

Facial Nerve Paralysis: An Unrecognized Cause of Lower Eyelid Entropion in the Pediatric Population

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Purpose: To describe the association between entropion and pediatric facial nerve paralysis in the pediatric population.

Methods: A retrospective case series was collected from 5 pediatric patients who required surgical correction for symptomatic entropion with a history of facial nerve palsy.

Results: All 5 patients presented with epiphora and punctate keratopathy. Following surgical correction of the entropion, all ocular symptoms resolved.

Conclusions: To the best of our knowledge, this is the first report linking facial nerve paralysis with entropion in the pediatric population. Ophthalmologists and pediatricians should consider this in the evaluation of children with craniofacial abnormalities and facial nerve paralysis.

Pediatric facial nerve (cranial nerve 7, CN VII) paralysis can be attributed to a variety of causes. The condition is generally considered to be developmental or traumatic in etiology. Craniofacial abnormalities such as the Möbius sequence, facio-auriculo-vertebral spectrum, and CHARGE syndrome have a reported incidence of facial paralysis in 8% to 25% of patients, with the remainder secondary to complications during delivery.¹ In adults, facial nerve paralysis typically presents with the triad of lagophthalmos, ectropion, and exposure keratopathy.² Gravitational forces on the lower eyelid and cheek are unopposed by the paretic orbicularis muscle contributing to ectropion or eversion of the eyelid margin.³

We recently examined 5 pediatric patients with facial paralysis who presented with lower eyelid entropion. All 5 patients had developmental craniofacial abnormalities of various causes in association with facial nerve paralysis. Only one previous case of pediatric paralytic entropion in Möbius syndrome, in association with strabismus, has been reported and facial paralysis was not a recognized etiology.⁴

The goal of this study is to report the findings in our case series, to discuss the interplay of factors resulting in the

development of entropion in pediatric facial paralysis, and to describe our methods of surgical repair.

METHODS

All patients presented to the Shiley Eye Center, University of California, San Diego Medical Center (both university-based referral centers), or Children's Hospital of San Diego. The medical records of 5 pediatric patients with paralytic entropion were retrospectively reviewed. Data obtained included etiologic diagnosis, nature of craniofacial anomalies, ophthalmic examination findings, description of surgery (if any), and length of follow-up. All patients had facial nerve palsy (unilateral or bilateral), and entropion on the side of facial palsy.

Surgical correction was performed in all 5 cases. A full-thickness incision was approached through the tarsus posteriorly 1 mm to 2 mm below the eyelid margin. The incision was extended horizontally for the full extent of the entropic eyelid segment. Blunt dissection was used to create a pocket between the superior tarsus and pretarsal orbicularis as shown in Figure 1A. Two or three double-armed 6-0 polygalactin sutures were then used in a horizontal mattress fashion to evert the eyelid margin. Each arm of the suture is passed from the inferior border of the tarsus in a partial-thickness fashion and directed through the newly created pocket between the pretarsal orbicularis and superior tarsus and directed just below the eyelash line. Each of the double-armed sutures is placed prior to tying them off (Fig. 1B). Figs. 1C and 1D show a graphical representation of the procedure. Each suture is then assessed for the amount of eyelid margin eversion and tied off separately (Fig. 2). The net result advances the lower eyelid retraction forces more anteriorly and superiorly, assisting the everting forces of the lower eyelid.⁵⁻⁷

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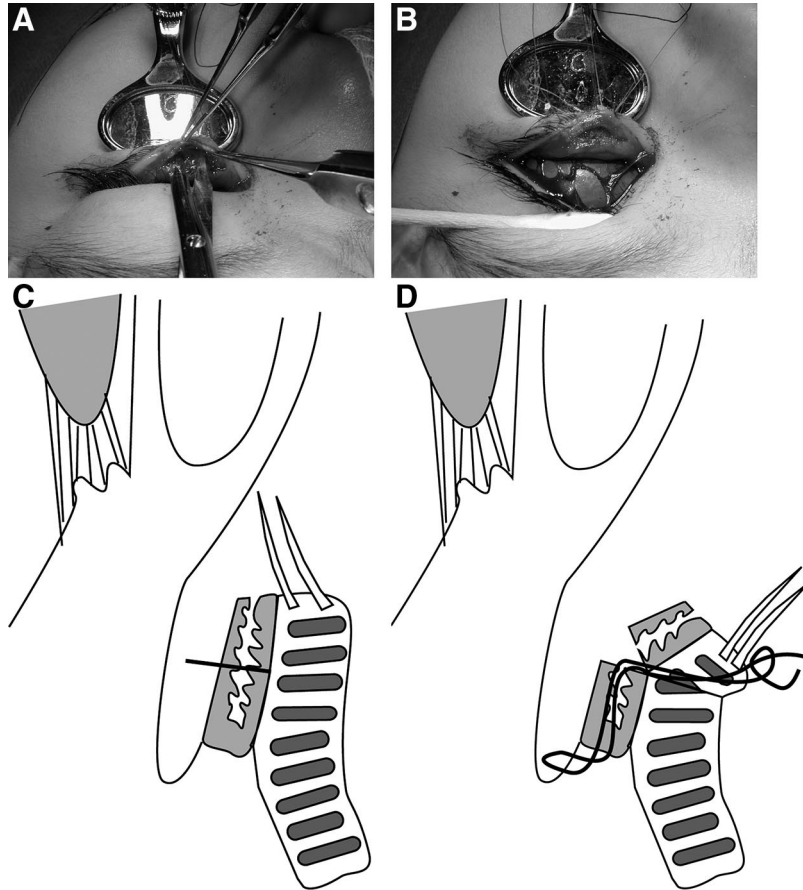


FIG. 1. **A**, Intraoperative view of pocket being created between the superior lower eyelid tarsus and pretarsal orbicularis oculi. **B**, Intraoperative view showing three double-armed 6-0 polygalactin sutures passed partial-thickness through the inferior tarsus then brought in pocket between pretarsal orbicularis and tarsus and exiting just below lash line. **C–D**, Graphical representation of posterior tarsal rotation after placement of everting sutures.

RESULTS

Case 1. A 38-month-old girl with brachio-oto-renal syndrome presented with microtia, bilateral brachial cleft fistulae, bilateral hearing loss, and right-sided paresis. Ophthalmic examination showed the ability to fixate and track easily with both



FIG. 2. Correction of lower eyelid inversion immediately after repair (Case 2).

eyes and normal ocular motility. Pupillary examination was normal. A diminished blink reflex with good Bell phenomenon and bilaterally elevated tear lakes consistent with nasolacrimal obstruction were noted. Eyelid findings showed entropion of the lower eyelids and right lagophthalmos. At surgery, the entropion was repaired by posterior tarsotomy. Bilateral silicone stents were also placed at the time of surgery. Resolution of entropion and epiphora continued at the most recent visit, 2 months postoperatively.

Case 2. A 10-month-old girl with Möbius sequence presented with bilateral facial paralysis, bilateral CN VI palsy, bilateral CN XII paresis, microglossia, camptodactyly of the left hand, and hemiparesis of the left upper extremity (Fig. 3A). Eyelid examination revealed bilateral lagophthalmos and bilateral lower eyelid entropion. Ocular surface examination revealed punctate corneal staining inferiorly. An elevated tear lake was also present (Fig. 3B). Posterior tarsotomy was performed to address the entropion. Intraoperative irrigation of the lacrimal system demonstrated full patency. Figure 4 shows the same patient at the 2-month postoperative visit with stable correction of the entropion. Examination at that time showed excellent eyelid position and resolution of epiphora.

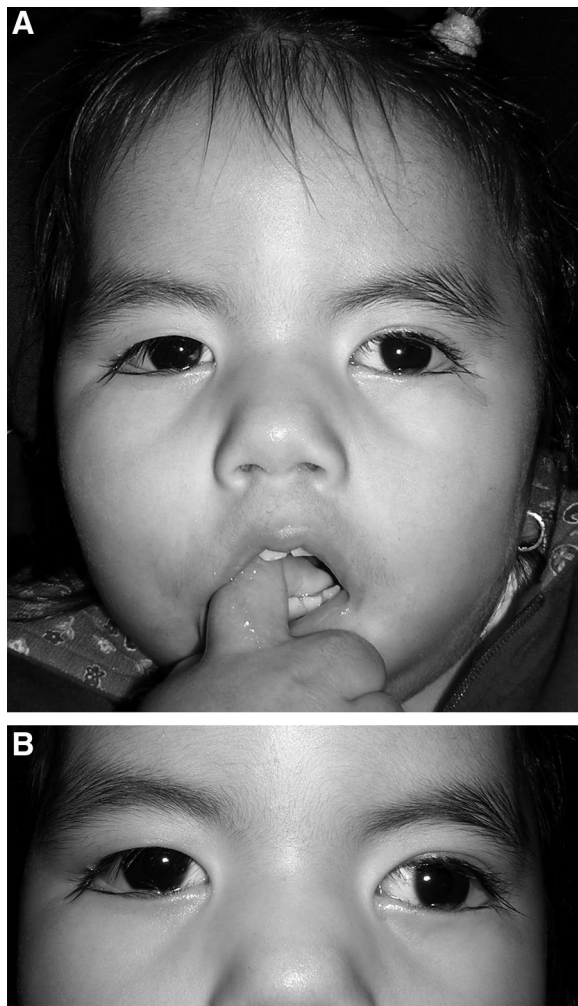


FIG. 3. A, Ten-month-old girl with facial diplegia. B, Note bilateral lower eyelid entropion and elevated tear lake (both Case 2).

Case 3. An 18-month-old girl with facio-auriculo-vertebral spectrum presented with tearing OD. Examination revealed right hemifacial microsomia, right anotia, and right facial nerve palsy.

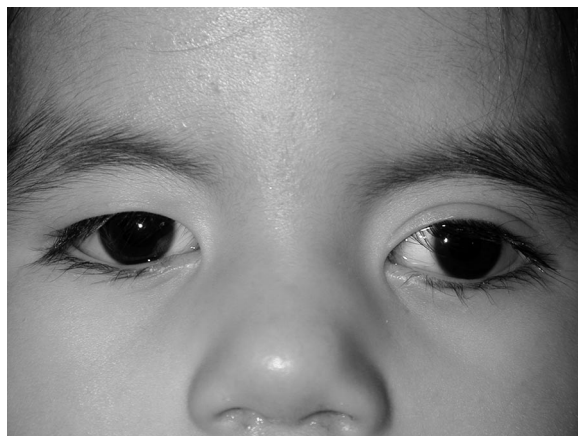


FIG. 4. Stable correction of lower eyelid position at 2 months after repair (Case 2).



FIG. 5. Four-year-old boy with right-sided facial paralysis and right lower eyelid entropion (Case 4).

Ophthalmic examination showed right lower eyelid entropion with the lashes rubbing against the cornea. Four millimeters of lagophthalmos was present along with inferior punctate staining of the cornea. Examination under anesthesia revealed a patent nasolacrimal system. The entropion was repaired with posterior tarsotomy. The patient responded well with resolution of the entropion and corneal staining at 12 months postoperatively.

Case 4. A 4-year-old boy with facio-auriculo-vertebral spectrum presented with physical findings of right microtia, right mandibular hypoplasia, right-sided facial palsy, and foreign body sensation OD. On ophthalmic examination, lower eyelid entropion was noted on same side as facial palsy (Fig. 5). Inferior punctate staining of the cornea was noted OD. Repair of the entropion with posterior tarsotomy resolved all ocular surface staining and irritation at 3 months postoperatively.

Case 5. A 6-year-old girl with Möbius sequence showed right-sided facial palsy and foreign body sensation OD. Right lower eyelid entropion was evident on the same side of palsy with associated 2 mm of lagophthalmos. Posterior tarsotomy was performed and the patient remains symptom free at 6 months postoperatively.

DISCUSSION

In adults, facial paralysis is associated with ectropion, eyelid eversion, and lagophthalmos. In our experience, this sequence was not noted in children. On the contrary,

we present a series of 5 patients who developed entropion attributable to facial paralysis. Several plausible explanations may account for this finding. In adults, the loss of orbicularis tone secondary to paralysis results in unopposed gravitational force on the lower eyelid and face. Ectropion and eyelid sagging result from relatively looser fascial and ligamentous attachments and comparatively heavier soft tissues. In children, however, facial nerve paralysis seems to be well tolerated and eyelid malpositions are rare.

An analysis of our clinical series has led us to identify several factors that may help to explain the occurrence of entropion in the setting of pediatric facial nerve paralysis. First, skin and facial soft tissues in youth are firmer and have greater resiliency.⁸ Second, ligamentous attachments in children are less elongated and more taut. Third, sheer facial volume is less, decreasing the contribution of gravitational effects. Furthermore, younger patients with facial paralysis often show lesser signs of facial droop.³

The stability of the lower eyelid is an interplay between everting and inverting forces.^{9,10} A balance of these forces results in a stable eyelid position, with any imbalance leading to eyelid malposition. We postulate that in children, the pretarsal orbicularis has an everting action on the lower eyelids that counters the inverting effect that the lower eyelid retractors exert. With facial paralysis, orbicularis muscle function is absent or diminished, tipping the balance to the lower eyelid retractors and resulting in entropion.

The shortcomings of this study are its retrospective nature, number of cases, and lack of suitable controls. Although the cases presented are few, we feel that this represents the rare nature of this condition. We also cannot discount the possibility that the underlying

craniofacial disorder inherently caused the entropion. However, the only common denominator in each of the cases is the presence of facial nerve paresis on the affected side.

In summary, we have described a series of pediatric patients with facial nerve paralysis causing lower eyelid entropion. In this subset of patients, the orbicularis muscle exerts an eyelid everting action and that facial soft tissues do not descend as in adults. Surgical correction is very effective in treating entropion associated with facial nerve paralysis. Finally, the resolution of epiphora among operated patients emphasizes that entropion must always be considered as the etiology of epiphora in a child with facial nerve paralysis.

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