

CASE REPORT

Transcutaneous ultrasound: An adjunct way to evaluate the intra-false vocal cord pathology—learning from a case of laryngeal Rosai-Dorfman disease

Cheng-Ping Wang  | Tseng-Cheng Chen 

Department of Otolaryngology, National Taiwan University Hospital and National Taiwan University College of Medicine, Taipei, Taiwan

Correspondence

Tseng-Cheng Chen, Department of Otolaryngology, National Taiwan University Hospital, 7, Chung-Shan South Rd., Taipei, Taiwan.
Email: kmu8501094@yahoo.com.tw

Abstract

In clinical practice, it is sometimes difficult to evaluate the intra-false vocal fold lesion. Transcutaneous ultrasound can be an option to evaluate the soft tissue lesion within the right false vocal cord in a 65-year-old man with laryngeal Rosai-Dorfman disease presenting with hoarseness and right false cord swelling.

KEYWORDS

hoarseness, larynx, sonography, ultrasonography, vocal fold

1 | INTRODUCTION

The larynx is the critical structure for voice. It composes of the true vocal fold, false vocal cord, and the ventricle between them. Any abnormal lesion on or in the vocal fold results in poor voice quality. The standard diagnostic tool is laryngoscopy with/without stroboscopy to evaluate the appearance, movement, and mucosal wave of the vocal folds.¹ One of the major problems of laryngoscopy is that the nature and extent of the intra-vocal fold lesion is not evaluable. Computed tomography (CT) or magnetic resonance imaging (MRI) is the imaging study to evaluate the submucosal soft tissue lesion in the larynx.

Although ossification of the thyroid cartilage and the air-soft tissue interface limit ultrasound energy transmission in the larynx, transcutaneous laryngeal ultrasound is becoming a simple, real-time, easily available imaging tool to evaluate the laryngeal structure, function, and some laryngeal pathologies.^{2,3} Most studies focused on the true vocal fold because it is the most critical structure for phonation. False vocal cord also has pathologies which are detrimental to the voice and respiration, but got little attention. Transcutaneous laryngeal ultrasound may be a simple way to evaluate the false vocal cord pathology.

Here, we report a case of laryngeal Rosai-Dorfman disease to demonstrate transcutaneous laryngeal ultrasound in diagnosis and follow-up of the intra-false vocal cord pathology. This case is National Taiwan University Hospital Institutional Review Board exempt.

2 | CASE REPORT

65-year-old man has progressive hoarseness for 2 years without dyspnea. He had three endoscopy sinus operations for recurrent chronic paranasal sinusitis since 10 years ago. The pathology of the sinus tissue revealed Rosai-Dorfman disease. On physical examination, he breathed well and had no anterior or lateral neck mass. Laryngoscopy showed right swollen false vocal cord and prolapse of the ventricle with smooth mucosal surface, which made the right true vocal fold invisible. The left vocal fold and false cord appeared normal (Figure 1). Bilateral vocal folds moved well and symmetrically. CT and MRI showed asymmetric enlargement of the right false vocal cord only, with similar radiodensity and signal intensity to the left vocal cord (Figure 2). No obvious thyroid cartilage destruction or significant cervical lymph nodes was noted on CT and MRI. Transcutaneous laryngeal

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2021 The Authors. *Clinical Case Reports* published by John Wiley & Sons Ltd.

ultrasound with a 7–18 MHz linear array transducer using the scan setting for the thyroid gland (Hitachi Hivision Avius, Hitachi Aloka Medical)² showed the hypoechoic homogeneous soft tissue lesion in the right false vocal cord in comparison with the normal hyperechoic left false vocal cord through the non-completely ossified thyroid cartilage window (Figure 3). The inner aspect of the thyroid cartilage looked intact without destruction by the hypoechoic soft tissue lesion.

During the operation, laryngoscopy showed that the submucosal tumor was yellow and soft, with partial involvement



FIGURE 1 Videolaryngoscopy showed right swollen false cord and prolapse of the ventricle with smooth mucosal surface, which made the right true vocal fold invisible

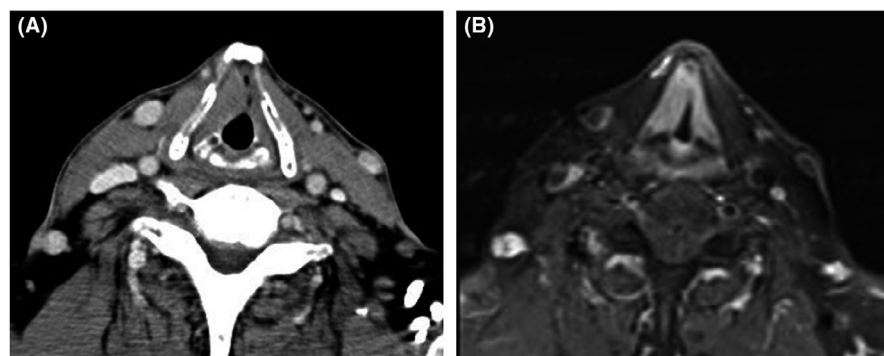


FIGURE 2 Computed tomography (A) and magnetic resonance imaging (B) showed asymmetric enlargement of the right false vocal cord without thyroid cartilage destruction or significant cervical lymph nodes. The radiodensity (CT) and signal intensity (MRI) of the right false vocal cord is similar to that of the contralateral cord

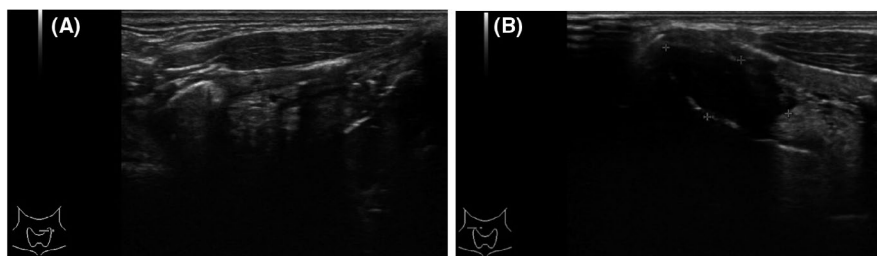


FIGURE 3 Transcutaneous laryngeal ultrasound using the scan setting for the thyroid gland showed the hypoechoic homogeneous soft tissue lesion in the right false vocal cord (B) in comparison with the normal left hyperechoic false vocal cord (A) through the non-completely ossified thyroid cartilage window

of the mucosal surface of the right true vocal fold. Transoral CO₂ laser microsurgery was performed for partial resection of the hypertrophic false vocal cord, prolapse of the ventricle, and the superficial layer of the true vocal fold (Figure 4). Pathology showed Rosai-Dorfman disease.

After operation, the patient feels the voice is much better up to now for 3 years and follow-up laryngoscopies showed symmetrically relatively normal true and false vocal folds without prolapse of the ventricle (Figure 5). Vocal fold movement is well and symmetric. Follow-up transcutaneous laryngeal ultrasound showed stable hypoechoic lesion in the right false vocal cord without destruction of the thyroid cartilage.

3 | DISCUSSION

The false vocal cord can be invaded by various mucosal lesions, such as laryngeal or hypopharyngeal cancer, which is easily diagnosed by laryngoscopy. On the contrary, the false vocal cord sometimes appears asymmetric swelling without obvious mucosal lesions. It is not easy for clinicians to know the pathology of the lesion within the false vocal cord only by laryngoscope. CT or MRI is performed for the nature and the extent of the submucosal lesion of the false vocal cord, but the diagnosis always remains unclear, especially when the imaging characters of the lesion are similar to that of contralateral normal cord, as this case report showed.

Recently, transcutaneous laryngeal ultrasound has been reported to be a simple, real-time, easily available imaging

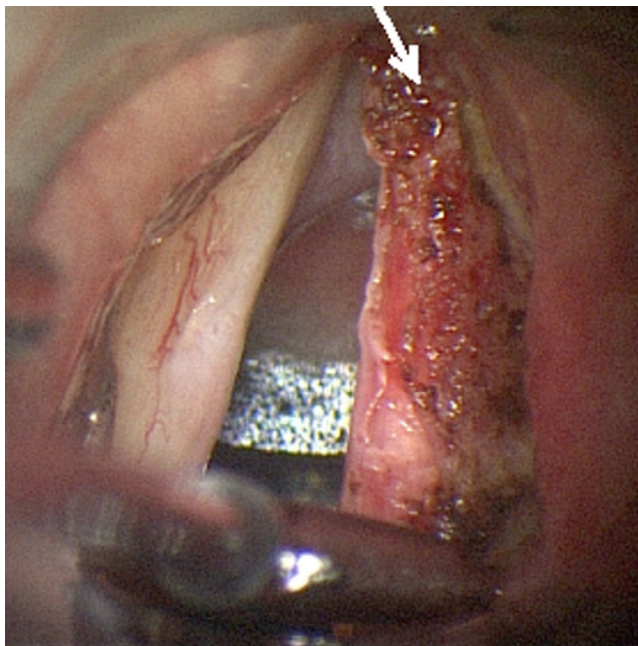


FIGURE 4 The submucosal tumor was yellow and soft, with partial involvement of the mucosal surface of the true vocal fold. Transoral CO₂ laser microsurgery was performed for partial resection of the hypertrophic false vocal cord, prolapse of the ventricle, and the superficial layer of the true vocal fold

tool to evaluate the larynx structure.^{2,3} Nowadays, ultrasound is an alternative way to evaluate vocal fold movement for airway management or for major surgery, for example, thyroid surgery, especially for pediatric or female patients when the laryngoscope is not available or not suitable for use.²⁻⁶ Compared with the true vocal fold with a hypoechoic feature, the false vocal cord appears as paired, hyperechoic triangular structure on transverse grayscale sonography because of the presence of fibrofatty tissue in it.^{7,8} Because most soft tissue lesions are homogeneously hypoechoic on sonography, it is potentially helpful to identify and define the extent of the intra-false vocal cord lesion by use of the ultrasound because the lesion is contrasted by the surrounding hyperechoic fatty tissue in the false vocal cord.

In this patient with laryngeal Rosai-Dorfman disease, which is extremely rare, laryngoscopy, CT and MRI did not tell the nature of the false cord submucosal lesion from simple false vocal cord hypertrophy, which is very common in voice abusers. Although the patient was man and more than 60 years old, transcutaneous laryngeal ultrasound still penetrated the thyroid cartilage without complete large ossification to evaluate the intra-larynx structure.² On sonography, the right false vocal fold had a hypoechoic homogeneous soft tissue lesion with the intact thyroid cartilage in comparison with the left false vocal fold. This information strongly indicated that surgery was necessary not only for correction of the false vocal cord



FIGURE 5 The laryngoscopy showed relatively symmetric appearance of the larynx 3 years after surgery

and ventricle for voice but also more importantly for the pathology of the lesion.

After surgery, laryngoscopy and transcutaneous laryngeal ultrasound in clinic can be the simple and quick ways to follow up the remaining benign laryngeal lesion with relatively normal laryngeal appearance and stable lesion size, instead of CT or MRI, which is not inconvenient and has more radiation or electromagnetic exposure.

In conclusion, transcutaneous laryngeal ultrasound can be an adjunct way to evaluate the intra-false vocal cord lesion at diagnosis and for follow-up, especially the laryngeal mucosa is intact and the thyroid cartilage is not completely ossified. Because the ultrasound is easily available and performed quickly in clinic, transcutaneous laryngeal ultrasound could be the first image to evaluating false cord swelling shown by indirect mirror or direct laryngoscopic examination.

ACKNOWLEDGEMENTS

We thank Division of Ultrasound, Department of Integrated Diagnostic & Therapeutics, and National Taiwan University Hospital for support with the ultrasound equipment during the study. Published with written consent of the patient.

CONFLICTS OF INTEREST

We declare no conflicts of interest.

AUTHOR CONTRIBUTIONS

Cheng-Ping Wang: concept of the study, writing, revision. Tseng-Cheng Chen: concept of the study, writing, revision, supervision.

IRB STATEMENT

This case is National Taiwan University Hospital Institutional Review Board exempt.

DATA AVAILABILITY STATEMENT

Data sharing not applicable—no new data generated or the article describes entirely theoretical research.

ORCID

Cheng-Ping Wang  <https://orcid.org/0000-0001-7872-1463>

Tseng-Cheng Chen  <https://orcid.org/0000-0002-3360-0382>

REFERENCES

1. Woo P, Colton R, Casper J, Brewer D. Diagnostic value of stroboscopic examination in hoarse patients. *J Voice*. 1991;5(3):231-238.
2. Wang CP, Chen TC, Yang TL, et al. Transcutaneous ultrasound for evaluation of vocal fold movement in patients with thyroid disease. *Eur J Radiol*. 2012;81:e288-e291.
3. Wang CP, Yang TL, Chen TC. Does sonography change clinical practice of otolaryngology and head and neck surgery? *Int J Head Neck Sci*. 2018;2:139-146.
4. Gambardella C, Offi C, Romano RM, et al. Transcutaneous laryngeal ultrasonography: a reliable, non-invasive and inexpensive preoperative method in the evaluation of vocal cords motility—a prospective multicentric analysis on a large series and a literature review. *Updates Surg*. 2020;72(3):885-892.
5. Ongkasuwan J, Ocampo E, Tran B. Laryngeal ultrasound and vocal fold movement in the pediatric cardiovascular intensive care unit. *Laryngoscope*. 2017;127:167-172.
6. Wong KP, Lang BHH, Ng SH, Cheung CY, Chan CTY, Lo CY. A prospective, assessor-blind evaluation of surgeon-performed transcutaneous laryngeal ultrasonography in vocal cord examination before and after thyroidectomy. *Surgery*. 2013;154:1158-1165.
7. Raghavendra BN, Horii SC, Reede DL, Rumancik WM, Persky M, Bergeron T. Sonographic anatomy of the larynx, with particular reference to the vocal cords. *J Ultrasound Med*. 1987;6(5):225-230.
8. Hu Q, Zhu SY, Luo F, Gao Y, Yang XY. High-frequency sonographic measurements of true and false vocal cords. *J Ultrasound Med*. 2010;29(7):1023-1030.

How to cite this article: Wang C-P, Chen T-C. Transcutaneous ultrasound: An adjunct way to evaluate the intra-false vocal cord pathology—learning from a case of laryngeal Rosai-Dorfman disease. *Clin Case Rep*. 2021;9:e04493. <https://doi.org/10.1002/ccr3.4493>