Early Thyroplasty in the Management of Unilateral Vocal Fold Paralysis

Paul E. Kwak, M.D., M.Sc., M.M.1; Andrew G. Titter, B.A.2; Donald T. Donovan, M.D., F.A.C.S.1; Julina Ongkasuwan, M.D., F.A.A.P.1

1Bobby R. Alford Department of Otolaryngology-Head and Neck Surgery, Baylor College of Medicine, Houston, Texas; 2Baylor College of Medicine, Houston, Texas

Abstract

Objective/Hypothesis: Injury to the recurrent laryngeal nerve (RLN) and unilateral vocal fold paralysis (UVFP) can occur after surgery on the aortic arch. Management options include temporary injection laryngoplasty while awaiting return of function versus definitive management with a type 1 thyroplasty. At our institution, the practice has been to proceed directly to thyroplasty to aid in spontaneous recovery.

Study Design: Retrospective chart review with telephone questionnaire

Methods: 364 patients with UVFP following surgery on the aortic arch since 1999 were identified; 40 were available for follow-up. The number of revision procedures following initial thyroplasty was ascertained, and the Voice Handicap Index (VHI) was administered by telephone.

Results: Six out of the 40 patients (15%) required revision thyroplasty following their initial procedure. Mean VHI was 36.0 (SD 27.2). Mean follow-up since initial thyroplasty was 46.5 months (SD 42.2).

Conclusions: In the setting of aortic arch surgery with injury to the RLN, early thyroplasty can reduce the number of procedures and produces voice outcomes comparable to those achieved in the literature with repeated injection and delayed thyroplasty.

Introduction

Treatment paradigms for unilateral vocal fold paralysis (UVFP) have centered around two issues: 1) timing (early versus late) and 2) materials (temporary versus permanent). Decision-making about when and with what material to mediate the paralyzed vocal fold is based on the suspected etiology of paralysis. In 1980, Tucker defined four main etiologies of UVFP: a) neoplastic (compression or infiltration of the vagus or recurrent laryngeal nerve by tumor), b) idiopathic, c) traumatic (surgical or nonsurgical). In nearly all cases, regardless of etiology, the affected vocal fold has impaired mobility, resulting in a glottic insufficiency that in turn results in varying degrees of breathiness or hoarseness of voice, as well as symptoms of dysphagia.

The questions about timing and technique in the treatment of UVFP center on the anticipated natural history of UVFP. Classically, a traumatic injury to the recurrent laryngeal nerve (RLN) results in lateralization of the ipsilateral vocal fold in the immediate post-traumatic period, but over the course of subsequent months, a certain amount of medialization is expected as a result of synkinetic reinnervation. Many authors thus advocate initial treatment with temporary injectable materials, followed by a period of watchful waiting, before proceeding to Type 1 thyroplasty as first described by Ishikii. The advantage of this approach is that it allows for maximal thyroplasty to follow the full course of expected reinnervation and medialization, to thus maximize the efficacy of the thyroplasty.

At our institution, we see a higher proportion of traumatic RLN injuries from referrals with the Texas Heart Institute, in patients who have undergone surgery on the aortic arch. These patients bear a unique set of predisposing factors that have pointed us toward early thyroplasty in the treatment of their unilateral vocal fold paralysis. First, their etiology of injury is universally traumatic; in many instances, the cardiac surgeon makes the referral because he himself was forced to transact the RN to accomplish the goals of the aortic surgery. Second, these patients generally endure an extended hospital stay due to their compromised cardiopulmonary status, making the model of accomplishing a definitive medialization procedure on the same hospitalization, often with the same surgical and anesthetic teams, far more desirable. Third, these patients often travel at great distance from remote areas for the planned cardiac surgery; there is thus increased motivation to accomplish a more permanent vocal fold medialization prior to discharge to a home area where otolaryngologic follow-up is uncertain. In addition, the need for pulmonary toilet and the high risks associated with aspiration in the immediate post-operative period following aortic arch surgery motivates earlier definitive intervention.

Thus, in the case of known injury during surgery to the aortic arch, the practice pattern of our institution has been to proceed with temporary thyroplasty. All patients who underwent Type 1 thyroplasty for unilateral vocal fold paralysis by a single surgeon (D.T.) were identified by ICD-9 and CPT code; a total of 364 patients were identified since 1999. Chart review was performed to the extent possible: patients with idiopathic vocal fold injury, thoracic malignancies causing vocal fold paralysis, vocal fold paralysis resulting from thyroideectomy, and patients with bilateral vocal fold paralysis were identified. Forty (40) patients were thus identified who sustained unilateral injury to the left RLN following surgery to repair the aortic arch. The patients were contacted via telephone; the voice-handicap index (VHI) questionnaire was administered over the phone. The patients were asked if they had had any revision procedures since the initial thyroplasty.

The rate of revision surgery was calculated. The mean VHI and standard deviation were calculated.

Discussion

This study presents an alternative paradigm for treatment of UVFP in a select group of patients, in whom injury is known to result from known iatrogenic injury to the RN following aortic arch surgery. Accomplishing thyroplasty early in the natural history of RLN injury achieves arevision rate comparable to rates reported in the literature, and voice outcomes measure similar to those previously published. To our knowledge, this is the first study to examine outcomes in a group of patients with a singular known traumatic etiology for UVFP.

Young et al. published a large series in 2010 documenting a 6% revision rate of all medialization laryngoplasties, including those performed along with arytenoid adduction. Although the procedures reported were all performed over a ten-year period, mean follow-up is unclear presumably due to the wide variety of responses collected from surgeons across the country. In addition, all etiologies for UVFP were included in this series. Thus, the revision rate of the current study aligns with historical rates.

This advantage of intervening early in the course of injury is reiterated in a study by Friedman et al. in 2010, in a study comparing early to late injection laryngoplasty. Sixty-two percent of the patients in the early group (injection performed within six months following injury) maintained adequate voice and did not undergo any further procedures; 37.5% thus went on to require permanent thyroplasty. All three patients that underwent late injection (100%) required permanent thyroplasty. Based on these results, the authors postulated that early medialization creates a favorable vocal fold position that is then maintained by synkinetic reinnervation. Yang et al. in a 2011 study found similarly that patients who underwent early injection laryngoplasty were significantly less likely to need a permanent medialization procedure. Still, 5 of the 19 (26%) in the group undergoing early injection laryngoplasty, and 23 of 35 (66%) who did not have early intervention required permanent thyroplasty. There is thus increasing evidence to support early intervention in the course of unilateral vocal fold paralysis.

Indeed, with a mean follow-up time of 46.5 months, our study provides some of the first data on longer-term outcomes in this population of patients. Although rates of revision and mean VHI in this study are higher than figures previously documented in the literature, the mean time to follow-up is significantly longer (by several years) than in the aforementioned studies. It may be simply that, the benefits of early intervention notwithstanding, voice outcomes are more likely to worsen with increasing time, and necessitate revision procedures.

Taken together, the trends from the current literature, including benefit from early intervention and comparability of outcome from temporizing and permanent medialization, support this study’s findings of the viability of early thyroplasty as an important treatment option in post-traumatic UVFP. Furthermore, type 1 thyroplasty is well tolerated by even very ill patients with cardiopulmonary disease and intrathoracic pathology.

Conclusions

Early thyroplasty remains an important option in the management of acute, post-traumatic UVFP. Previous studies may have underestimated revision rates and the impact on voice of unilateral paralysis due to relatively short follow-up time and heterogeneity of study populations. Additional, prospective studies that include EMG data and stroboscopy are needed to further elucidate objective anatomical changes and more specifically depict subjective voice changes before and after both injury and treatment.

References

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