CASE REPORT

Eyelid reanimation, neurotisation, and transplantation of the cornea in a patient with facial palsy

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SUMMARY

Patients affected by facial palsy suffer from failure to fully close the eyelids; the resulting eye exposure can lead to dry eye syndrome, loss of epithelial integrity, corneal ulceration and infections. Corneal anaesthesia exacerbates risk of corneal damage in these patients. Eyelid paralysis-associated corneal lesions may induce severe visual impairment, for which the ideal treatment is corneal transplantation, a procedure contraindicated in patients with corneal sensitivity and inadequate eyelid closure. We present the case of a patient affected by unilateral facial palsy associated with corneal anaesthesia, due to seventh and fifth cranial nerve damage following homolateral eighth cranial nerve surgery. The patient underwent surgery to re-establish eyelid and corneal competence, and then received a corneal graft with consequent amelioration of visual acuity. This is the first case of associated corneal anaesthesia and facial palsy that was comprehensively treated with a set of surgical procedures, including a corneal transplant.

BACKGROUND

Patients affected by facial palsy due to seventh cranial nerve damage cannot fully close their eyelids, causing chronic exposure of the ocular surface. The consequences of exposure include dry eye, loss of epithelial integrity, ulcers, stromal melting, perforation and corneal and eye infections.

Multiple palsies are rare and mostly result from previous maxillofacial surgery. If palsy results from damage to the ophthalmic branch of the trigeminal nerve (responsible for corneal sensitivity and for the first arch of the blink reflex), patients are at higher risk for corneal damage. In these patients, decreased visual acuity is very common and may be as severe as blindness. Visual acuity may be improved by corneal transplantation (keratoplasty, KP), but inadequate eyelid dynamics and blinking interfere with graft integration and recovery of vision.[1] Eyelid closure and blinking in patients affected by facial palsy may be partially restored by sophisticated surgical reanimation techniques. Recently, Terzis *et al*[2] proposed a new method for restoring corneal sensitivity, eyelid movement and visual acuity.

In this report, we present the case of a patient affected by acquired, unilateral palsy of the fifth and seventh nerves, who developed a corneal abscess and lost significant visual acuity. The patient was therefore treated surgically to restore eyelid competence and corneal sensitivity, and at a second step, received a corneal graft with consequent amelioration of visual acuity. To the best of our knowledge, this is the first reported case of corneal transplantation in a patient affected by unilateral facial palsy and corneal anaesthesia.

CASE PRESENTATION

A 45-year-old woman, affected by right facial palsy that had developed less than 12 months before the first observation, was referred to our clinic. The patient's symptoms were consistent with damage to the seventh and fifth cranial nerves, which likely resulted from surgical removal of a homolateral eighth cranial nerve neurinoma. She was unable to close her right eye and reported corneal scarring; her visual acuity was below 20/200.

INVESTIGATIONS

Ophthalmic examinations were performed before surgery and every month for 6 months. At each visit, eyelid closure (forced closure and spontaneous blinking) was evaluated; corneal sensation in the four quadrants was tested by Cochet-Bonnet aesthesiometer, and the interior of the eye was examined by ophthalmoscopy. Before surgeries, the cornea was completely insensitive (aesthesiometry null in all quadrants). Following surgery, the eye was no

Figure 1 The image showing the platysma muscle (single arrow) grafted into a pocket prepared into the previously paralysed superior eyelid and directly neurotised by insertion of the distal end of the sural nerve already grafted (double arrow).

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Figure 2 The image showing the expected position of the left supraorbital and supratrochlear nerves and their main branches that will be identified and dissected on the undersurface of the frontal skin, after a coronal incision.

longer exposed on forced closure. At follow-up, corneal sensitivity progressively improved in all quadrants: 6 months after neurotisation, aesthesiometry measurements were 60 mm in the superior quadrant, 50 mm in the nasal and temporal, and 10 mm in the inferior.

TREATMENT

The patient first underwent facial reanimation by masseteric–facial nerve anastomosis to restore facial symmetry at rest, as well as to restore the abilities to smile and voluntarily close the lids. The patient underwent sural nerve cross-face grafting over the facial nerve branch of the orbicularis oculi to recover spontaneous eyelid closure and blinking. Nine months later, the patient underwent a second surgical procedure in which a 6×3 cm portion of the contralateral platysma muscle was grafted into a pocket prepared within the previously paralysed superior eyelid and was directly neurotised by insertion of the distal end of the previously grafted sural nerve (figure 1).

Six months later, after ascertaining recovery of eyelid closure, a third surgical step was carried out to re-establish corneal sensitivity by direct neurotisation. Through coronal incision, the left supraorbital and supratrochlear nerves, along with their main branches, were identified and dissected from the undersurface of the frontal skin (figure 2). The nerves were tunnelled over the nasal bridge to reach a 10 mm incision in the right superior eyelid along the pre-existing scar. Using a Wright needle, the

Figure 3 The image showing the supraorbital and supratrochlear nerves distal branches passed into the prepared perilimbal space and finally distributed and fixed by suture stitches at the four cardinal points.

Figure 4 The image showing the completed neurotisation of the eye after the corneal transplantation.

distal nerve branches were retrieved in the superior conjunctival fornix. By means of a conjunctivotomy and tenonectomy, the nerves were tunnelled to gain access to the subtenonian area. Each distal branch was passed into the prepared perilimbal space and finally distributed and fixed by suture stitches at the four cardinal points (figure 3). Corneal sensation improved, spontaneous blinking recovered, and the peripheral cornea became clear, especially in the superior, temporal and nasal quadrants. Six months after corneal neurotisation, the patient received penetrating KP (figures 4 and 5), while maintaining a more than satisfying eyelid closure (figure 6).

OUTCOME AND FOLLOW-UP

Follow-up of KP was uneventful, with a clear cornea and no epithelial defects; the patient progressively gained vision up to 0.7 with correction by 6 months post-KP.

DISCUSSION

The facial nerve provides motor fibres directed to all mimetic muscles of the face, including the orbicularis oculi, which contributes to eyelid closure. Patients with facial nerve damage often present lagophthalmos and ectropion, which cause eye exposure and dryness, loss of epithelial integrity, corneal stroma exposure, ulceration and infection.[3] Corneal anaesthesia can result from congenital and acquired conditions, but the most common cause is surgical injury. Facial palsy, especially impairment of the Bell's phenomenon, acts synergistically with corneal anaesthesia to increase the risk of corneal lesions that can lead to visual impairment.[2] Corneal transplantation is the only treatment that restores vision following this type of corneal degeneration, but is contraindicated in cases of eyelid incompetence and corneal anaesthesia. Thus, eyelid palsy and corneal anaesthesia must be treated to successfully transplant the cornea.

Figure 5 The image showing the successful penetrating keratoplasty of the right eye at 6-month follow-up.

Figure 6 Eyelid closure before (above) and after (below) completion of the surgical protocol.

Several authors have presented successful techniques for treating eyelid movement impairment following facial palsies, but few restore blinking. The described technique is particularly useful to re-establish the blinking reflex that is essential for effective eye lubrication. Another innovative technique has recently been suggested to restore corneal sensitivity.[2]

Following these insightful examples, we decided to combine two established sophisticated techniques (ie, corneal neurotisation[2] and upper eyelid neurotised platysma graft[4 5]—see also ref. 6) with corneal transplant to address three major problems: corneal anaesthesia, eyelid paralysis and, above all, loss of visual acuity. This is the first report of this kind of procedure. In the hands of a trained team of maxillofacial surgeons and ophthalmologist, this procedure was proven safe and all three issues were successfully managed: the patient regained corneal sensitivity, eyelid movement and visual acuity.

Learning points

- Patients affected by facial palsy due to seventh cranial nerve damage cannot fully close the eyelids, which causes chronic exposure of the ocular surface. The consequences of exposure include dry eye syndrome, loss of epithelial integrity, ulcers, stromal melting, perforation and corneal and eye infections.
- The concurrence of facial palsy and corneal anaesthesia increases the risk of corneal lesions that can lead to visual impairment.
- Improvement of visual acuity may be achieved by corneal transplantation (keratoplasty), which is contraindicated if eyelid dynamics and blinking are inadequate.

Contributors PF and LR did the keratoplasty surgery. FB and FA did the corneal neurotisation.

Competing interests None.

Patient consent Obtained.

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