



Che Hung Kuo¹, Hsing Mei Wu^{1,2}, Clint Tanner Allen³, Yih Jeng Tsai^{1,2}, Chu Chun Huang¹ and Chia Jung Lee^{1,2*}

¹Department of Otolaryngology, Shin Kong Wu Ho-Su Memorial Hospital, Taipei, Taiwan

²School of Medicine, Fu Jen Catholic University, Taipei, Taiwan

³Department of Otolaryngology, Head and Neck Surgery, The Johns Hopkins School of Medicine, Baltimore, MD, USA

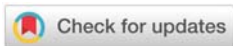
Received: 02 March, 2019

Accepted: 13 March, 2019

Published: 14 March, 2019

*Corresponding author: Chia Jung Lee, Department of Otolaryngology, Shin Kong Wu Ho-Su Memorial Hospital; Fu Jen Catholic University, Taiwan, ROC, Tel: +886922662665; Fax: +886228385716; Email: gialon12@gmail.com

<https://www.peertechz.com>



Introduction

Presbylaryngis is defined as age-related structural changes of the vocal folds.

Aging results in ossification of the laryngeal skeleton, arthritis of the cricoarytenoid and cricothyroid joints, and structural changes to the superficial layer of the lamina propria that results in true vocal fold bowing [1]. Patients with presbylaryngis often present with symptoms of glottal insufficiency that may include a hoarse-breathy voice, higher than normal pitch and vocal fatigue. In some cases, the glottic insufficiency is severe enough that patients are at risk of aspiration [1]. Reulbach et al. [2], estimated that some degree of glottal incompetence due to bowed vocal folds is present in 72% of healthy adults over 40 years of age.

Swallow dysfunction is less well characterized compared to voice alterations in patients with presbylaryngis. Silent aspiration in patients with presbylaryngis may be a risk factor for developing aspiration pneumonia [3]. Despite this risk and the high prevalence of dysphagia among elderly patients, only one fifth of elderly patients with dysphagia seek intervention [4]. Lack of awareness of this problem, and the possible interventions available, by both physicians and patients may be contributing factors. Treatment options for glottic insufficiency due to presbylaryngis include laryngeal

Research Article

The effect of Bilateral Thyroplasty on swallowing for Presbylaryngis

framework interventions, such as injection laryngoplasty or medialization thyroplasty, and expert speech and swallow therapy with a speech language pathologist [5,6]. Here, we retrospectively characterized changes in swallow function in patients with presbylaryngis following bilateral medialization thyroplasty, by using Eating Assessment Tool-10 (EAT-10), which has demonstrated excellent validity and reliability in monitoring the treatment response of swallowing disorders.7

Material and Methods

Patient population

Records for patients undergoing bilateral medialization thyroplasty at a single institution, the Department of Otolaryngology Head and Neck Surgery, Shin-Kong We Ho-Su Memorial Hospital, in Taipei, Taiwan were retrospectively reviewed. Records for patients with diagnosis of bilateral vocal atrophy and dysphagia from January 2014 to June 2018 were collected and reviewed.

Exclusion criteria

Patients with diagnosed vocal fold lesions, vocal fold immobility, or severe vocal fold scar/sulcus were excluded. Patients who had incomplete symptom surveys, a previous history of head and neck cancer, a diagnosed comorbid neurologic disorder, or NPO status with enteral feeding during the study period were also excluded.

Pre-operative survey

Patients were evaluated pre-operatively with videostroboscopy, Eating Assessment Tool-10 (EAT-10) and Voice Handicap Index-10 (VHI-10).

Operative intervention

Bilateral medialization thyroplasty with Gore-tex ribbon with the use of intraoperative laryngoscopy was performed under local anesthesia by a single surgeon (Chia-Jung Lee).

Post-operative follow-up and outcomes

Patients were evaluated post-operatively with videostroboscopy, EAT-10 and VHI-10. Post operation complications were also recorded.

Results

Twenty-six patients were included in this retrospective study. Demographic data including gender, age, previous treatment intervention, and complication were recorded (Tables 1). The follow-up period ranged from 1 months to 6 months.

The pre- and post-operative EAT-10 and VHI-10 scores were compared in paired-t tests; this demonstrated statistically significant decreases in both scores after bilateral medialization thyroplasty (Figures 1,2). There were no major complications. Two patients experienced minor complications of ecchymosis and vocal cord hematoma.

Table 1:

| | | |
|-----------------------------------|----------|---|
| Patient Number | 26 | |
| Age: (year) | | |
| mean | 65.3±9.2 | |
| range | 46-83 | |
| Sex: | | |
| Male/Female | 17:09 | |
| Diagnosis: | | |
| Bilateral vocal atrophy | 26 | |
| Previous Treatment | 1 | Fat Injection laryngoplasty |
| Average Procedure duration (min.) | 102 | |
| Result | | |
| EAT-10 score: | | |
| Pre-OP | 9.76 | P value: |
| Post-OP | 5.84 | 0.0023 |
| VHI-10 score: | | |
| Pre-OP | 17.08 | P value: |
| Post-OP | 11.56 | <0.001 |
| Complication | 2 | Wound ecchymosis Vocal fold hematoma |

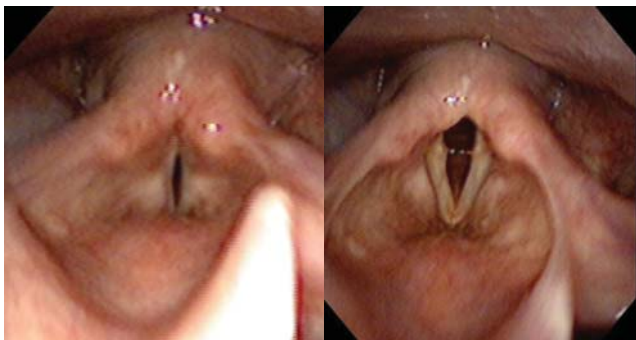


Figure 1: Pre-operation image



Figure 2: Post-operation (1 month) image

Discussion

Dysphagia and dysphonia are common clinical problems in the elderly population with individual studies citing prevalence from 14-47% [8-12]. Both issues negatively impact quality of life, and in the case of dysphagia, sequelae can be life threatening. Clinically obvious dysphagia occurs in at least 40% to 60% of nursing home residents [13]. Dysphagia is also highly common in community-dwelling elderly individuals [10,14,15], with a prevalence of approximately 9% in persons 65 to 74 years of age, 19% in those 75 to 80 years, and 19% to 33% of persons older than 80 years [16]. This is due in part to age-related changes in swallowing associated with normal aging [17,18]. Age related vocal cord changes can also lead to deterioration of vocal quality and durability [19]. Despite these significant swallowing and voice problems, many elderly patients do not seek examination and treatment [20,21].

Since efficient glottic closure is an important mechanism of airway protection during swallowing [22]. and important for vocal projection and durability, we hypothesized reducing glottic incompetence in patients with presbylaryngis with bilateral type I thyroplasty could improve swallow and voice function. This work is among the first to demonstrate improvement in EAT-10 and VHI-10 scores after bilateral type I thyroplasty. Allensworth JJ. et.al. [19], found significant improvement in objective outcome measures without major complications. Postma et al. [23], reported 94% of patients (n =16) reported improved quality of life following bilateral framework surgery using a custom questionnaire. All six patients with presbylaryngis who underwent bilateral medialization in a report by Netterville and colleagues (1993) demonstrated a subjective improvement in voicing and swallowing, although objective data and VHI scores were not collected [24].

Pathophysiology

Swallow changes occur to some extent in most older adults, usually beginning at 45 years of age. This process, known as presbyphagia, is the result of multiple factors: age-related changes in head and neck anatomy as well as changes in the neural and physiologic mechanisms that control swallowing [25]. These changes affect all phases of deglutition [26]. and may cause impaired bolus control and transport (prolonged oral phase), reduced tongue pressure, delayed triggering of the swallow reflex, delayed closure of the larynx, slowing of pharyngeal swallow initiation, ineffective pharyngeal clearance, impaired cricopharyngeal opening, and reduced secondary esophageal peristalsis [17,27,28]. Additionally, the prevalence of diseases increases with aging, and dysphagia is a common co-finding of many disease processes or their treatments [25]. Swallowing involves coordination of both voluntary and involuntary muscle actions as described above, and failure of any one or more of these mechanisms may cause a wide range of swallow dysfunction [29].

Treatment choices for presbylarynges include: conservative treatment with reassurance, voice therapy, injection laryngoplasty and medialization thyroplasty [30].

Orellana et al., indicated that injection laryngoplasty may improve both phonation and swallow function, but this improvement will be temporary [31]. Bilateral type I thyroplasty carries the advantage of being a permanent procedure [32].

Limitations of this retrospective study including dependency on documented charts reviews only and lack of overall image study for the swallowing function survey, such as FEES (flexible endoscopic evaluation of swallowing) or VFSS (videofluoroscopic swallowing study). This present preliminary study does not eliminate the potential influence of other undiagnosed diseases that may change swallowing movement or function.

Conclusion

Care of the aging patient can be challenging. Bilateral vocal atrophy or presbylaryngis may produce glottic insufficiency and lead to swallowing and voice dysfunction. In the most severe cases, patients are at increased risk of aspiration. Here, we demonstrate clinical benefit to patients with presbylaryngis following bilateral type I medialization thyroplasty. Given the low risk of adverse events following this surgery, bilateral type I thyroplasty should be considered for aging patients with voice and swallow dysfunction caused by clinically documented presbylaryngis.

Compliance with Ethical Standards

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study.

References

- O'Connell Ferster AP, Hu A, Dworkin JP (2017) Chapter 3. Laryngology. In Pasha R, Golub JS (Eds.), *Otolaryngology-Head and Neck Surgery: Clinical Reference Guide, Fifth Edition* 117. [Link: https://goo.gl/A7EHWg](https://goo.gl/A7EHWg)
- Reulbach TR, Belafsky PC, Blalock PD, Koufman JA, Postma GN (2001) Occult laryngeal pathology in a community-based cohort. *Otolaryngol Head Neck Surg* 124: 448-450. [Link: https://goo.gl/tMmhQm](https://goo.gl/tMmhQm)
- Garon BR, M, C (1996) Silent Aspiration: Results of 1000 Video Fluoroscopic Evaluations. *J Neuro Rehab* 10: 121-126 [Link: https://goo.gl/M89HZR](https://goo.gl/M89HZR)
- Turley R, Cohen S (2009) Impact of voice and swallowing problems in the elderly. *Otolaryngology Head and Neck Surgery* 140: 33-36. [Link: https://goo.gl/ZSjyBK](https://goo.gl/ZSjyBK)
- Lagorio LA, Carnaby-Mann GD, Crary MA (2010) Treatment of Vocal Fold Bowing Using Neuromuscular Electrical Stimulation. *Arch Otolaryngol Head Neck Surg* 136: 398-403. [Link: https://goo.gl/QtaJ2e](https://goo.gl/QtaJ2e)
- Orellana MJ, Badía P, Napolitano C (2017) Injection laryngoplasty treatment for vocal atrophy in the elderly. *MOJ Gerontol Ger* 2: 212-213. [Link: https://goo.gl/G8qXAt](https://goo.gl/G8qXAt)
- Belafsky PC, Mouadeb DA, Rees CJ (2008) Validity and reliability of the Eating Assessment Tool (EAT-10). *Ann Otol Rhinol Laryngol* 117: 919-924. [Link: https://goo.gl/YcmC2c](https://goo.gl/YcmC2c)
- Golub JS, Chen PH, Otto KJ, Hapner E, Johns MM 3rd (2006) Prevalence of perceived dysphonia in a geriatric population. *J Am Geriatr Soc* 54: 1736–1739. [Link: https://goo.gl/5aZjME](https://goo.gl/5aZjME)
- Roy N, Stemple J, Merrill RM, Thomas L (2007) Epidemiology of voice disorders in the elderly: preliminary findings. *Laryngoscope* 117: 628-633. [Link: https://goo.gl/dDDDPH](https://goo.gl/dDDDPH)
- Bloem BR, Lagaay AM, van Beek W, Haan J, Roos RA, et al. (1990) Prevalence of subjective dysphagia in community residents aged over 87. *BMJ* 300: 721–722. [Link: https://goo.gl/xq6ttj](https://goo.gl/xq6ttj)
- Chen PH, Golub JS, Hapner ER, Johns MM 3rd. (2009) Prevalence of perceived dysphagia and quality-of-life impairment in a geriatric population. *Dysphagia* 24: 1-6. [Link: https://goo.gl/cPnBsf](https://goo.gl/cPnBsf)
- Eslick GD, Talley NJ (2008) Dysphagia: epidemiology, risk factors and impact on quality of life—a population-based study. *Aliment Pharmacol Ther* 27: 971–979. [Link: https://goo.gl/nHUVdt](https://goo.gl/nHUVdt)
- Murray T, Carrau RL (2006) *Clinical manual of swallowing disorders*. 2nd ed. San Diego, CA: Plural Publishing. [Link: https://goo.gl/rTw7iV](https://goo.gl/rTw7iV)
- Kawashima K, Motohashi Y, Fujishima I (2004) Prevalence of dysphagia among community-dwelling elderly individuals as estimated using a questionnaire for dysphagia screening. *Dysphagia* 19: 266-271. [Link: https://goo.gl/Ld8xHt](https://goo.gl/Ld8xHt)
- Lindgren S, Janzon L (1991) Prevalence of swallowing complaints and clinical findings among 50-79-year-old men and women in an urban population. *Dysphagia* 6: 187-192. [Link: https://goo.gl/HEcfHx](https://goo.gl/HEcfHx)
- Stegemann S, Gosch M, Breitzkreutz J (2012) Swallowing dysfunction and dysphagia is an unrecognized challenge for oral drug therapy. *Int J Pharm* 430: 197-206. [Link: https://goo.gl/zHr3JE](https://goo.gl/zHr3JE)
- Schindler JS, Kelly JH (2002) Swallowing disorders in the elderly. *Laryngoscope* 112: 589-602. [Link: https://goo.gl/Ryppcw](https://goo.gl/Ryppcw)
- Morley MB (2015) Dysphagia and aspiration. *J Am Med Dir Assoc* 16: 631-634. [Link: https://goo.gl/Ygvmnn](https://goo.gl/Ygvmnn)
- Allensworth JJ, O'Dell K, Ziegler A, Bryans L, Flint P, et al. (2019) Treatment Outcomes of bilateral medialization thyroplasty for presbylaryngis. *J Voice* 33: 40-44. [Link: https://goo.gl/MVUT94](https://goo.gl/MVUT94)
- Wilkins T1, Gillies RA, Thomas AM, Wagner PJ (2007) The prevalence of dysphagia in primary care patients: a HamesNet Research Network study. *J Am Board Fam Med* 20: 144–150. [Link: https://goo.gl/RwSrc9](https://goo.gl/RwSrc9)
- Tibbling L, Gustafsson B (1991) Dysphagia and its consequences in the elderly. *Dysphagia* 6: 200–202. [Link: https://goo.gl/etEMka](https://goo.gl/etEMka)
- Pontes P, Brasolotto A, Behlau M (2005) Glottic characteristics and voice complaint in the elderly. *J Voice* 19: 84-94. [Link: https://goo.gl/f2AEyk](https://goo.gl/f2AEyk)
- Postma GN, Blalock PD, Koufman JA (1998) Bilateral medialization laryngoplasty. *Laryngoscope* 108: 1429–1434. [Link: https://goo.gl/eLGFef](https://goo.gl/eLGFef)
- Netterville JL, Stone RE, Luken ES, Civantos FJ, Ossoff RH (1993) Silastic medialization and arytenoid adduction: the Vanderbilt experience. A review of 116 phonosurgical procedures. *Ann Otol Rhinol Laryngol* 102: 413–424. [Link: https://goo.gl/ARQom4](https://goo.gl/ARQom4)
- Nawaz S, Tulunay-Ugur OE (2018) Dysphagia in the Older Patient. *Otolaryngol Clin North Am* 51: 769-777. [Link: https://goo.gl/4WcJbv](https://goo.gl/4WcJbv)
- Wirth R, Dziewas R, Beck AM, Clavé P, Hamdy S, et al. (2016) Oropharyngeal dysphagia in older persons – from pathophysiology to adequate intervention: a review and summary of an international expert meeting. *Clin Interv Aging* 23: 189-208. [Link: https://goo.gl/asn9yW](https://goo.gl/asn9yW)
- Rofes L, Arreola V, Romea M, Palomera E, Almirall J, et al. (2010) Pathophysiology of oropharyngeal dysphagia in the frail elderly. *Neurogastroenterol Motil* 22: 851–858. [Link: https://goo.gl/SQT7TG](https://goo.gl/SQT7TG)



28. Roy N, Stemple J, Merrill RM, Thomas L (2007) Dysphagia in the elderly: Preliminary evidence of prevalence, risk Factors, and socioemotional effects. *Ann Otol Rhinol Laryngol* 116: 858-865. [Link: https://goo.gl/hu9nfi](https://goo.gl/hu9nfi)
29. Dewan K, Chhetri DK (2018) Chapter 16. Epiglottic dysfunction. In Chhetri DK, Dewan K. (Eds.) *Dysphagia Evaluation and Management in Otolaryngology*. Louis, Missouri: Elsevier 123-128. St. [Link: https://goo.gl/jt2No7](https://goo.gl/jt2No7)
30. Davids T, Klein AM, Johns MM 3rd (2012) Current dysphonia trends in patients over the age of 65: is vocal atrophy becoming more prevalent? *Laryngoscope* 122: 332-335. [Link: https://goo.gl/o4Crrt](https://goo.gl/o4Crrt)
31. Pedro Badía V, Matías Winter D, Norma León M, Carla Napolitano V, Diego Correa F (2015) Laryngoplasty injection with hyaluronic acid, Hospital Clinico de la Pontificia Universidad Catolica de Chile experience. *Rev Otorrinolaringol Cir Cabeza Cuello* 75: 232-238. [Link: https://goo.gl/e1iQuC](https://goo.gl/e1iQuC)
32. Omori K, Slavitt DH, Kacker A, Blaugrund SM, Kojima H (2000) Effects of thyroplasty type I on vocal fold vibration. *Laryngoscope* 110: 1086-1091. [Link: https://goo.gl/Sj3Ftx](https://goo.gl/Sj3Ftx)

Discover a bigger Impact and Visibility of your article publication with Peertechz Publications

Highlights

- ❖ Signatory publisher of ORCID
- ❖ Signatory Publisher of DORA (San Francisco Declaration on Research Assessment)
- ❖ Articles archived in worlds' renowned service providers such as Portico, CNKI, AGRIS, TDNet, Base (Bielefeld University Library), CrossRef, Scilit, J-Gate etc.
- ❖ Journals indexed in ICMJE, SHERPA/ROME0, Google Scholar etc.
- ❖ OAI-PMH (Open Archives Initiative Protocol for Metadata Harvesting)
- ❖ Dedicated Editorial Board for every journal
- ❖ Accurate and rapid peer-review process
- ❖ Increased citations of published articles through promotions
- ❖ Reduced timeline for article publication

Submit your articles and experience a new surge in publication services
(<https://www.peertechz.com/submission>).

Peertechz journals wishes everlasting success in your every endeavours.

Copyright: © 2019 Kuo CH, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.