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A modified tarsorrhaphy in patients with facial nerve palsy

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ABSTRACT

Purpose: We report our experience with a modified tarsorrhaphy (MT) technique in patients with facial nerve palsy (FNP).**Methods:** This study involved a retrospective chart review of patients with FNP undergoing MT over a 10-year period in one Medical Center. Patient demographics, presence of lagophthalmos, occurrence of eyelid malpositions, recurrent retraction, and repeat procedures were noted from medical records.**Results:** Twenty patients (11 females, mean age 38 years) were included. Mean follow-up was 41 months (range 6–132). All patients had lagophthalmos prior to surgery compared with four on last follow-up. The number of patients with punctate epithelial erosions (PEEs) reduced from nine preoperatively to five postoperatively. While seven patients used lubricating drops prior to surgery, two stopped lubrication completely and five reduced the amount after surgery. No patients developed a new-onset lower eyelid malposition. No recurrence or postoperative complications were noted.**Conclusion:** This MT technique avoids grey line split and excision of orbicularis muscle or skin. It improves lower eyelid retraction and reduces lagophthalmos in FNP.

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1. Introduction

Facial nerve palsy (FNP) results in paralysis of the orbicularis muscle, which is responsible for the closure of the eyelids. Since the antagonist muscles responsible for the opening of the eyelids are not paralyzed by the FNP, a dysfunction with upper and lower eyelid retraction, as well as horizontal laxity, results. This leads to lower eyelid paralytic ectropion and lagophthalmos, which both lead to a risk of exposure keratopathy. Moreover, because the lateral horns of the retractors are thicker than the medial horns, a lateral sagging results (Kakizaki et al., 2009).

Numerous techniques have been described to elevate and support the lower eyelid (Leatherbarrow and Collin, 1991). These include tarsorrhaphy (McLaughlin, 1957), various forms of canthal suspension (Fante and Elner, 2001), lower eyelid retractor recession (Tan et al., 2018; Holds et al., 1990; Compton et al., 2015), posterior lamellar spacer grafts, midface elevation, and periocular placement of fascia lata slings (Sendul et al., 2015; Elner et al., 2003; Olver, 2000). Often, these techniques involve transcutaneous incisions,

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grey line split with division of the posterior lamella, and manipulation of the orbicularis muscle. All these lead to a postoperative reduction in orbicularis function, which is already weak due to FNP.

Here we describe a modification to traditional permanent tarsorrhaphy surgery. It avoids grey line split and excision of orbicularis muscle or skin. It reduces the vertical palpebral aperture and corrects lateral sagging. The aim of this study was to describe the technique as well as emphasize the importance of patient selection and evaluation.

2. Material and methods

We conducted a retrospective review of the medical records of all patients with FNP who underwent MT in our institution during a 10-year period (2007–2017). Inclusion criteria were patients with FNP who underwent MT alone or in conjunction with other eyelid procedures. Patients with less than 3 months' follow-up were excluded.

The surgical technique is as follows:

While the patient is sitting, the extent of lateral closure needed to reduce lateral sagging is measured.

The eyelids are then infiltrated with local anesthetic (2% lidocaine with adrenaline).

A vertical incision with iris scissors is made at the lid margin, avoiding skin and orbicularis.

Then, a horizontal excision of the lid margin is carried out up to the lateral canthal angle in both the inferior and superior eyelids.

Two vertical mattress sutures (5-0 vikryl) are then passed from the superior to the inferior lid (Fig. 1).

Patient demographics (age, gender) and clinical characteristics of FNP (etiology of FNP, and laterality and amount of lagophthalmos) were obtained from medical records. The amount of lubrication drops used and the number of patients with corneal punctate epithelial erosions (PEEs) were recorded before and after surgery. Postoperative complications, such as granuloma formation, wound dehiscence, suture-related infection, preseptal or orbital cellulitis, pain, and irritation, were noted. Recurrence of lower eyelid sagging and occurrence of eyelid malposition were documented as well. The study was approved by the Institutional Review Board (IRB).

3. Results

Twenty patients (11 females) with FNP underwent MT. Mean age was 38 (range 2–64) years; mean follow-up period was 41.7 (range 6–132) months. Clinical characteristics of FNP are shown in Table 1. The most common cause of FNP was excision of a parotid tumor. Ocular procedures prior to this MT included one brow lift, two temporary tarsorrhaphies, and one ectropion repair by lateral tarsal strip (LTS). Two patients underwent dynamic procedures for facial reanimation prior to MT. Procedures after MT included two direct brow lifts, two face lifts, and one four-lid blepharoplasty. All patients had lagophthalmos prior to surgery compared with four on final follow-up. Lateral sagging, which was evaluated by inferior scleral show, improved in all patients. The number of patients with punctate epithelial erosions (PEEs) reduced from nine

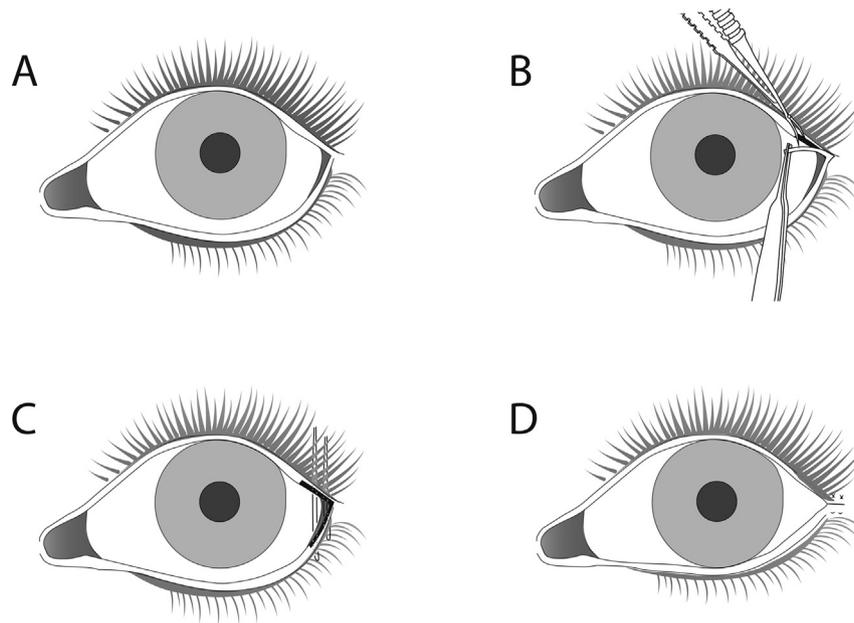


Fig. 1. A) Paralytic ectropion with lower lid sagging. B) After a vertical incision with iris scissors, a horizontal excision of the lid margin is carried out up to the lateral canthal angle in both the inferior and superior eyelids. C) Two vertical mattress sutures are passed from the superior to the inferior lid. D) Final result.

Table 1

Clinical characteristics of 20 patients with facial nerve palsy. SCC: squamous cell carcinoma; CVA: cerebral vascular accident; NF2: neurofibromatosis type 2.

Patient number	Age (years)	Etiology	Adjunctive surgeries Pre-MIT	Adjunctive surgeries Post- MIT	Complications	Follow up (months)
1	2	Goldenhar syndrome	None	None	No	108
2	57	Parotid gland SCC	None	None	No	36
3	9	Crouzon syndrome	None	None	No	36
4	76	Ear Paraganglioma	None	None	No	6
5	60	Parotid gland SCC	None	None	No	96
6	5	Exophytic pilocytic astrocytoma	None	None	No	9
7	5	Parotid gland SCC	None	None	No	8
8	46	Parotid gland SCC	Lateral tarsal strip	None	No	12
9	54	CVA	None	None	No	6
10	56	Metastatic Merkel cell carcinoma	Temporary tarsorrhaphy			6
11	64	Parotid gland SCC	None	Direct brow lift	No	8
12	26	NF2	None	None	No	60
13	23	Herpes Zoster	Direct brow lift	None	No	24
14	63	Acoustic schwannoma	None	Face lift	No	25
15	3	Acoustic schwannoma	None	Face lift	No	6
16	74	Parotid gland SCC	Dynamic surgery facial reanimation	None	No	36
17	3	CVA	None	Four lids blepharoplasty	No	8
18	44	Acoustic schwannoma	None	Direct brow lift	No	62
19	52	Parotid gland SCC	Temporary tarsorrhaphy	None	No	132
20	36	Bells palsy	Dynamic surgery facial reanimation	None	No	84

preoperatively to five postoperatively. While seven patients used lubrication drops prior to surgery, two stopped lubrication completely and five reduced their use after surgery (Fig. 2 shows photographs of patients before and after surgery). No patients developed new-onset lower eyelid malposition. No recurrence or post-surgery complications were noted (Table 2).

4. Discussion

Here we describe a surgical technique for correction of lid malpositioning in FNP patients. This involves minimally invasive surgery, which avoids grey line split as well as excision of orbicularis muscle, or skin.

In this consecutive series of 20 patients, all showed improvement in lower lid contour, lateral flare, and amount of lagophthalmos. Sixteen patients (80%) had no lagophthalmos on final follow-up. All showed better symmetry with the contralateral eyelid, and all patients were satisfied with the cosmetic appearance. Five patients reduced their use of lubrication drops after surgery, while two stopped completely. No complications were reported. Moreover, this procedure has the advantage of being reversible. In cases of regeneration of facial nerve function, it can easily be opened by a simple horizontal cut.

The aim of this MT is to reduce lower lid contour asymmetry and to improve cosmetic appearance. This is a less invasive procedure because grey line split and excision of orbicularis muscle and tarsus are not required. Therefore, our patient selection included mild lagophthalmos or ectropion with healthy corneas, or only mild keratopathy. This technique is not recommended for patients with a lagophthalmos of more than 6 mm, ectropion more than 'moderate', or a cornea with more significant keratopathy. Moreover, where there is an absence of upward Bell's phenomenon, an absence of or reduced corneal sensation, a reduced Schirmer's test of ≤ 5 mm, or where the affected eye is an only-eye, corneal protection is the priority and more invasive surgeries will be required. Careful consideration of the pathology, extent of exposure keratopathy, and patient's preference is therefore imperative to achieve a good postoperative outcome.

In 1953, McLaughlin (McLaughlin, 1957) described a lateral tarsorrhaphy procedure to connect the upper and lower eyelids laterally. During half a century it was the only procedure for protecting the cornea after FNP, until 1992, when Kelley and Sharpe (1992) described upper lid loading with gold weights. Tarsorrhaphy was the only procedure used for severe lagophthalmos. Therefore, it fused the upper and lower lids from the lateral canthus to beyond the center of the lid, resulting in reduced visual field and



Fig. 2. Photographs of patients before and after surgery.

Table 2
Patient's results, before and after surgery.

Patient number	Lagophthalmos pre-MIT	Lagophthalmos post-MIT	Pee pre-MIT	Pee post-MIT	Eye drops pre-MIT	Eye drops post-MIT
1	Yes	No	No	No	Yes	Yes
2	Yes	No	No	No	Yes	Yes
3	Yes	No	No	No	Yes	Yes
4	Yes	No	Yes	Yes	Yes	Yes
5	Yes	No	No	No	No	No
6	Yes	No	No	No	Yes	No
7	Yes	No	Yes	No	No	No
8	Yes	No	No	No	No	No
9	Yes	No	No	No	No	No
10	Yes	Yes	Yes	Yes	Yes	Yes
11	Yes	No	Yes	No	No	No
12	Yes	Yes	Yes	Yes	No	No
13	Yes	Yes	No	No	No	No
14	Yes	Yes	Yes	No	No	No
15	Yes	No	No	No	No	No
16	Yes	No	Yes	No	No	No
17	Yes	No	No	No	Yes	No
18	Yes	No	No	Yes	No	No
19	Yes	Yes	Yes	No	No	No
20	Yes	No	Yes	Yes	No	No

poor cosmetic outcome. In our series, the patients selected for MT had ‘mild’ lagophthalmos with a ‘healthy’ cornea. The fusion of the upper and lower lids at the lateral canthus involved a few millimeters only, with no distortion of the canthus and no reduction in visual field.

Previous authors have described modified techniques for tarsorrhaphy. In 2005, Chang and Olver (2006) described an augmented lateral tarsal strip tarsorrhaphy, which required a long strip (10–15 mm) to maximize elevation of the lower eyelid. In this technique, the lateral tarsal strip was draped over the posterior lamella of the lateral part of the upper eyelid and sutured to the outer aspect of the superolateral orbital rim and periosteum. This improved corneal signs in 93% of patients, while producing low morbidity. Recently, Kwon (Kwon et al., 2015) described a combined lateral tarsal strip with minimal temporal tarsorrhaphy, which showed good functional results concerning lagophthalmos and the protection of the cornea. Moreover, of 22 patients all but three were satisfied with the cosmetic appearance.

Other studies have described techniques to reduce sagging and lower lid retraction by retractor recession. Lower eyelid retractor recession was reported as early as 1990 by Holds et al. (1990), who described a minimal incision ‘en-glove’ retractor lysis of the lower eyelid. They achieved up to 3 mm improvement in inferior scleral show. Compton et al. (2015) performed recession and extirpation of lower eyelid retractors in 11 patients with FNP. They reported an improvement of 3.0 mm in lower eyelid height and 4.8 mm of lagophthalmos. However, all patients also had concurrent upper eyelid loading, which would confound postoperative lagophthalmos measurements. Yoo et al. (2014) reported their technique for a minimally invasive, orbicularis sparing (MIOS), transconjunctival retractor release and lateral horn lysis. Their series included 11 patients with FNP. MIOS alone achieved 1.40 mm correction in five patients. Six patients with adjunctive tarsorrhaphy achieved 2.40 mm correction. Recently, Tan and Malhotra (Tan et al., 2018) reported a retrospective study of 42 FNP patients with lower lid retraction. They showed that retractor recession, either alone or as an adjunctive procedure, significantly improves lower eyelid height and lagophthalmos.

Currently, there are several techniques for reducing lagophthalmos after FNP, such as upper lid loading, levator recession, or a combination of both. Surgical upper lid loading with a gold weight is now well established as an effective, safe, predictable, and reversible technique to restore gravity-assisted closure of the upper lid (Pickford et al., 1992). However, complications such as a poor cosmetic outcome, loss of function with time, infection, migration, and extrusion have all been described. These complications have had a published incidence of up to 61% (Pickford et al., 1992; Jacob et al., 1999). Moreover, Vahdani et al. reported a complication rate of 16.9% and reoperation rate of 9% among 557 lower lid LTS performed. Most common complications were granuloma formation, wound dehiscence, and suture-related infection (Vahdani et al., 2018). Such complications are not relevant in our MT technique because it avoids canthotomy and cantholysis.

Our study is limited by its size and retrospective design, and by possible referral bias because our unit is a tertiary referral center. There is also no standardization of adjunctive surgeries, and one could argue that the additional procedures will themselves affect lower eyelid height or sagging. However, we believe that our results show that this is an effective, enduring, and noninvasive technique with no significant complications and high patient satisfaction.

5. Conclusion

In conclusion, this MT is an effective and reversible surgical option for the treatment of mild lower eyelid ectropion and lagophthalmos resulting from FNP. In selected patients, this technique provides good ocular protection with minimal morbidity.

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