


Transoral Chondrolaryngoplasty: Scarless Reduction of the Adam's Apple

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Abstract

The purpose of our study is to test the feasibility of transoral thyroid chondrolaryngoplasty using a similar approach to transoral thyroidectomy. This approach would allow for gender-affirming surgery while avoiding an external neck scar. We carried out our cadaveric feasibility study in an anatomy laboratory at an academic center. Five fresh cadavers were used for this study. We used a lower oral vestibular incision, along with retractors and an endoscope to dissect and gain access to the laryngeal prominence of the thyroid cartilage. Portions of the laryngeal prominence were then removed using scissors to achieve a satisfactory neck contour. Endoscopic as well as extracorporeal photographs were taken to demonstrate the approach. We were able to remove the laryngeal prominence successfully in all of our cadaveric specimens with this transoral approach.

Keywords

laryngoplasty, chondrolaryngoplasty, thyrochondrolaryngoplasty, endoscopic, gender, transgender

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Otolaryngologists are occasionally asked to provide gender-affirming surgery for transgender women transitioning from male to female. One example of such a surgery is the reduction of the Adam's apple, or the laryngeal prominence of the thyroid cartilage. This procedure is known as thyroid chondrolaryngoplasty and is traditionally performed through a small anterior neck incision, as originally described in 1975 by Wolfort and Parry.¹ While this procedure is simple and effective, it does result in a visible neck scar that may serve as an undesired reminder of the transitioning process for the patient. While no studies exist examining neck scar dissatisfaction in the transgender population, studies have shown decreased quality of life associated with similar thyroidectomy neck scars.² As a result, techniques have been developed incorporating endoscopes and

robots that permit “scarless” transoral thyroidectomy.³ We propose that a similar approach can be used for transoral thyroid chondrolaryngoplasty to avoid a visible anterior neck incision.

Materials and Methods

This study was approved by the West Virginia State Anatomical Board and the Institutional Review Board of West Virginia University Office of Research Integrity and Compliance. Five fresh cadavers were donated by the West Virginia University Human Gift Registry. Two cadavers were female and used as the initial proof of concept, and three were male and used to confirm the efficacy of transoral chondrolaryngoplasty.

Operative Technique

The cadavers were positioned with the head in extension with a shoulder roll. An approximately 3-cm vestibular incision was placed behind the lower lip, between the mental nerves (see **Figure 1**). Sharp dissection was carried through the mentalis muscles, followed by subperiosteal dissection with an elevator toward the inferior border of the mandible, through the platysma, and into the submental space. Dissection was continued caudally following the anterior digastric muscles to the hyoid bone. An Eastman retractor was then used to lift the anterior neck skin away from the larynx, and a 0° endoscope was introduced. Further dissection revealed the infrahyoid strap muscles and the laryngeal prominence (see **Figure 2**).

Parting the strap muscles along the midline raphe revealed the thyroid notch. A blade was then used to sharply incise the perichondrium along the superior margin of the thyroid ala. Using a Cottle elevator, the laryngeal mucosa

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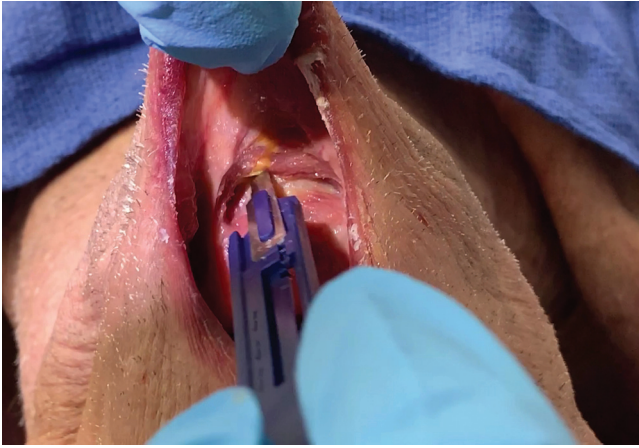


Figure 1. An incision is made in the lower anterior vestibule, between the mental nerves. Additional incisions can be made lateral to the mental nerves for the introduction of endoscopic instruments (not shown).

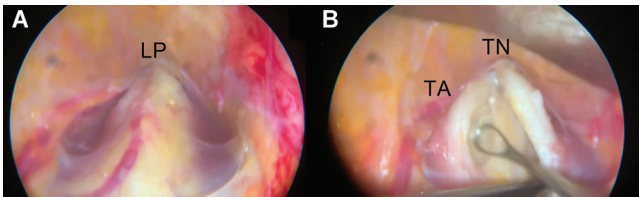


Figure 2. Endoscopic view. (A) The laryngeal prominence (LP) is visible through the transoral dissection. (B) The inner perichondrium is dissected away from the thyroid ala (TA). The thyroid notch (TN) is seen anteriorly.

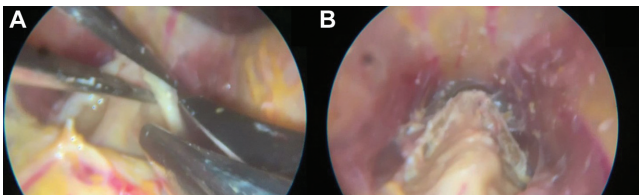


Figure 3. Endoscopic view. (A) The prominent portions of the thyroid ala are excised. (B) Final appearance of the thyroid cartilage.

was elevated off of the inner thyroid cartilage but not beyond the thyroid notch, as this may disrupt the vocal ligament. Direct visualization of the laryngeal lumen with a second endoscope may be done during this step to further reduce the risk to the vocal ligament, although we found that the onset of resistance to dissection to be a reliable landmark for the insertion of the ligament. The prominent portions of the thyroid ala were then removed with Metzenbaum scissors until a satisfactory neck contour was achieved (see **Figures 2** and **3**). Please see Supplemental Video 1 for a demonstration of the operative technique.

Results

In all cadaveric specimens, we were able to achieve the exposure and access necessary to perform transoral thyroid chondrolaryngoplasty. Furthermore, adequate thyroid cartilage reduction and acceptable neck contour were achieved in the male specimens (see **Figure 4**). While the procedure was technically more challenging compared with the traditional approach, the learning curve was short, and we were able to complete the procedure in approximately 60 to 90 minutes.

Discussion

Transgender women sometimes seek surgical procedures to align their body with the gender with which they identify. Reduction of the laryngeal prominence is a simple procedure that can result in significant patient satisfaction but is traditionally done through an external neck incision that can result in a telltale scar on the anterior neck.

Recently, otolaryngologists have greatly expanded the types of surgeries that can be performed through the mouth to avoid a neck scar, including thyroidectomy. We believe that the same technique can be used to perform transoral thyroid chondrolaryngoplasty, and we demonstrate that this technique is feasible in cadaveric subjects.

Because of its similarity to transoral thyroidectomy, we expect similar surgical risks including mental nerve, lip, and neck skin injuries.⁴ However, we do not expect recurrent laryngeal nerve or parathyroid injuries, as these structures are not within the surgical field. There is, however, the

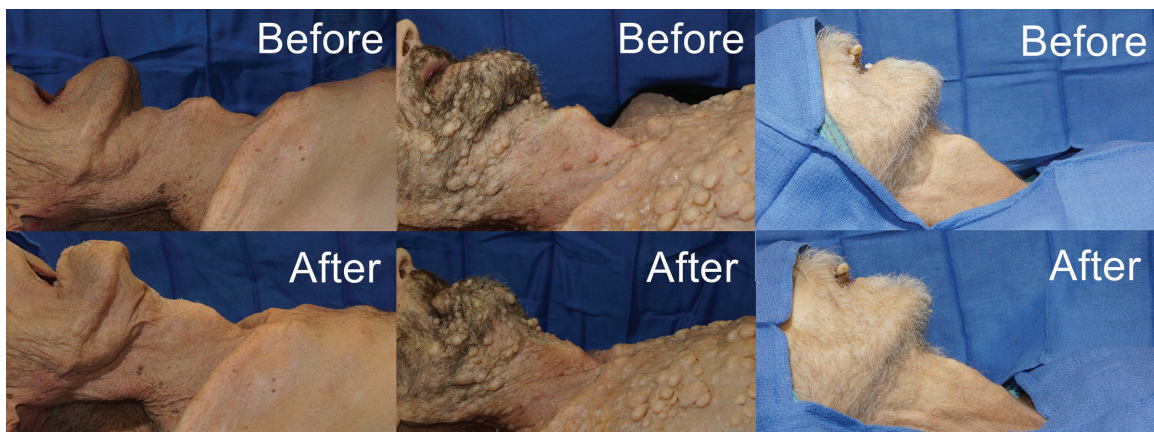


Figure 4. Laryngeal prominence before transoral resection in all 3 male cadavers (top) and after transoral resection (bottom).

additional risk of entry into the laryngeal lumen, voice change from anterior commissure disruption, and laryngeal edema requiring airway rescue, although these risks also apply to the traditional external approach. Compared with the traditional approach, the transoral route does require a more extensive dissection, and as a result, recovery time may be longer. Patients should also be counseled regarding the possibility of converting to an open approach should difficulties arise.

Although we conducted our study with simple traditional and endoscopic instruments, transoral robotic surgical instruments can also be used, as was reported by a contemporaneous study by Khafif et al.⁵ Similarly, specialty long rasps and drills may also be used to further shape the thyroid cartilage, particularly below the level of the anterior commissure, where only the outer cortex can be safely removed. Future studies and additional experience are required to further refine this technique.

Conclusion

Our cadaveric study showed that transoral thyroid chondrolaryngoplasty is feasible and may be an acceptable way to reduce the laryngeal prominence without an anterior neck scar.

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Author Contributions

Jeffson Chung, participated in the design and conduct of the study, wrote the manuscript, edited and approved the final version of the manuscript to be published, agrees to be accountable for all aspects of the work; **Phillip Purnell**, participated in the conduct of the study and analysis of results, edited the manuscript, edited and approved the final version of the manuscript to be published, agrees to be accountable for all aspects of the work; **Sidney Anderson**, participated in the conduct of the study and analysis of results, edited the manuscript, edited and approved the final

version of the manuscript to be published, agrees to be accountable for all aspects of the work; **Charlotte Hoelke**, substantial contribution to the conception of the work, edited the manuscript, revised the manuscript critically for important intellectual content, edited and approved the final version of the manuscript to be published, agrees to be accountable for all aspects of the work; **Adam Bender-Heine**, participated in the design and conduct of the study including dissection of cadavers, edited and approved the final version of the manuscript to be published, agrees to be accountable for all aspects of the work; **H. Wayne Lambert**, participated in the design and ethics approval of the study, edited the manuscript, edited and approved the final version of the manuscript to be published, agrees to be accountable for all aspects of the work.

Disclosures

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Supplemental Material

Additional supporting information is available at <http://journals.sagepub.com/doi/suppl/10.1177/2473974X20938299>

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