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Title: Identification and Protection of the Recurrent Laryngeal Nerve during Transoral Robotic Thyroidectomy

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Author Questionnaire

1. We have marked your project as author-provided footage, meaning you film the video yourself and provide JoVE with the footage to edit. JoVE will not send the videographer. Please confirm that this is correct.

✓ Correct

2. Interview statements: Which interview statement filming option is the most appropriate for your group? **Please select one.**

☒ Interviewees self-record interview statements. JoVE can provide support for this option.

3. Proposed interview filming date: Please indicate the proposed date that your group will self-film interviews: **2025/09**

When you are ready to submit your video files, please contact our China Location Producer, [Yuan Yue](#).

Current Protocol Length

Number of Steps: 14

Number of Shots: 18

Introduction

INTRODUCTION:

- 1.1. **Yan Xu:** This study focuses on the identification and protection of the recurrent laryngeal nerve during transoral robotic thyroidectomy, aiming to evaluate the feasibility of this method during surgery.
 - 1.1.1. INTERVIEW: Named Talent says the statement above in an interview-style shot, looking slightly off-camera. *Suggested B-roll: 2.9.1*

What are the current experimental challenges?

- 1.2. **Yan Xu:** The challenge lies in the extended time required for nerve identification when anatomical variations are present or when significant intraoperative haemorrhage occurs.
 - 1.2.1. INTERVIEW: Named Talent says the statement above in an interview-style shot, looking slightly off-camera.

CONCLUSION:

What significant findings have you established in your field?

- 1.3. **Yan Xu:** We have performed approximately 400 transoral robotic thyroidectomies in China. Compared to open surgery, this technique offers the advantages of faster recovery and reduced trauma.
 - 1.3.1. INTERVIEW: Named Talent says the statement above in an interview-style shot, looking slightly off-camera.

Ethics Title Card

This research has been approved by the Clinical Research Ethics Committee of Daping Hospital, the Third Affiliated Hospital of the Army Medical University

Protocol

2. Surgical Procedure to Dissect Subcutaneous Flap

Demonstrator: Yan Xu

2.1. To begin, load the surgical forceps into the left trocar labeled Arm 1. Then, load the monopolar curved scissors into the right trocar labeled Arm 3 [1].

2.1.1. LAB MEDIA: File name: 68460-1.mp4 Timestamps: 23:00 – 23:13

2.2. Using the monopolar curved scissors, make a 4 to 5-centimeter longitudinal incision along the linea alba cervicis at the midline. Dissect the sternohyoid muscles by applying the blunt separation mode at 20 watts using the soft coagulation setting [1]. Elevate the thyroid surgical capsule using the curved tip in blunt mode and expose the mid-third portion of the thyroid parenchyma as the target zone [2].

2.2.1. LAB MEDIA: File name: 68460-1.mp4: Timestamps: 23:17–23:50,

2.2.2. LAB MEDIA: File name: 68460-1.mp4: Timestamps: 38:46 – 38:55

2.3. Then, inject 0.2 milliliters of mitoxantrone hydrochloride per site into the thyroid parenchyma at a depth of 2 to 3 millimeters. Ensure that the total dose does not exceed 0.6 milligrams [1].

2.3.1. LAB MEDIA: File name: 68460-1.mp4 Timestamps: 39:48-40:00

2.4. Now, load the surgical forceps into the left trocar labeled Arm 1. Then, load the shears into the right trocar labeled Arm 3 [1].

2.4.1. LAB MEDIA: File name: 68460-1.mp4: Timestamps: 41:14-41:20

2.5. Using surgical forceps and shears, separate the sternohyoid muscles to expose the deep cervical fascia [1].

2.5.1. LAB MEDIA: File name: 68460-1.mp4: Timestamps: 42:15-42:23, 45:50-46:00

2.6. Use 4-0 (*Four-Oh*) absorbable sutures to stitch the sternohyoid muscle and scapulothyroid muscle at 1 to 2 centimeters from the incision margin on the sternohyoid muscle, using horizontal cricoid cartilage sutures [1]. Elevate the muscles to create an inclined angle of 15 to 20 degrees with respect to the tracheal axis to generate tension [2].

2.6.1. LAB MEDIA: File name: 68460-1.mp4 Timestamps: 48:49-49:00

2.6.2. LAB MEDIA: File name: 68460-1.mp4 Timestamps: 49:25-49:30

2.7. Activate the scalpel in Precision Seal mode and divide the thyrohyoid membrane. Dissect through the Cricothyroid Space and locate the carotid bifurcation level [1]. While dissecting, maintain a 2-millimeter distance from the external branch of the superior laryngeal nerve. Then, sever the superior thyroid artery [2].

2.7.1. LAB MEDIA: File name: 68460-1.mp4: Timestamps: 52:31-52:50

2.7.2. LAB MEDIA: File name: 68460-1.mp4: Timestamps: 54:15-54:20, 54:27-54:32, 54:42-54:51

2.8. Now, load the surgical forceps into the left trocar labeled Arm 1. Then, insert the 5-millimeter Maryland Bipolar Coagulator into the right trocar labeled Arm 3 [1].

2.8.1. LAB MEDIA: File name: 68460-1.mp4: Timestamps: 59:10-59:20

2.9. Confirm the triangle of recurrent laryngeal nerve entry, with the medial border being the inner edge of the parathyroid gland, the lateral border being the thyroid gland capsule, and the posterior border formed by the inferior constrictor muscle of the larynx. Identify the critical landmark where the recurrent laryngeal nerve enters the larynx posterior to the cricothyroid joint [1].

2.9.1. LAB MEDIA: File name: 68460-1.mp4: Timestamps: 01:03-10-01:03:40

2.10. Compress the bleeding site with surgical gauze for exactly 3 seconds [1].

2.10.1. LAB MEDIA: File name: 68460-2.mp4 Timestamps: 00:00-00:04

2.11. Then, apply the Maryland Bipolar Coagulator to lyse the fibrofatty tissue. Trace the recurrent laryngeal nerve along its course and continue dissecting until the laryngeal entry point is visible [1].

2.11.1. LAB MEDIA: File name: 68460-2.mp4: Timestamps: 00:19-00:38

2.12. Confirm the recurrent laryngeal nerve entry point at the cricothyroid joint. Dissect the recurrent laryngeal nerve and the thyroid capsule using Maryland forceps [1]. Mobilize the recurrent laryngeal nerve in an inferomedial direction along its anatomical path. Preserve 1 to 2 millimeters of perineural tissue around the nerve throughout the dissection [2].

2.12.1. LAB MEDIA: File name: 68460-2.mp4: Timestamps: 01:40-02:00

2.12.2. LAB MEDIA: File name: 68460-2.mp4: Timestamps: 02:00-02:16

2.13. Using unipolar scissors, dissect the Ligament of Berry starting at the junction between the recurrent laryngeal nerve and the trachea. Follow the curvature of the thyroid capsule and advance at a rate of 5 to 7 millimeters per second [1].

2.13.1. LAB MEDIA: File name: 68460-2.mp4 Timestamps: 09:39-10:00

2.14. Finally, dissect the thyrothymic ligament and the anterior thyroid fascia to expose and divide the inferior thyroid pole vessels. Keep the ultrasonic blade parallel to the nerve while dissecting the thyroid lobe and central lymph nodes [1-TXT].

2.14.1. LAB MEDIA: File name: 68460-2.mp4: Timestamps: 29:40-30:00, 30:20-30:30
TXT: Activate the ultrasonic blade in 2 s bursts, with 3 s cooling

Results

3. Results

3.1. Preoperative flexible laryngoscopy conducted 48 hours before surgery confirmed normal bilateral vocal cord mobility in all patients [1].

3.1.1. LAB MEDIA: Table 1. *Video editor: Highlight the column “Preoperative laryngoscopy results”*

3.2. Postoperative follow-ups at 1 week [1], 1 month [2], and 6 months showed no evidence of vocal cord paralysis or dysphonia in any patients [3].

3.2.1. LAB MEDIA: Table 1. *Video editor: Highlight the column “Voice 1 week after surgery”*

3.2.2. LAB MEDIA: Table 1. *Video editor: Highlight the column “Voice 1 month after surgery”*

3.2.3. LAB MEDIA: Table 1. *Video editor: Highlight the column “Voice 6 months after surgery”*

1. **trocar**

IPA: /'troʊkər/

Phonetic: TROH-kar

2. **monopolar**

IPA: /ˌmoʊnoʊˈpoʊlər/

Phonetic: MOH-noh-POH-lur

3. **curved scissors**

“curved” IPA: /kɜrvd/ — kurvd

“scissors” IPA: /'sɪzərz/ — SIZ-erz

4. **linea alba cervicis**

“linea alba” IPA: /'lɪniə 'ælbə/ — LIN-ee-uh AL-buh

“cervicis” IPA: /'sɜrvɪsɪs/ — SUR-vih-sis

5. **sternohyoid**

IPA: /ˌstɜrnoʊˈhaɪɔɪd/

Phonetic: STERN-oh-HY-oid

6. **parenchyma (thyroid parenchyma)**
IPA: /pə'reŋkɪmə/
Phonetic: puh-REN-ki-muh
7. **mitoxantrone hydrochloride**
“mitoxantrone” IPA: /ˌmaɪtə'zænˌtroʊn/ — MY-tuh-ZAN-trone
“hydrochloride” IPA: /ˌhaɪdroʊ'klɔraɪd/ — hy-droh-KLOR-ide
8. **absorbable sutures**
“absorbable” IPA: /əb'zɔrbəbəl/ — uh-ZORB-uh-buhl
“sutures” IPA: /'su:tʃərz/ — SOO-cherz
9. **cricothyroid**
IPA: /ˌkrɪkoʊ'θaɪrɔɪd/
Phonetic: kri-koh-THY-roid
10. **inferomedial**
IPA: /ˌɪnfəroʊ'miːdiəl/
Phonetic: in-fer-oh-MEE-dee-uhl
11. **ultrasonic blade**
“ultrasonic” IPA: /ˌʌltrə'sɒnɪk/ — uhl-truh-SAW-nik
“blade” IPA: /bleɪd/ — blAYd
12. **fibrofatty**
IPA: /ˌfaɪbroʊ'fæti/
Phonetic: FY-broh-FAT-ee