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Vessel Ligation in Transoral Robotic Surgery: Survey of the American Head and Neck Society

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VESSEL LIGATION IN TRANSORAL ROBOTIC SURGERY: SURVEY OF THE AMERICAN HEAD AND NECK SOCIETY

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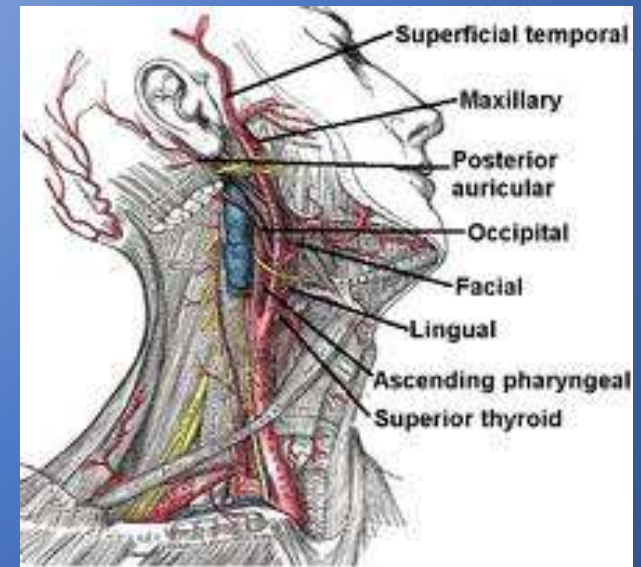
WHAT IS TORS?



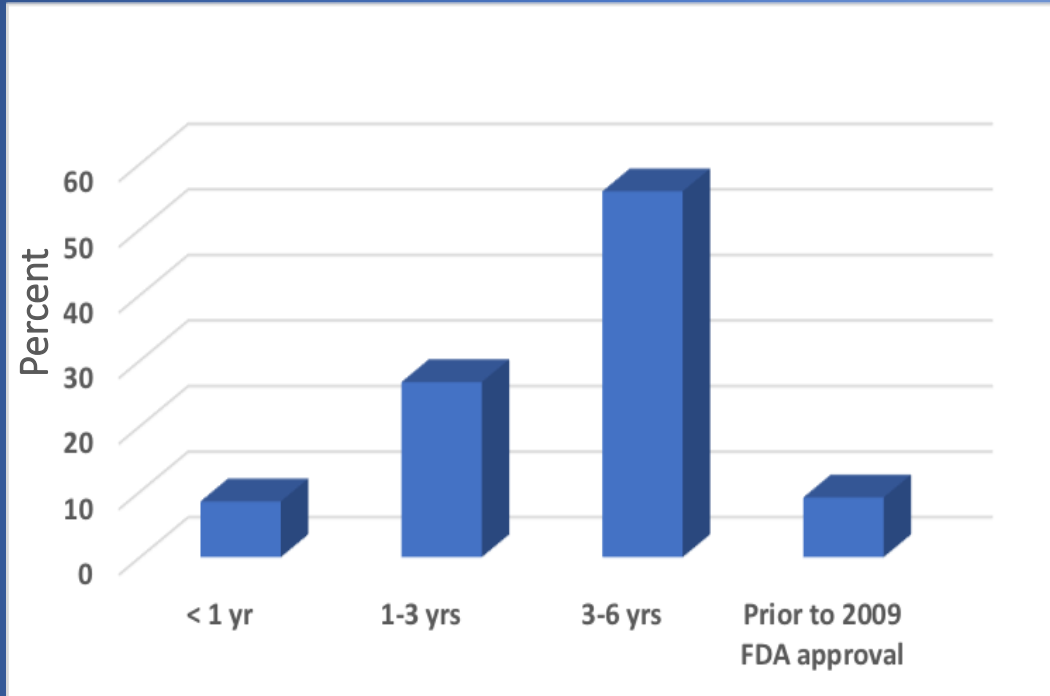
- Transoral Robotic Surgery (TORS) is a minimally invasive approach to the treatment of oral, throat, and skull base cancers
- Contrast to traditional open surgical approaches, primary defects in TORS are left open to heal by secondary intention
- Subsequent to its emergence, a variety of reports demonstrated that the risk of postoperative hemorrhage range from 3.6-18.5%
- Neck vessel ligation has been an increasingly adopted technique as a means to prophylactically decrease the risk of severe life-threatening bleeds

STUDY DESIGN

- We performed a survey in which 165 members of AHNS completed 10 questions focusing on their experiences with TORS
- Questions included length of time performing TORS, number of TORS completed since residency/fellowship and per year, reasons for vessel ligation, changes in ligation practices, as well as incidence of hemorrhage

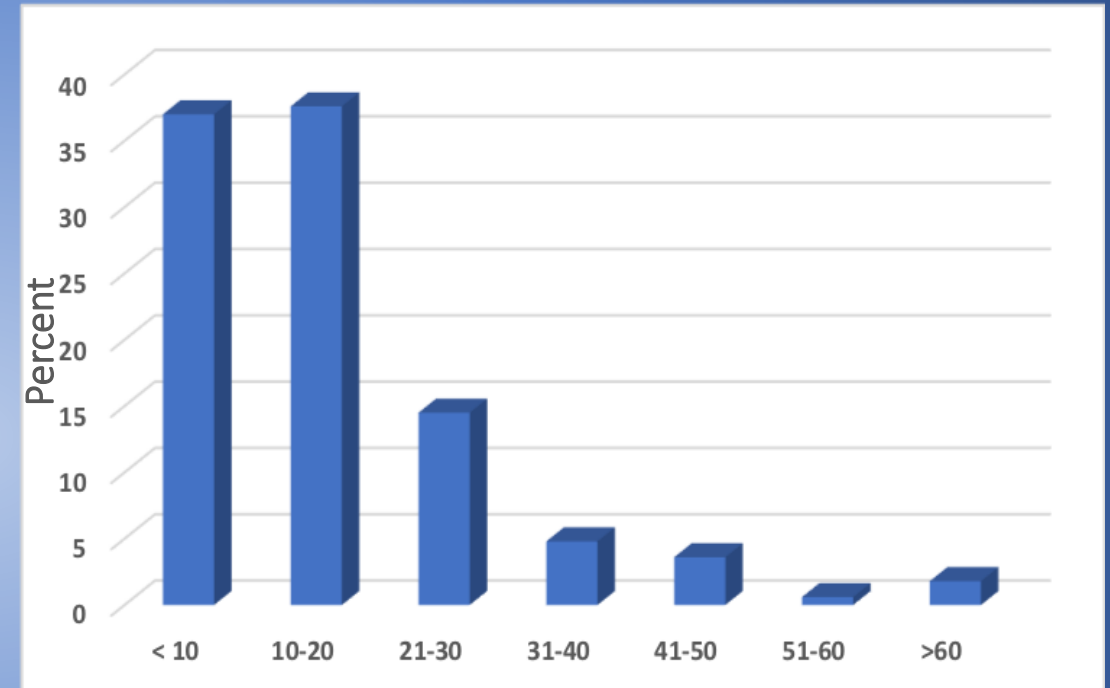


How long have you performed TORS?



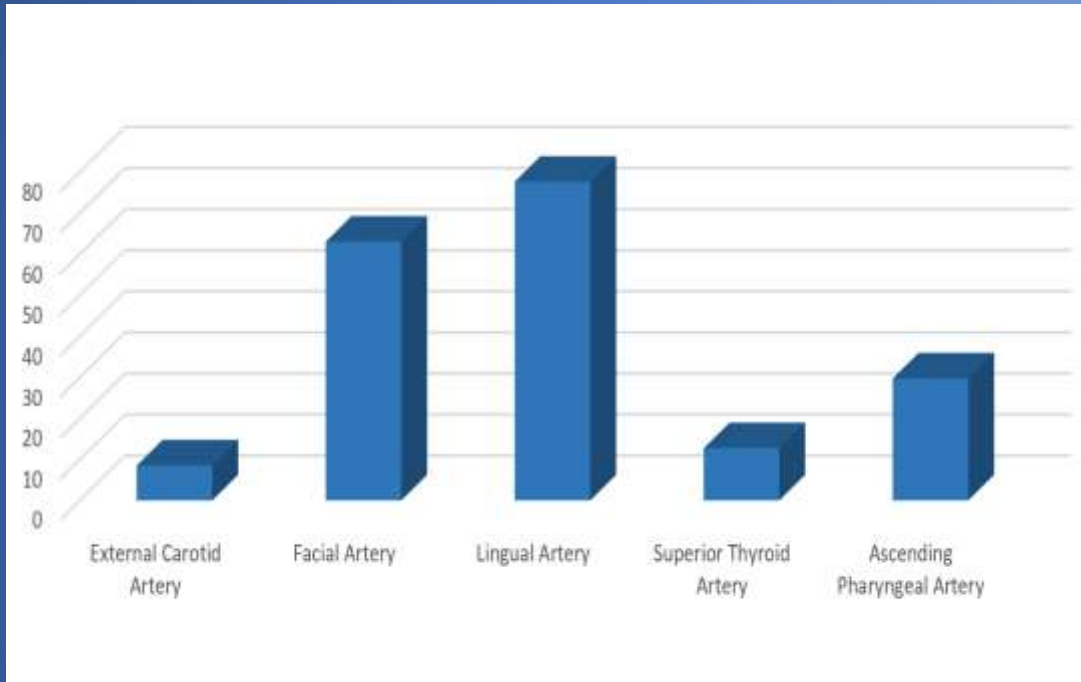
- 55.8% reported 3-6 years
- 26.7% reported 1-3 years
- 8.5% reported <1 year
- 9.1% reported prior to 2009 FDA approval

How many TORS cases for cancer-related diagnosis per year?



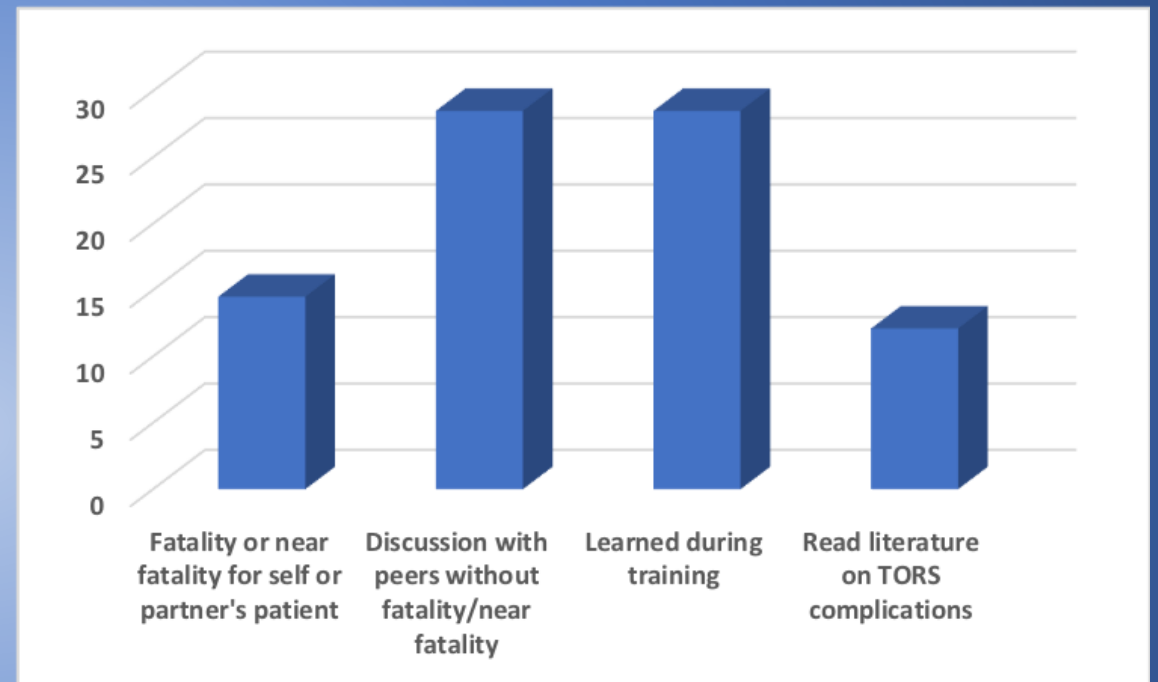
- 38% reported performing 10-20 procedures per year
- 14% reported performing 21-30 per year
- 37% reported performing <10 per year

Which vessels are ligated?



- 77.6% reported ligating the lingual artery
- 63% reported ligating the facial artery
- 29.7% reported ligating the ascending pharyngeal artery
- 12.7% reported ligating the superior thyroid artery
- 8.5% reported ligating the external carotid artery

Reasons for vessel ligation



- 28.5% due to discussion with peers without personally experiencing bad outcome
- 14.5% due to fatality/near fatality in their own or partner's patient
- 28.5% adopted it from training

RESULTS CONT'D.

- Unligated vessels:
 - Life-threatening bleeds (Grade IV) in 21.2% of cases
 - Death secondary to bleed (Grade V) in 9.1% of cases
 - Bleeding that was easily managed in the OR (Grade III) in 42% of cases
- Ligated vessels:
 - Life-threatening bleeds (Grade IV) in 6.1% of cases
 - Death secondary to bleed (Grade V) in 1.8% of cases
 - Bleeding that was easily managed in the OR (Grade III) in 33.3% of cases

DISCUSSION

- Although there was a strong agreement amongst the surgeons with regards to prophylactic vessel ligation, there was an appreciable variation when choosing which vessel to ligate, the most common being the lingual artery
- Of note, 15% of respondents did not incorporate vessel ligation into their practice, citing futility in light of the bilateral blood supply

WHAT'S IN THE LITERATURE?

Analysis of postoperative bleeding and risk factors in transoral surgery of the oropharynx.

Pollei TR¹, Hinni ML, Moore EJ, Hayden RE, Olsen KD, Casler JD, Walter LC.

Author information

Abstract

IMPORTANCE: With an increasing incidence of oropharyngeal carcinoma and prevalence of transoral surgical techniques, postoperative bleeding, with its associated risk factors, deserves evaluation.

OBJECTIVE: To classify and review postoropharyngectomy hemorrhage rates and associated risk factors.

DESIGN, SETTING, AND PARTICIPANTS: Single-institution, multicenter retrospective medical chart review analyzing surgical procedures in 906 patients treated with transoral surgery for oropharyngeal carcinoma at a tertiary care, academic referral center from 1994 to 2012. Tumor stage, previous treatment, resection method, and transcervical external carotid branch ligation were analyzed in relationship to postoperative hemorrhage rate, and severity. A novel classification system was created, grading bleeding episodes as minor, intermediate, major, or severe based on management method and related sequelae.

RESULTS: Postoperative bleeding occurred in 5.4% of patients (49 of 906) with 67.3% of these (33 of 49) requiring operative intervention. Severe bleeding episodes were very rare (1.1% of patients). Transcervical external carotid system vessel ligation was performed with the primary resection in 15.6% of patients with no overall difference in bleeding rate or severity of bleeding in patients who underwent ligation vs those who did not ($P = .21$ and $P = .66$, respectively). Vessel ligation was performed more frequently in patients with a higher T stage ($P = .002$). In previously treated patients, severity of bleeding was decreased if vessels were ligated ($P > .05$). Higher T-stage tumors had a higher bleeding rate ($P = .02$). Bleeding rates were similar between those treated with laser (5.6%) and robotic (5.9%) oropharyngectomy ($P = .80$); however, patients with significantly higher T-stage tumors were treated with laser vs robot techniques ($P < .001$).

CONCLUSIONS AND RELEVANCE: Transoral resection of oropharyngeal carcinoma is safe, and severe life-threatening hemorrhage is rare. Although transcervical vessel ligation did not result in an overall decrease in bleeding rate, there is a trend toward reduced postoropharyngectomy bleeding severity with ligation. We recommend ligation for higher T-stage tumors, primary tonsil tumors, and patients undergoing revision surgery.

Analysis of post-transoral robotic-assisted surgery hemorrhage: Frequency, outcomes, and prevention.

Mandal R¹, Duvvuri U^{1,2}, Ferris RL¹, Kaffenberger TM³, Choby GW¹, Kim S¹.

Author information

Abstract

BACKGROUND: Transoral robotic-assisted surgery (TORS) carries a small, but not insignificant, risk of life-threatening postsurgical hemorrhage. The purpose of this study was to analyze all post-TORS hemorrhagic events at our institution to establish preventative recommendations.

METHODS: We conducted a retrospective review of 224 consecutive patients who underwent TORS for any indication at a single tertiary care institution.

RESULTS: Twenty-two patients ($n = 22$; 9.82%) had varying degrees of postoperative bleeding. An impaired ability to protect the airway at the time of hemorrhage increased the rate of severe complications. Prophylactic transcervical arterial ligation did not significantly decrease overall postoperative bleeding rates (9.1% vs 9.9%; $p = 1.00$); however, there was a trend toward decreased hemorrhage severity in prophylactically ligated patients (3.0% vs 7.3%; $p = .7040$).

CONCLUSION: Prophylactic transcervical arterial ligation may reduce the incidence of severe bleeding following TORS. Post-TORS patients displaying an inability to protect the airway should be strongly considered for prophylactic tracheostomy to assist airway protection. © 2015 Wiley Periodicals, Inc. *Head Neck* 38: E776-E782, 2016.

LIMITATIONS AND FUTURE WORK

- As with any survey, there is potential for bias
- The survey focused on members of AHNS, who may not be representative of other surgeons
- Future work should focus multi-center protocols for vessel ligation incorporating larger numbers of cases to obtain more powerful data
- The choice of which vessels to ligate and their relative associations with risk of hemorrhage should be further explored as it remains controversial and subjective

QUESTIONS?

Thank you!

REFERENCES

- Yeh D, Tam S, Fung K, et al. Transoral robotic surgery vs. radiotherapy for management of oropharyngeal squamous cell carcinoma – A systematic review of the literature. *Eur J Surg Oncol*. 2015;41(12):1603-1614. doi:10.1016/j.ejso.2015.09.007.
- Gildener-Leapman N, Kim J, Abberbock S, et al. Utility of up-front transoral robotic surgery in tailoring adjuvant therapy. *Head & Neck*. 2016;38(8):1201-1207. doi:10.1002/hed.24390.
- Broglie MA, Soltermann A, Haile SR, Huber GF, Stoeckli SJ. Human papilloma virus and survival of oropharyngeal cancer patients treated with surgery and adjuvant radiotherapy. *Eur Arch Otorhinolaryngol*. 2014;272(7):1755-1762. doi:10.1007/s00405-014-3099-y.
- Weinstein GS, O'Malley BW, Cohen MA, Quon H. Transoral Robotic Surgery for Advanced Oropharyngeal Carcinoma. *Arch Otolaryngol Head Neck Surg*. 2010;136(11):1079. doi:10.1001/archoto.2010.191.
- Cohen MA, Weinstein GS, O'Malley BW, Feldman M, Quon H. Transoral robotic surgery and human papillomavirus status: Oncologic results. *Head & Neck*. 2010;33(4):573-580. doi:10.1002/hed.21500.
- Almeida JRD, Moskowitz AJ, Miles BA, et al. Cost-effectiveness of transoral robotic surgery versus (chemo)radiotherapy for early T classification oropharyngeal carcinoma: A cost-utility analysis. *Head & Neck*. 2015;38(4):589-600. doi:10.1002/hed.23930
- Laccourreye O, Malinvaud D, Holostenco V, Ménard M, Garcia D, Bonfils P. Value and limits of non-robotic transoral oropharyngectomy for local control of T1-2 invasive squamous cell carcinoma of the tonsillar fossa. *Eur Ann Otorhinolaryngol Head Neck Dis*. 2015;132(3):141-146. doi:10.1016/j.anorl.2015.03.010.
- Vergez S, Lallemand B, Ceruse P, et al. Initial Multi-institutional Experience with Transoral Robotic Surgery. *Otolaryngol Head Neck Surg*. 2012;147(3):475-481. doi:10.1177/0194599812443221.
- Aubry K, Vergez S, Mones ED, et al. Morbidity and mortality revue of the French group of transoral robotic surgery: a multicentric study. *J Robot Surg*. 2015;10(1):63-67. doi:10.1007/s11701-015-0542-z.
- Asher SA, White HN, Kejner AE, Rosenthal EL, Carroll WR, Magnuson JS. Hemorrhage after Transoral Robotic-Assisted Surgery. *Otolaryngol Head Neck Surg*. 2013;149(1):112-117. doi:10.1177/0194599813486254.
- Pollei TR, Hinni ML, Moore EJ, et al. Analysis of Postoperative Bleeding and Risk Factors in Transoral Surgery of the Oropharynx. *JAMA Otolaryngol Head Neck Surg*. 2013;139(11):1212. doi:10.1001/jamaoto.2013.5097.
- Mandal R, Duvvuri U, Ferris RL, Kaffenberger TM, Choby GW, Kim S. Analysis of post-transoral robotic-assisted surgery hemorrhage: Frequency, outcomes, and prevention. *Head & Neck*. 2015;38(S1). doi:10.1002/hed.24101.
- Zenga J, Suko J, Kallogjeri D, Pipkorn P, Nussenbaum B, Jackson RS. Postoperative hemorrhage and hospital revisit after transoral robotic surgery. *Laryngoscope*. 2017;127(10):2287-2292. doi:10.1002/lary.26626.
- Gleysteen J, Troob S, Light T, et al. The impact of prophylactic external carotid artery ligation on postoperative bleeding after transoral robotic surgery (TORS) for oropharyngeal squamous cell carcinoma. *Oral Oncol*. 2017;70:1-6. doi:10.1016/j.oraloncology.2017.04.014.
- Weinstein GS, O'Malley BW, Magnuson JS, et al. Transoral robotic surgery: A multicenter study to assess feasibility, safety, and surgical margins. *Laryngoscope*. 2012;122(8):1701-1707. doi:10.1002/lary.23294.
- Genden EM, Desai S, Sung C-K. Transoral robotic surgery for the management of head and neck cancer: A preliminary experience. *Head & Neck*. 2009;31(3):283-289. doi:10.1002/hed.20972.
- Almeida JRD, Genden EM. Robotic Surgery for Oropharynx Cancer: Promise, Challenges, and Future Directions. *Curr Oncol Rep*. 2012;14(2):148-157. doi:10.1007/s11912-012-0219-y.
- Dean NR, Rosenthal EL, Carroll WR, et al. Robotic-Assisted Surgery for Primary or Recurrent Oropharyngeal Carcinoma. *Arch Otolaryngol Head Neck Surg*. 2010;136(4):380. doi:10.1001/archoto.2010.40.