

# Transoral Robotic Approach for Resection of a Giant Hypopharyngeal Fibroma

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**A**ggressive fibromatosis are rare, benign, fibrous neoplasms that arise from musculo-aponeurotic structures throughout the body and account for approximately 0.03% of all neoplasms [1]. While regarded as benign, lacking the capacity to metastasize [2], their clinical behavior is aggressive due to local infiltration and a tendency to recur, rendering treatment challenging. The most common site of aggressive fibromatosis is the abdominal region where approximately 37–50% of aggressive fibromatosis occur [3]. The most common extra-abdominal sites include the musculature of the shoulder, chest wall, upper arm, thigh, head and neck [4]. Aggressive fibromatosis lesions of the larynx are usually managed by tracheotomy and an open approach (partial pharyngectomy/laryngectomy) associated with significant morbidity.

The case presented here, of hypopharyngeal fibromatosis resected via the minimally invasive transoral robotic approach is, to the best of our knowledge, the first to be reported. Transoral robotic surgery (TORS) using the da Vinci Surgical System (Intuitive Surgical, Inc., Sunnyvale, CA, USA) provides excellent three-dimensional visualization and instrument access and has several technical advantages. First, translation of the surgeon's hand to scaled-down movements of the robotic arm filters tremors. This feature provides more accurate

dissection in tenuous areas. Second, the high magnification, three-dimensional, high definition image at the surgeon's console provides improved visualization of lateral-based structures and enables direct visualization at and around the tumor, which helps to compensate the lack of haptic feedback. Third, angled scopes also improve visualization and help the surgeon navigate around corners. Fourth, the articulated robotic arms add degrees of freedom to surgical movements [5]. The technique allows release of the lesion from the neurovascular structures and muscles and safe per-oral removal of the intact tumor.

## PATIENT DESCRIPTION

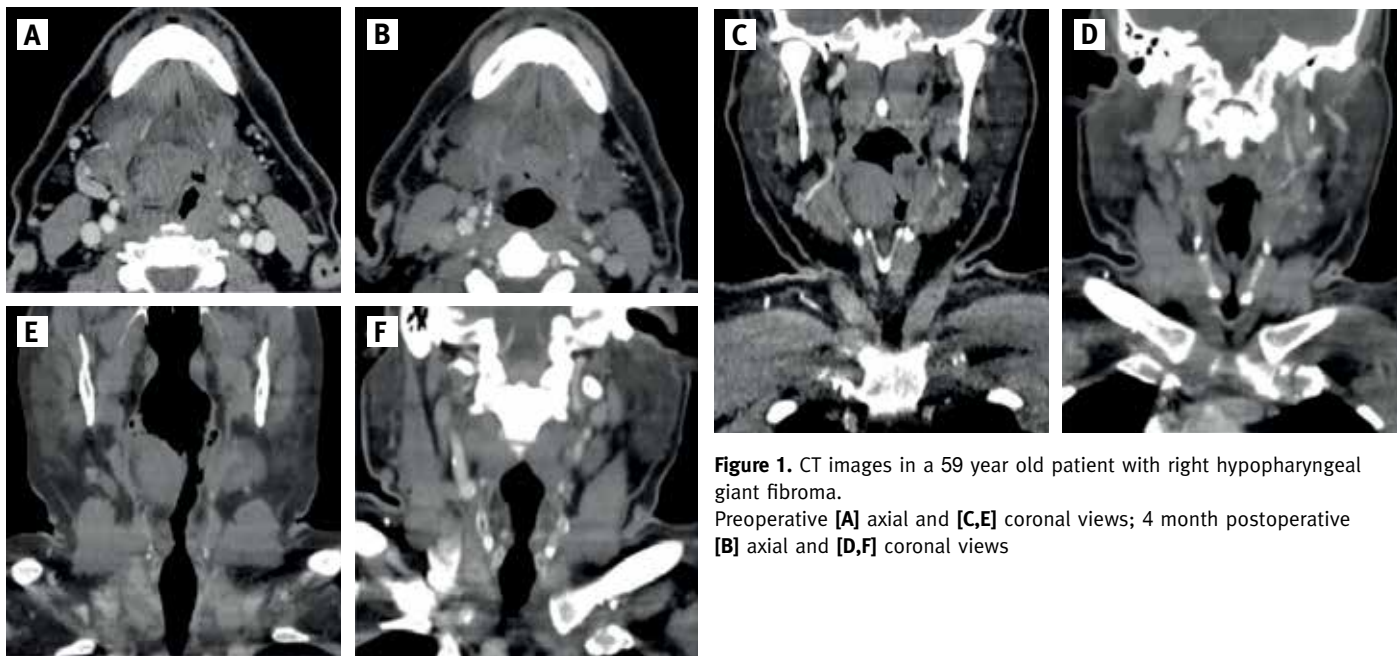
A 59 year old obese, hypertensive, diabetic man, with a history of heavy cigarette smoking, presented to our clinic with symptoms of dysphagia, breathing disturbances and obstructive sleep apnea for 5 years that had gradually worsened. He was referred to our clinic after completing radiation therapy for prostate cancer. He did not undergo prostate surgery due to repeated unsuccessful intubation attempts.

Flexible fiber optic nasolaryngoscopy revealed a smooth submucosal hypopharyngeal mass reaching the right pyriform sinus, pushing the epiglottis to the left, narrowing the upper airway significantly. The larynx seemed intact, and the vocal cords were normal, with normal range of motion and a sufficient glottic opening. No cervical lymphadenopathy was noticed. Computerized tomography (CT) and magnetic resonance imaging (MRI) scans of the neck demonstrated a 5 x 6 cm solid submucosal right hypopharyngeal mass

narrowing the upper airway [Figure 1 A,C,E]. There was no evidence of extralaryngeal extension or cervical lymph node enlargement. A laryngoscopy-guided biopsy taken under local anesthesia using a flexible scope with a working channel was not conclusive.

Using awake trans-nasal endoscopic guided intubation, a reliable and large submucosal biopsy was obtained. Pathology results were conclusive for fibrous mass tissue. Four weeks after the biopsy, minimally invasive surgery was performed utilizing the transoral robotic approach under general anesthesia with nasal endotracheal intubation.

A transoral robotic approach with a Feyh-Kastenbauer (FK) Laryngo-Pharyngoscope retractor (Gyrus ACMI/Explorent GmbH, Tuttlingen Germany) was used. The da Vinci Surgical System was docked at the right of the patient's bed, and an 8 mm camera at a 0 degree angle was installed and inserted to the mouth. The robotic arm ipsilateral to the lesion was installed with a 5 mm monopolar cautery with a spatula tip, and the contralateral arm with a 5 mm Maryland dissector. The robotic arms were positioned so that the instrument tips were within the field of view of the endoscope with minimal angulation. A second surgeon sitting at the head of the bed assisted with a pediatric Yankauer suction and bipolar cautery. The tumor was identified and grasped by the robotic arms. Using the robotic arms, separation of the tumor from its surrounding tissue was performed, until 360° severance was achieved. Transoral delivery of a 6 cm diameter intact mass was performed. The specimen was submitted



**Figure 1.** CT images in a 59 year old patient with right hypopharyngeal giant fibroma. Preoperative [A] axial and [C,E] coronal views; 4 month postoperative [B] axial and [D,F] coronal views

to the pathology laboratory for analysis. The wound was copiously irrigated and hemostasis was achieved with a bipolar electrocautery. Total surgical time was 1 hour, with 30 minutes of robotic utilization. Complete excision of the tumor was achieved. No intra-, peri-, or postoperative complications were encountered.

After the operation the patient was extubated uneventfully and transferred to the post-surgery care unit. Nutrition was provided for 24 hours post-surgery by means of a nasogastric feeding tube positioned during the surgery. Oral diet was initiated on postoperative day 1. On postoperative day 2 the patient was discharged home, breathing, drinking and eating with no difficulty for the first time in years. At follow-up, the patient maintained good oral intake, with complete resolution of his preoperative complaints. Pathology results showed fibromatosis, and connective tissue with spindle cells and collagen fibers. Immunohistochemistry was used to further evaluate the cellular components of the lesion. The tumor's spindle cells were stained weakly for smooth muscle actin. Immunohistochemistry for S100, desmin, CD34 and beta-catenin yielded negative labeling. Based on these histological data,

the neoplasm was pathologically diagnosed as aggressive fibromatosis.

Complete resection of the tumor was achieved, as noted by flexible fiber optic nasolaryngoscopy follow-up examination and on 4 month postoperative CT scan [Figure 1 B,D,F].

### COMMENT

Aggressive fibromatosis of the larynx is a rare, benign, but locally infiltrating and progressive disease. Laryngoscopy-guided biopsy should be performed for initial histological evaluation. In spite of the rarity of this condition in the hypopharynx, it should be included in the differential diagnosis for hypopharyngeal mass.

Hypopharyngeal neoplasms pose a surgical challenge due to difficulties in exposure and approach. Thus, traditionally, they are managed first by securing the airway surgically with a tracheotomy, followed by morbid open procedures such as partial pharyngectomy/laryngectomy.

We describe a transoral robotic approach for removal of hypopharyngeal tumors. The minimally invasive technique described, utilizing the da Vinci Surgical System, provided improved visualization

throughout the surgery, meticulous dissection of the tumor from the adjacent structures, safe removal of the tumor while maintaining minimal morbidity, safe vascular control and excellent functional and cosmetic outcomes, maintaining the vocal cords and trachea intact.

TORS enables the removal of very large hypopharyngeal tumors, vascular tumors, as well as removal of low grade malignant tumors arising from the hypopharynx using a minimally invasive technique.

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