Establishing a Training Program for Residents in Robotic Surgery

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Introduction

The utility of the da Vinci Surgical System (dVSS) (Intuitive Surgical®, Sunnyvale, CA) has recently been described in oral, pharyngeal, and laryngeal surgery. Given the inevitable responsibility to introduce robotic skills training into the clinical curriculum. We have established a simple, cost-effective teaching method to develop robotic skills for residents in otolaryngology by using a teaching module designed from inanimate objects (Figure 5). We report the preliminary results of resident performance that was analyzed for errors and total time of procedure.

Materials & Methods

Seven Otolaryngology residents at the UMDNJ residency program participated (all the PGY 2 – PGY 5 residents in the program except the first author who had previous experience using the dVSS). An interactive teaching module (Figure 5) was designed and fabricated. This module tested the following tasks: 1) simultaneous bimanual carrying, 2) circular pin transfer, 3) precision bead drop, 4) suture tying, and 5) needle passing. Performance of these tasks was recorded and the proficiency of the resident rated based on time needed, and number of errors made. Prior to beginning the teaching module, each participant received a verbal explanation about the use of the dVSS and such specific task. No participants practiced any of the prearranged tasks. Five tasks were performed by each participant. Each task was completed three times. The performance was observed, video recorded and reviewed by one of the authors (J.M.). Each participant earned a composite score for each trial on each task.

Results

Recently, investigators have demonstrated the feasibility of applying robotic technology to otolaryngologic surgery. Weinstein et al. have operated on greater than 100 patients using Transoral Robotic Surgery (TORS). It has been shown that robotic surgery resulted in shorter operative time, faster recovery time, and the avoidance of external incisions. Additionally, benefits specific to Otolaryngology patients include avoidance of mandibulotomy, avoidance of tracheostomy, and reduced requirements for complex reconstructions.

This report describes our preliminary work in developing a curriculum in surgical robotics for residents in an otolaryngology training program. Residents quickly became facile in robotic surgical skills with no previous experience on a robotic device. This suggests that the technology is designed such that little time is required to learn basic robotic surgical maneuvers.

From the first to the third trial of each task the participants’ mean time decreased, though the effect was not statistically significant. There was no statistically significant effect for trial on mean error score. But, the mean number of errors tended to decrease on subsequent trials, suggesting that with more trials statistical significance may have been achieved. Gallagher et al. researched the use of simulators in surgical training and reported that errors are valuable measurements of proficiency. The ANOVA for Composite Score revealed statistically significant effects for Task and Trial. The relationship between the parameters measured suggests learning had taken place, demonstrating the value of the training module.

Conclusion

The results of this project demonstrate that a program designed to teach basic robotic skills can easily be introduced into a residency program. Moreover, resident progress in acquiring robotic surgical skills can be measured and tracked. We are continuing to develop further stages of this robotics skills curriculum designed to assure the safe transition to the use of robots by residents in the operating room. Future directions involve implementing introductory didactics on robotic surgery, and simulated surgical procedures on models following skills training on the module.

References