Transoral Robotic Surgery: Supraglottic Partial Laryngectomy

Mahedi hasan (191-15-12172)

Objectives: We assessed the feasibility of performing transoral supraglottic partial laryngectomy with robotic instrumentation.

Methods: Transoral robotic surgery (TORS) was performed on 3 human patients with supraglottic carcinoma in a prospective human trial. The study was approved by our institutional review board and involved the da Vinci Surgical Robot (Intuitive Surgical, Inc, Sunnyvale, California).

Results: All procedures were completed robotically. The median overall operation time to perform the robotic procedure was 120 minutes (range, 1:32:48 to 2:58:18), including 18 minutes (range, 00:6:07 to 00:30:39) for exposure and robotic positioning. There were no intraoperative or postoperative complications or surgical mortality.

Conclusions:
The preliminary results of our series suggest that application of the da Vinci robotic surgical system for TORS to supraglottic partial laryngectomy is technically feasible and relatively safe. Furthermore, TORS provides excellent surgical exposure that allows complete tumor resection. Most importantly, TORS provides an alternative to open approaches and "conventional" transoral supraglottic partial laryngectomy.

Transoral laser supraglottic partial laryngectomy by means of standard instrumentation with an operative microscope and a carbon dioxide laser is generally accepted for diagnostic and therapeutic procedures in patients with supraglottic malignant lesions. Although in many cases standard instrumentation provides excellent exposure that allows for a successful transoral operation, in some cases, the tumor location may render present standard approaches suboptimal and technically challenging, thus possibly increasing the risk of surgical complications. The recent introduction of robotic systems has resulted in improved surgical approaches in various surgical fields. The two specialties in which the da Vinci robotic system (Intuitive Surgical, Inc, Sunnyvale, California) has found its major niche are cardiac surgery and urologic surgery. For example, approximately 10% of radical prostatectomies were performed robotically in 2004.1 In 2005, Hockstein et al2,3 reported the feasibility of transoral use of the da Vinci robotic system in mannequin and cadaver models.

RESULTS

Adequacy of Exposure. After placement of the FK retractor for the area of anatomy under evaluation, adequacy of exposure was achieved in all cases (Fig 2). Ability to Perform TORS. The surgeons were able to successfully perform TORS in all cases. Operative Time. The mean overall operative time used to perform the robotic procedure was 120 minutes (range, 1:32:48 to 2:58:18), including 18 minutes (range, 00:6:07 to 00:30:39) for exposure and robotic positioning (Table 1). Blood Loss. The mean blood loss was 200 mL (range, 100 to 400 mL) for the therapeutic procedures. Surgical Margins. Patient 1 had initial close surgical margins, and no tumor was seen on subsequent final margins. Patient 2 had negative margins. Patient 3 had an initial microscopically positive margin, and no tumor was seen on subsequent final margins. Complications. There were no complications and no conversions to standard procedures.

DISCUSSION

The major thrust of robotic surgery in the United States has been in cardiac and urologic surgery, and there has been recent development of robotic techniques in the areas of bariatric and gynecologic surgery.1,6-8 Because the "working portions" of the robotic system, the surgical instrumentation, are akin to standard surgical instrumentation with computer enhancement, the oncological efficacy of robotic techniques in areas such as the prostate has been as good as or superior to that of standard techniques.9 Minimally invasive surgical technique has been enhanced with the addition of robotic surgical systems. Natural hand movements are transferred to the operative field from the hand grips at the console. The movements of the "wristed" ends of the robotic surgical instruments allow for 6° of freedom and translate precisely the movement of the surgeon's wrist, providing a significant advantage over standard endoscopic equipment. Among other advantages is the lack of the "fulcrum effect" seen in conventional endoscopic surgery.

References

1. Binder J, Brautigam R, Jonas D, Bentas W. Robotic surgery in urology: fact or fantasy? BJU Int 2004;94:1183-7.

2. Hockstein NG, Nolan JP, O'Malley BW Jr, Woo YJ. Robot-assisted pharyngeal and laryngeal microsurgery: results of robotic cadaver dissections. Laryngoscope 2005;115:1003-8.

3. Hockstein NG, Nolan JP, O'Malley BW Jr, Woo YJ. Robotic microlaryngeal su technical feasibility study using the daVinci surgical robot and an airway mannequin. Laryngoscope 2005;115:780-5. 4. Weinstein GS, O'Malley BW Jr, Hockstein NG. Transoral robotic surgery: supraglottic laryngectomy in a canine mod

Thank you