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# Transnasal tendon suspension for the paralyzed lower eyelid

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## KEYWORDS

Lower-lid suspension;  
Facial reanimation;  
Facial paralysis;  
Ectropion;  
Static reanimation;  
Transnasal wiring

**Summary** *Background:* Paralytic ectropion is a significantly functional and esthetic problem leading to problems with lacrimation, corneal exposure, and poor palpebral closure.

Limitations with traditional corrective procedures include poor apposition of the lid to the globe, suboptimal medial canthal position, and high recurrence rates.

*Objective:* The objective of this study was to develop a technique of lower-lid suspension using transnasal wiring for the long-term maintenance of lid position.

*Methods:* Twenty-three consecutive patients with complete unilateral facial nerve paralysis underwent the procedure, and they were followed up for a median of 27 months (1–73 months).

*Results:* Fifteen of 18 patients maintained their intraoperative lower-lid position beyond the 12-month follow-up. Three patients had a minimal scleral show at 3 months. One of these patients also developed lid laxity seen on the snap test. No perioperative complications were experienced.

*Conclusions:* Transnasal wiring of the lower-lid tendon suspension provides consistent results that are maintained over time.

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## Introduction

Ectropion caused by the paralysis of the orbicularis oculi is a significantly functional and esthetic problem. The paralyzed lower eyelid falls away from the globe compromising controlling of lacrimation, worsening corneal exposure, and reducing palpebral closure. Over time, the gradual pull caused by gravity in conjunction with tissue laxity further displaces the position of the lower lid and medial canthus. The medial component of the ectropion further disrupts lacrimal drainage, and it also causes noticeable aesthetic distortion by the medial conjunctival exposure. However, most conventional reconstructive techniques for the lower eyelid involve lid tightening by a lateral approach, and they do not directly address the medial ectropion. Furthermore, the results are often temporary as worsening tissue laxity causes lid malposition with the need for a subsequent revision surgery.

Paralysis of the orbicularis oculi muscle results in medial canthal laxity, but the contribution of the medial canthal tendon position to paralytic ectropion is commonly overlooked. Repositioning the medial lower eyelid is also made more difficult because of the complex relationship of the medial canthal tendon, the presence of the lacrimal drainage system, and the lack of strong anchoring to the bone. In the medial eyelid, the loss of canthal support leads to inferior, anterior, and lateral displacement (Figure 1). The combination of the medial and lateral lid laxity is responsible for the overall inferior displacement of the lower lid. Ectropion results as the lid falls away from the globe.

Anatomic correction of the lower eyelid position thus requires support to the eyelid in three vectors: horizontal, vertical, and anteroposterior, incorporating both the lateral and medial canthal tendons. The lateral tarsal-strip procedure can effectively reposition the lateral tendon, but such a straightforward approach is not possible for the medial aspect. The use of a mini-tendon or a fascia graft threaded along the border of the lower eyelid and suspended at each end to reposition the eyelid has been described.<sup>1</sup> In this procedure, the tendon graft is anchored to the native medial canthal tendon. In our experience, the limitation with this technique has been caused by continued laxity of the medial canthus, and some patients experience recurrent medial canthus displacement over time (Figure 2). To address these problems, we have modified the tendon technique described by Terzis by rigidly suspending the lateral and medial canthi to the bone. A tendon graft is threaded along the lower eyelid margin. Laterally, a tarsal-strip canthopexy is performed to shorten the lid, and the tendon graft is attached to a drill hole in the lateral orbital rim. Medially, the tendon is



**Figure 1** Typical paralytic ectropion, with lid displacement.



**Figure 2** A 2-year postoperative photograph of a patient who underwent tendon wrapping around the medial canthal tendon. She has continued the displacement of the medial canthus.

anchored in a superior–posterior vector using transnasal wire fixation. This transnasal wire technique is well described for the treatment of naso-orbito-ethmoidal (NOE) complex fractures.<sup>2–4</sup> This anatomical resuspension of the lower eyelid leaves it apposed to the convexity of the globe along its entire length. The purpose of this study is to analyze the long-term maintenance of the transnasal suspension technique with respect to lid position and relief of symptoms.

## Methods

### Patients

Study approval was obtained from the University of Western Ontario Research Ethics Board. All patients who underwent the lower-lid suspension procedure using transnasal wires were included in the analysis. All patients originally referred to the London Facial Nerve Clinic at the Victoria Hospital, London Health Sciences Centre between 2008 and 2014, were reviewed. Indications for surgery included patients with long-standing, irreversible facial paralysis and symptomatic lower eyelid ectropion with epiphora. Exclusion criteria included patients with scleral show and no ectropion, patients with little or no symptoms, or patients who were candidates for reinnervation procedures.

All patients underwent a full ocular examination including the assessment of lower-lid position and laxity, medial and lateral canthal tendon laxity, and the patency and function of the lacrimal drainage system. All patients were photographed before and after surgery using a standard protocol that includes frontal views of the full face with both eyes open and closed, oblique, and lateral views. Video recordings were also performed to document the dynamic facial function before and after surgery. Patients were examined for the presence of a palmaris longus tendon. If this tendon was clinically absent, patients were consented for the harvest of either plantaris tendon or extensor digitorum longus tendon from the third toe.

### Surgical technique

Tendon harvest is first performed. The tendon is then split into 1–2 mm strips using a scalpel. Several incisions are required (Figure 3). Modified blepharoplasty incisions are then performed on both upper lids. These incisions are 15–20 mm in length placed within the medial extent of the supratarsal fold, and they allow access to both medial

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