

Transoral Robotics Supracricoid Hemilaryngopharyngectomy

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ABSTRACT

Traditional open surgical approaches for hypopharyngeal carcinomas carry a great risk of developing treatment-related morbidity. Transoral robotic surgery (TORS) is an established treatment modality for head and neck cancer and can minimise this morbidity. Owing to the access and improved flexibility of the robotic system, hypopharyngeal tumours can now be reached and successfully treated with organ preservation, resulting in adequate function, especially in swallowing and phonation. In this study, we describe the surgical technique and clinical and oncological results for supracricoid hemilaryngopharyngectomy performed by transoral robotic surgery (TORS SCHLP) in a patient with hypopharyngeal carcinoma extending to the arytenoid mucosa. An interarytenoid sagittal cut extending to the cricoid cartilage was made. The epiglottis was split via a laterally placed vertical incision at the tumour-bearing side, extending to the anterior commissure. The inner perichondrium of the thyroid cartilage was peeled off. A horizontal cut in the postcricoid region was made, paying close attention to the safe surgical margins. A final cut, parallel to the cricoid cartilage, was made using curved scissors and the tumour was removed en bloc. In conclusion, TORS SCHLP should be considered for resectable tumours to avoid the undesirable consequences of open surgical resection.

Keywords: Robotic surgery, hypopharyngeal cancer, TORS

INTRODUCTION

Hypopharyngeal cancers have the lowest overall survival rates among all head and neck cancers. They often present in advanced stages and require comprehensive surgical resections, primary chemoradiotherapy, or a combination of both. Over the past decades, a definitive surgical approach (mostly total laryngopharyngectomy) has been the mainstay of treatment. However, the open surgical approach is highly invasive and often complicated by postoperative wound infection, phonation, and swallowing problems (1). Therefore, the treatment paradigm for many pharyngeal cancers has gradually shifted from open surgery to nonsurgical radiotherapy or chemoradiotherapy. However, late complications of radiation therapy, such as neck stiffness, dysphagia, and xerostomia, greatly reduce patients' quality of life (2).

With advances in technology, today, an increasing number of pharyngeal cancers are being detected at earlier stages (3). For selected patients with early-stage hypopharyngeal cancer, laryngeal preservation surgery can be performed with adequate

functional results (4). Supracricoid hemilaryngopharyngectomy (SCHLP) is a well-defined conservative technique for patients with early carcinoma of the pyriform sinus (4). In this technique, resection of the medial wall of the pyriform sinus and hemilarynx is accomplished with good local control (4). To decrease treatment-related morbidities and increase postoperative quality of life, minimally invasive techniques such as transoral laser microsurgery (TLM) have been used for the treatment of hypopharyngeal cancers (5). The technique of TLM often necessitates the surgeon not only to split the tumour but also to cut the tumour into pieces. Surgeons often have the feeling of operating with inadequate dexterity in a dark hole. The inadequate operative field of view and tough learning curve lead to the disadvantages of TLM for laryngopharyngeal cancer treatment.

Transoral robotic surgery (TORS) is one of the options and has proven to be an effective, minimally invasive surgical technique for hypopharyngeal cancers (6). It has the advantage of good visualisation and manipulation of the tissue to facilitate surgical resection. The 360° motion of the robotic arms provides

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excellent access for cutting tissues that cannot be achieved with endoscopic or transoral laser surgery. Optimal transoral exposure is essential for the surgery. Patients eligible for TORS must be good candidates for endoscopic laryngeal conservation surgery. Relative or strict contraindications for TORS are vocal fold fixation, invasion of the pyriform sinus apex, and invasion of the thyroid cartilage inner perichondrium.

To the best of our knowledge, this is the first report of supracricoid hemilaryngopharyngectomy performed by transoral robotic surgery (TORS SCHLP).

CASE PRESENTATION

The patient was a 76-year-old man with a history of smoking (50 pack-years) who presented with globus sensation and throat discomfort. Upon evaluation, a cT1N0M0 lesion was identified, arising from the medial wall of the right pyriform sinus, extending anteriorly, and involving the aryepiglottic fold and the lateral mucosa of the right arytenoid. (Figure 1A). Vocal fold mobility was normal. Preoperative imaging showed no lymph node invasion. The diagnosis of squamous cell carcinoma was confirmed after hypopharyngeal biopsy.

Transoral robotic supracricoid hemilaryngopharyngectomy (TORS SCHLP) with ipsilateral functional neck dissection was performed at Umraniye Research and Training Hospital, Department of Otolaryngology Clinic. Informed consent was obtained from the patient. The patient's demographic and clinical characteristics are presented in Table 1.

SURGICAL TECHNIQUE

The airway was secured with a standard orotracheal tube. The patient was positioned for TORS. The larynx and hypopharynx were exposed using an FK-WO retractor (Gyrus ACMI, Southborough, MA). The daVinci Xi Surgical System (Intuitive Surgical, Sunnyvale, CA) was positioned on the patient's right side. A 30-degree robotic camera was placed in the midline with 8 mm Hot Shears™ monopolar curved scissor and ProGrasp™ forceps on the lateral arms. An interarytenoid sagittal cut extending to the cricoid cartilage was made. The

epiglottis was split via a laterally placed vertical incision at the tumour-bearing side, extending to the anterior commissure. The superior laryngeal vessel was coagulated with a harmonic scalpel and cut. Upon reaching the thyroid cartilage, the dissection continued posteriorly along its inner surface. After incising the perichondrium, the inner perichondrium of the thyroid cartilage was peeled off to ensure a safe margin in the anterolateral portion. A horizontal cut in the postcricoid region, starting from the interarytenoid space and extending to the vertical epiglottic incision, was made, paying close attention to safe surgical margins at this time. The tumour specimen was grasped with ProGrasp forceps. A final cut, parallel to the cricoid cartilage, was made using curved scissors and the tumour was excised en bloc. The surgical margins were sent to the pathologist for frozen sections. Once it was confirmed that the margins were clear, the procedure was completed.

RESULTS

TORS exposure was adequate in our case. The operative time for the robotic setup was 20 min and the operative time to perform the procedure was 40 min. Negative surgical margins were achieved. The patient was extubated immediately after the surgery without tracheotomy. Venous bleeding at the operative site that did not require surgical intervention was the only postoperative complication. The nasogastric tube was removed on the 6th postoperative day, and normal food intake was possible. Figure 1B shows the postoperative endoscopic examination of the patient.

The patient underwent ipsilateral functional neck dissection. There was no lymph node metastasis in the pathological evaluation of the neck. Table 1 shows the data on the clinical and pathological staging of the patient. There was no sign of disease recurrence in the 45-month follow-up of the patient.

DISCUSSION

Supracricoid hemilaryngopharyngectomy was first described in the 20th century, and the first large series was published in 1987 (7, 8). Laccourreye et al. published long-term follow-up of

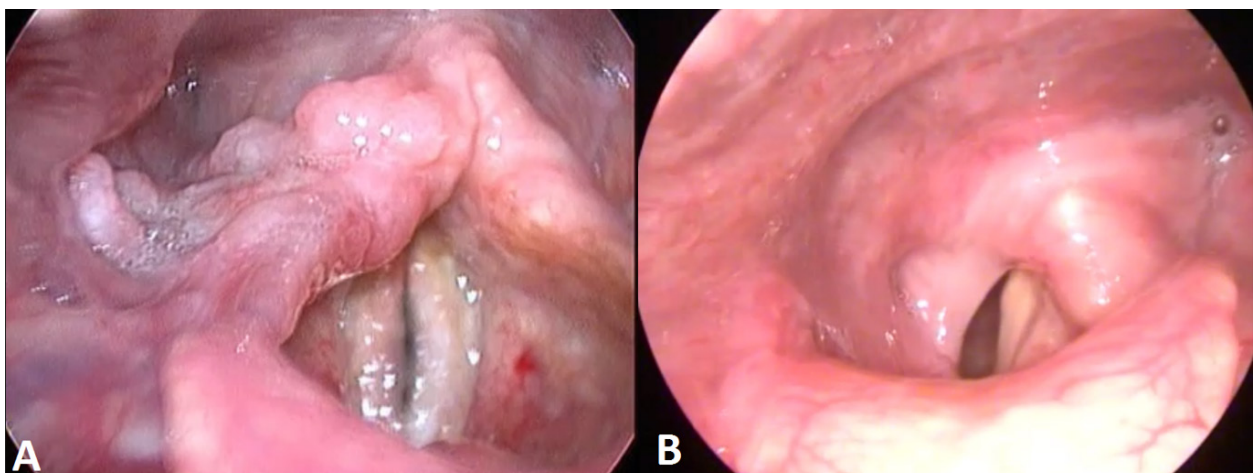


Figure 1: Preoperative (A) and postoperative (B) endoscopic examination of the patient

Table 1: Demographic and clinical characteristics of the patient

Patient	Sex	Age	Tumour staging	Extubation	Nasogastric removal (day)	Operation time (minutes)	Robotic positioning (minutes)	RT	Outcome (months)
1	M	76	cT1N0M0 pT1N0M0	Immediate	6	40	20	-	45

RT: Postoperative radiotherapy, M: Male

patients and comprehensive functional and oncological results of the technique (4). The technique was developed to resect ipsilateral hemilarynx and the medial wall of the pyriform sinus for tumors arising from the pyriform sinus and/or the hemilarynx. Despite the good results reported with SCHLP, it has not gained worldwide popularity, probably because the procedure is technically challenging.

Similar to any conservative surgical procedure performed by an external approach, SCHLP disrupts the physiological function of the larynx much more than transoral surgeries. Open surgery for hypopharyngeal cancer is frequently associated with organ loss and the need for permanent tracheotomy. Park et al. compared TORS and radical open surgery for hypopharyngeal cancer and showed better postoperative functional recovery results in terms of decannulation, swallowing, and duration of hospitalisation in the TORS group (9). In the TORS group, all patients underwent temporary tracheotomy and were decannulated on an average of 7.2 days. Laccourreye et al. reported a mean decannulation time of nine days in their SCHLP series (4). In the same study, the mean length of time for the removal of the feeding tube was 22 days (4). Patients treated with TORS for hypopharyngeal cancer have been reported to have tolerated an oral feeding after an average of 8.1 days (6). In our patient, the feeding tube was removed on the sixth postoperative day. We normally open a tracheotomy in TORS for hypopharyngeal surgeries. However, we did not perform tracheotomy for the patient. The fact that the operation was relatively nonbleeding compared to normal and that it would not disturb the operation site in terms of postoperative bleeding was effective in making this decision. Unfortunately, there was venous bleeding at the operation site on the third postoperative day. Fortunately, the bleeding ceased without any surgical intervention. Venous bleeding deep in the larynx/hypopharynx may prevent reintubation with catastrophic consequences. Therefore, regardless of how bleeding-free the operation is, we believe that temporary tracheotomy is absolutely necessary in these cases to ensure the safety of the patient. Park et al. reported postoperative bleeding in one of 23 patients who underwent transoral robotic hypopharyngeal surgery (6).

Similar functional and oncological results have been reported with the transoral laser resection of hypopharyngeal tumours (5). However, "line of sight" resection through a small laryngoscope lumen leads surgeons to remove the tumour in a piecemeal fashion. This type of resection does not allow caudal to cranial resection or axial plane resection. In inexperienced hands, piecemeal resection may result in three-dimensional

disorientation of the surgeon and leave the tumoral tissue behind. En bloc resection yields a postoperative specimen that can be assessed by a pathologist as an en bloc specimen, in contrast to piecemeal resection. We performed resection in an en bloc fashion and achieved negative surgical margins in the patient.

Therefore, we believe that TORS SCHLP is an oncologically safe and reliable method for proper hypopharyngeal tumours. The main advantages of TORS over the endoscopic laser approach include three-dimensional magnified views, the ability to see and maneuver around curves or angles, and the availability of two or three robotic arms. Furthermore, the combination of a 30-degree robotic telescope with an FK-WO retractor provides excellent exposure of the hypopharyngeal wall and larynx, allowing wide en bloc resection of the larynx and hypopharynx. We performed all resections defined in SCHLP with explained advantages using a robotic system except thyroid cartilage removal.

CONCLUSION

With the increasing interest in minimally invasive surgery, the da Vinci surgical robot has seen enhancements that improve visualisation, exposure, and tissue manipulation. Although TORS is well established for oropharyngeal lesions, its application in hypopharyngeal and laryngeal surgery remains uncommon. In selected cases, surgical resection margins can be attained with transoral robotic surgery as in open surgery. We believe that a temporary tracheotomy is essential for ensuring patient safety in TORS for hypopharyngeal carcinoma.

Informed Consent: Written informed consent was obtained from patient who participated in this study.

Peer Review: Externally peer-reviewed.

Author Contributions: Conception/Design of Study- Ç.O., O.A.; Data Acquisition- O.A.; Data Analysis/Interpretation- Ç.O., O.A.; Drafting Manuscript- Ç.O., O.A.; Critical Revision of Manuscript- Ç.O., O.A.; Final Approval and Accountability- Ç.O., O.A.; Material or Technical Support- Ç.O., O.A.; Supervision- Ç.O., O.A.

Conflict of Interest: The authors have no conflict of interest to declare.

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