Orthodromic Temporalis Tendon Transfer: Anatomic Considerations

Noah P Parker MD, Lindsay S Eisler MD, Harley S Dresner MD, and William E Walsh MD
Department of Otolaryngology-Head and Neck Surgery, University of Minnesota

Introduction

Surgical reconstruction for complete, unilateral facial paralysis continues to pose a formidable challenge. While facial nerve reinnervation is generally preferred, a variety of clinical scenarios illustrate the continued role of muscular slings. For the lower face, temporalis muscle or tendon transposition has been used in a variety of ways to enhance symmetry and, in some cases, function. Temporalis techniques have evolved toward the mobilization and attachment of the tendon insertion to the perioral soft tissues with or without proximal muscle release and/or grafts to achieve adequate length. Such techniques serve to reintroduce orthodromic suspension and dynamic function to the lower face. We employ a transfacial approach to the ascending ramus and coronoid process through a melolabial incision that avoids proximal muscle release and lengthening grafts. An examination of the anatomic structures at risk for injury and the functional limitations of the mobilized tendon principally motivates this study.

Objectives

(1)To define at-risk anatomic structures during the orthodromic temporalis tendon transfer.
(2)To define achievable tendon length without temporal releasing incisions or perioral lengthening materials.

Methods and Materials

Ten fresh cadavers provided 20 hemi-faces for dissection. Measurements and photographic documentation examined the parotid duct , masseteric artery (MA), inferior alveolar nerve (IAN), internal maxillary artery (IMA), and mobilized tendon relative to adjacent landmarks.

Results

The parotid duct was found in a reproducible region 1-cm posterior to the melolabial crease and within 2cm inferior to a reference line from the central point of the upper lip vermillion border to the most posterior point of the tragus, the parotid duct reference line (see **Figure 1**). The MA was found posterior to the posterior-most attachment of the tendon at its exit from the sigmoid notch. The IAN was found greater than 1cm posterior to the tendon insertion in all cases. The IMA coursed superiorly from posterior to anterior along the medial mandible just adjacent to the coronoidectomy site. **Figure 2** illustrates the relationships between these neurovascular structures and adjacent landmarks. The tendon reached beyond the melolabial crease in 17 of 20 hemi-faces (85%) with the oral commissure in neutral position.

Figure 1: Parotid Duct Localization

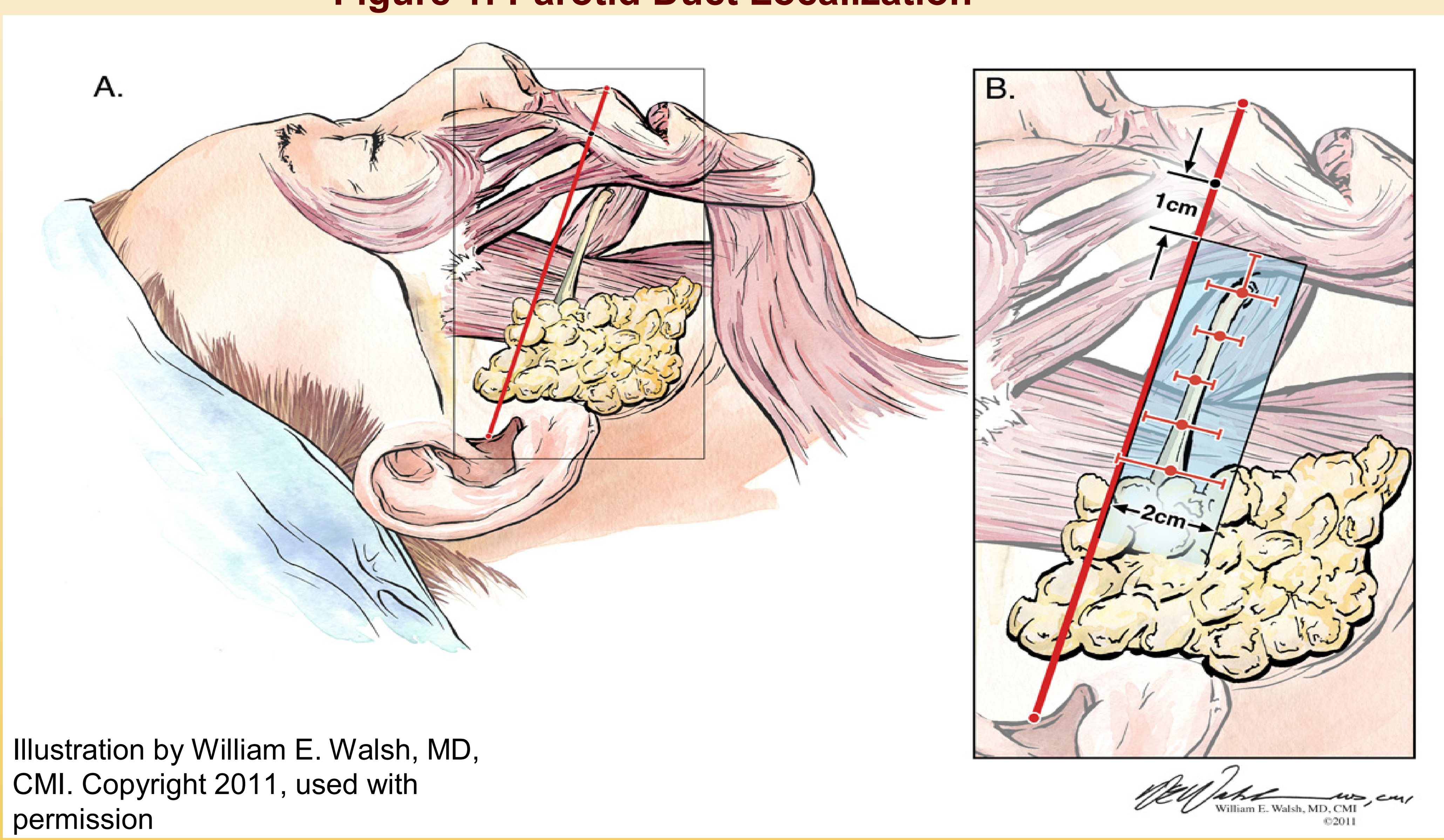

Figure 1A: Parotid duct (yellow line) relative to the parotid duct reference line (red line). Figure 1B: Data points (red dots) represent mean distances between the parotid duct, the parotid duct reference line, and the melolabial crease. Error bars represent 2 standard deviations from mean distances.

Figure 2: Neurovascular Structures at Risk

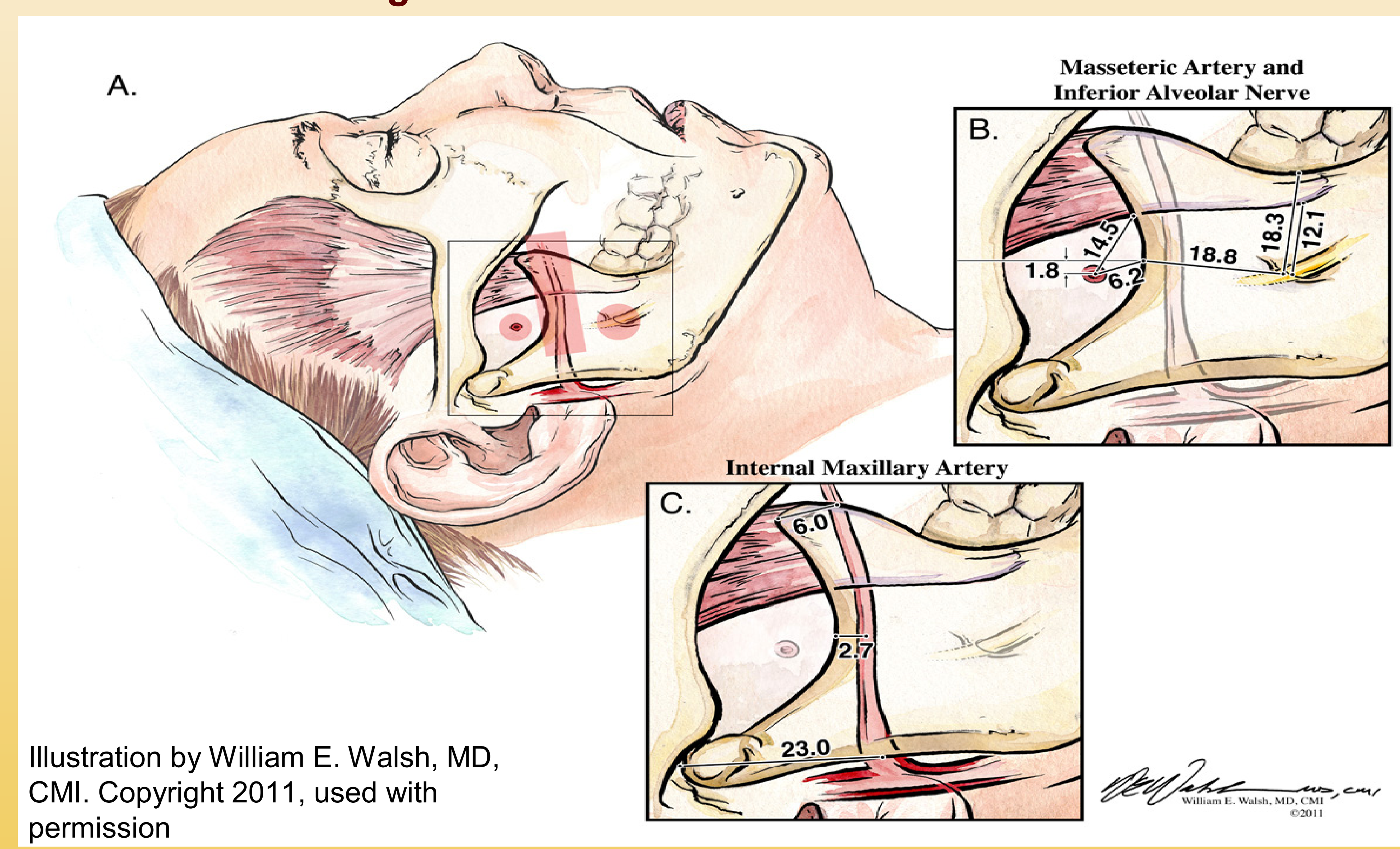

Figure 2A: Locations of the masseteric artery (MA, superior red circle), internal maxillary artery (IMA, red rectangle), and inferior alveolar nerve (IAN, inferior red circle). Figure 2B: Mean distances (mm) between the MA, tendon insertion, and sigmoid notch, as well as the IAN, ramus, posterior tendon insertion, and sigmoid notch. Figure 2C: Mean distances (mm) between the IMA, coronoid, sigmoid notch, and condyle.

Conclusions

The parotid duct reference line and melolabial crease allow pre-incision estimation of parotid duct location. Anatomic relationships between the tendon, parotid duct, neurovascular structures, and anatomic landmarks underscore the importance of deliberate soft tissue retraction and subperiostial elevation to minimize injury. The tendon alone appears to achieve adequate length for orthodromic suspension.

Acknowledgment

This study was generously supported by an Otolaryngology Department Grant from the Minneapolis Medical Research Foundation.