Future directions for transoral endoscopic thyroid surgery.

Instruções futuras para cirurgia transroal endoscópica de tireoide.

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LETTER TO THE EDITOR

We have read with interest the recent work from Tesseroli *et al.* and Callardo-Molina's commentary[1,2]. Certainly, the colleagues must be praised for the study they carried out and proper appraisals[1,2].

The transoral approach represents a good direction for thyroid endoscopic surgery[1-5]. Endoscopes did facilitate the advent of minimally invasive thyroid surgery. By providing a wide-angle view into the neck and placing illumination in the line of sight, with the additional option of a 30° or 45° off-axis view, the endoscope provides clear visualization of structures that are obscured from view with the direct line of sight of the surgeon eye[2]. Endoscopy bring clearer and magnified visualization of the neck's recesses, including the tracheal-esophageal grove, the central compartment lymph nodes (both level 6 and 7), the entire course of the inferior and superior laryngeal nerves, the parathyroid glands. Endoscopes also allow the simultaneous use of other instruments, such as forceps, Maryland dissectors, energy based devices, sponge, especially useful during refined dissection or haemostasis. Furthermore, specialized instruments with curved tips have been developed.

Despite growing enthusiasm, the endoscopic transoral thyroid surgery is not currently the standard of care and is not accepted as a feasible option by all endocrine surgeons[3,4]. One of the principal challenge is instrument interferences. During traditional surgery, instruments in the nondominant hand usually maintain retraction and perform suction to remove blood from the operative field, while the dominant hand performs more delicate maneuvers. Two more assistants support retraction and bloodless control. Surgical techniques in open thyroid surgery have been developed for this three-surgeons technique. As such, currently available instruments are not necessarily optimized for the endoscopic environment. Moreover, the learning curve for many surgeons is long and, even with experience, many aspects of endoscopy in thyroid surgery remain challenging[5].

Instruments for retraction, dissection, cutting, coagulation, moving a swab into the intended place, removal specimens, technological advances in the design of the endoscope, camera, and suction-dissection instruments have led to incremental advances in the surgeon's ability to perform more difficult cases using endoscopic techniques. To further advance the development of endoscopic thyroid technology and instruments to facilitate endoscopy, it is important to have a detailed understanding of the limitations of current instruments and the specific challenges that surgeons face. Endocrine surgeons need better instrumentation to facilitate specific challenges posed by endoscopy. Further, surgeons performing greater proportions of surgeries using endoscopy will experience different challenges than those who use endoscopy less frequently. Similarly, surgeons who use instrument sets that are specialized for endoscopy may experience different challenges than those who do not[6,7].

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The following factors add difficult to the endoscopic transoral thyroid surgery: it is a two-handed surgery (no third assistant, no retractor), efficiency/operative time, technical difficulty, cost, managing bleeding. The nature of the technical difficulties faced by thyroid surgeons or the influence of surgical instruments on these difficulties need to be studied in prospective trials. Most instruments derive from non-thyroidal procedures (i.e. laparoscopy)[8]. There is a request for measuring the degree to which surgeons experience specific challenges during surgery to guide the development of thyroid-endoscopic instruments that could facilitate such surgery. The authors of this commentary have a strong perception of the need for improved instruments, particularly to facilitate dissection in areas that are beyond the reach of conventional instruments but can be observed clearly with endoscopy. This perception might be stronger in surgeons who complete more procedures endoscopically. Certainly, future instrument development should focus on instruments that improve our ability to reach structures and facilitate dissection, and removal of greater thyroid gland and lymph nodes[9].

Bleeding control

Management of intraoperative bleeding is also as a significant challenge when performing transoral endoscopic surgery, especially for bleeding of the upper thyroid vessel. Intraoperative bleeding may impair surgical field clarity and obscure target tissues, which may lead to increased rates of residual thyroid tissue in the case of inferior thyroid vessel bleeding[8]. To manage this, techniques such as hypotensive anesthesia, patient positioning, local vasoconstrictors, and atraumatic surgical techniques have been employed. In addition, specialized instrument sets need to be developed specifically to improve bleeding management in endoscopic thyroid surgery, incorporating a functional tip with a rotatable suction shaft to allow for cutting, dissection, or tissue elevation while suctioning. An instrument combining suction with an additional function, such as dissecting or cauterizing, would be beneficial. These quantitative and qualitative analyses suggest that current specialized thyroid endoscopic instruments do not adequately manage intraoperative bleeding[7].

Endoscope technology

Keeping the endoscope lens clean is another challenge. Fogging and smearing of the endoscope tip is a challenge during endoscopic thyroid surgery, making surgeons pause surgery, remove the endoscope from the neck, and wipe it clean on a defog pad periodically. This can be time consuming. On the other hand, frequent removal of the endoscope from the field may be beneficial in preventing heating from the light source and, thus, reducing the risk of thermal injury of the skin above. An endoscope holder might be advantageous. One major disadvantage of a static endoscope is that small adjustments cannot readily be made to optimize the angle of view or to allow safe introduction and manipulation of instruments in the neck. Potential safety hazards include the risk of thermal injury. An additional benefit of holding the endoscope is that small movements can be made to change viewing angle and enhance perception.

CONCLUSION

Characterizing technical difficulties faced by endocrine surgeons in performing transoral thyroidectomy and/or lymph node dissection is important. We identify a need for better instruments to address the following challenges: 1) bleeding control, 2) keeping the endoscope lens clean, 3) cutting and/or removing specimens, 4) reaching structures visualized by the endoscope, 5) dissection of the recurrent laryngeal nerve, and 6) moving and positioning a sponge into the intended place. We perceive a need for improved instruments to help with all of these challenges. Current specialized instrument sets inadequately address them. Through highlighting some of the challenges experienced when performing this procedure, this commentary direction for future instrument design to enhance further development of this minimally invasive surgical technique.

REFERENCES

1. Tesseroli MAS, Spagnol M, Sanabria A. Transoral endoscopic thyroidectomy by vestibular approach (TOETVA): initial experience in Brazil. Rev Col Bras Cir. 2018;45(5):e1951.
2. Gallardo-Molina N. The technique and variants of transoral endoscopic thyroidectomy by vestibular approach (TOETVA) to reduce complications. Rev Col Bras Cir. 2019;46(1):e2090.
3. Russell JO, Razavi CR, Shaear M, Chen LW, Lee AH, Ranganath R, et al. Transoral vestibular thyroidectomy: current state of affairs and considerations for the future. J Clin Endocrinol Metab. 2019 Mar 12. pii: jc.2019-00116. doi: 10.1210/jc.2019-00116.
4. Juarez MC, Ishii L, Nellis JC, Bater K, Huynh PP, Fung N, et al. Objectively measuring social attention of thyroid neck scars and transoral surgery using eye tracking. Laryngoscope. 2019 Mar 22. doi: 10.1002/lary.27933.
5. You JY, Kim HY, Chai YJ, Kim HK, Anuwong A, Tufano RP, et al. Transoral robotic thyroidectomy versus conventional open thyroidectomy: comparative analysis of surgical outcomes in thyroid malignancies. J Laparoendosc Adv Surg Tech A. 2019;29(6):796-800. Epub 2019 Feb 20.
6. Jongekkasit I, Jitpratoom P, Sasanakietkul T, Anuwong A. Transoral endoscopic thyroidectomy for thyroid cancer. Endocrinol Metab Clin North Am. 2019;48(1):165-180.
7. Sun H, Dionigi G. Applicability of transoral robotic thyroidectomy: Is it the final solution? J Surg Oncol. 2019;119(4):541-2.
8. Kim HK, Chai YJ, Dionigi G, Berber E, Tufano RP, Kim HY. Transoral robotic thyroidectomy for papillary thyroid carcinoma: perioperative outcomes of 100 consecutive patients. World J Surg. 2019;43(4):1038-46.
9. Chen S, Zhao M, Qiu J. Transoral vestibule approach for thyroid disease: a systematic review. Eur Arch Otorhinolaryngol. 2019;276(2):297-304.

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