, Rebollo I, Belmonte C. Effects of capsaicin on corneal wound healing. Invest Ophthalmol Vis Sci. 1990; 31(10):1968-1974.
3. Sacchetti M, Lambiase A. Diagnosis and management of neurotrophic keratitis. Clin Ophthalmol. 2014 Mar 19; 8:571-9. doi: 10.2147/OPTH.S45921. PMID: 24672223; PMCID: PMC3964170.
4. Elbaz, U. et al., 2014. Restoration of Corneal Sensation with Regional Nerve Transfers and Nerve Grafts: A New Approach to a Difficult Problem. JAMA Ophthalmology, pp.1–7.
5. Terzis JK, Dryer MM, Bodner BI. Corneal neurotization: a novel solution to neurotrophic keratopathy. Plast Reconstr Surg. 2009 Jan;123(1):112-120
6. Bains R.D., Elbaz U., Zuker R. Corneal neurotization from the supratrochlear nerve with sural nerve grafts: a minimally invasive approach. Plast. Reconstr. Surg. 2015; 135:397–400.