Robotic Approaches to the Pharynx: Tonsil Cancer

Daniel Brickman, MD, Neil D. Gross, MD*

KEYWORDS

• Robotic surgery • Transoral resection • Partial pharyngectomy • Tonsil cancer
• Squamous cell carcinoma

KEY POINTS

- Transoral robotic surgery (TORS) for tonsil cancer is an effective alternative to open surgery.
- Robotic lateral oropharyngectomy requires thorough understanding of oropharyngeal internal, parapharyngeal, and vascular anatomy.
- Preliminary reports have shown similar oncologic outcomes compared with historical surgical and nonsurgical treatments.
- The functional results of TORS compared with open surgical approaches show a decreased rate of permanent gastrostomy and tracheostomy tube dependence.

Videos of transoral robotic surgery (TORS) accompany this article at http://www.oto.theclinics.com/

INTRODUCTION

It was estimated that 41,380 individuals (29,620 men and 11,760 women) would be diagnosed with and 7890 men and women would die of squamous cell carcinoma (SCC) of the oral cavity and pharynx in 2013.[1] Although the overall incidence of oral cavity and oropharynx SCC has been decreasing by approximately 1% per year, the incidence continues to increase in younger patients, because of the increasing incidence of human papillomavirus (HPV)-associated oropharyngeal SCC.[2] Treatment of oropharyngeal SCC is particularly challenging, because this site is involved in the crucial functions of breathing, deglutition, and speech. Impairment of any of these functions may significantly affect quality of life. Thus, both oncologic and functional outcomes are important considerations in the treatment of oropharyngeal SCC, including cancers that involve the tonsil.

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Department of Otolaryngology - Head and Neck Surgery, Oregon Health and Science University, Mail Code: PV01, 3181 Southwest Sam Jackson Park Road, Portland, OR 97239-3098, USA
* Corresponding author.
E-mail address: grossn@ohsu.edu

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Traditional treatment of oropharyngeal cancers centered on surgical resection, which was often associated with significant morbidity. Several surgical options are available, with different exposures and associated morbidities. Mandibulotomy or mandibulectomy allow broad access to the oropharynx, but complication rates range from 10% to 60% and include difficulty with speech and swallowing, malocclusion, temporomandibular joint pain, and cosmetic deformity.[3–5] Lateral pharyngotomy, transhyoid pharyngotomy, or suprahyoid pharyngotomy may be used as an alternative to mandible splitting procedures. Patients undergoing pharyngotomy are at increased risk of pharyngocutaneous fistula formation and severe dysphagia, which has been reported to occur in 7% to 38% of patients.[6–8] Transoral resection provides the most direct route to the oropharynx, with the potential for decreased morbidity. The primary disadvantage of the transoral approach can be related to exposure, because of the need for direct line of sight. Many tonsil and pharyngeal cancers are difficult or impossible to reach through the mouth under direct vision. Acceptable oncologic outcomes have been reported using each of these approaches in selected patients (**Table 1**).[9]

Because of the difficult of exposure and potential for surgery-related morbidity, the treatment of oropharyngeal SCC in recent decades has evolved to a primary nonsurgical approach, namely chemoradiation. The Veterans Affairs study in 1991[10] heralded an era of organ preservation strategies, which have since been extrapolated from the larynx to the oropharynx. However, surgical approaches and techniques in head and neck cancer surgery have evolved dramatically. There is increased attention to functional preservation and use of minimally invasive procedures wherever feasible without compromising oncologic outcomes. Less radical procedures with minimal collateral tissue damage are preferred to decrease postoperative complications and to improve quality of life.

Several studies[11–14] have shown that transoral robotic surgery (TORS) may be an effective alternative to open surgery. The high-resolution, magnified, three-dimensional view of the operative field provided by TORS allows for excellent visualization of the target anatomy. TORS may overcome some limitations in exposure of surgical anatomy inherent in the direct line of site approach used in transoral laser microsurgery with its use of angled binocular endoscopic visualization. Additional advantages of TORS may include improved cosmesis, decreased length of hospital stay, and a low rate of gastrostomy tube dependence, improved long-term preservation of swallowing function, and ability to deintensify adjuvant therapy (**Table 2**).[15,16] High rates of negative surgical margins have been reported, which correlate well with local disease control (**Table 3**).[11,12,14]

TREATMENT GOALS

Current indications for robotic lateral oropharyngectomy include disease that is surgically resectable with negative margins. TORS is best suited for early stage SCC of the tonsil (T1-2, N0-1) with the goal of avoiding radiation therapy. In addition, advanced staged patients with low volume disease (T1-3, N1-2b) can be treated with the goal of avoiding adjuvant chemotherapy with planned postoperative radiation. Using these guidelines, the incidence of routine tracheotomy and prolonged gastrostomy tube use should be low.

PATIENT SELECTION

A thorough knowledge of the anatomy and appropriate robotic training are requisite to successful robotic lateral oropharyngectomy. Adequate exposure is also paramount. Before consideration of patients, potential deleterious patient factors must be