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Robotics in head and neck surgery

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Recently, transoral robotic surgery (TORS) has been incorporated into head and neck surgery as a new approach in the management of pharyngeal and supraglottic cancer. The use of 3D-HD angled endoscopes in combination with robotic arms results in better visualization and assessment of anatomic regions which are difficult to visualize. The most widely used robotic system in head and neck surgery is the da Vinci Si HD (Intuitive Surgical, Sunnyvale, CA), through which surgeons are able to perform pharyngeal and some laryngeal procedures transorally. In contrast to this well-known system originally designed for large cavity surgery, the new Flex Robotic System (Medrobotics, Raynham, MA) was developed in order to broaden the application of TORS by being specifically tailored to the needs of head and neck surgery. The objective of our study was the evaluation of TORS comparing the da Vinci® (30 cancer patients) versus the Medrobotics® system (n=63, which is the largest patient series worldwide) with respect to adjustability, maneuverability, visualization and resectability of the tumor. Using the da Vinci® Robot base of tongue as well as oropharyngeal tumors could be accessed, visualized and resected. In contrast, cancer of the supraglottic region was not sufficiently accessible in three out of four cases due to the conflict of the robotic-arms in a narrow anatomic space. In case of the Medrobotics system access, visualization and resection in the pharynx and supraglottic region was excellent. However, false vocal cords and vocal cords were more difficult to expose in three cases due to anatomical limitations. Meanwhile there are new laryngeal instruments available overcoming these problems. The Flex® Robotic System is more mobile than the da Vinci System, allowing a fast and simple set-up and the instruments are easy to handle and provide tactile feedback. The flexible robotic scope provides a good overview of all relevant anatomic structures. 3D-camera systems and 4K resolution are common future challenges and prospects in endoscopic surgery and will be also relevant in endoscopic robotic surgery. The implementation of TORS in the surgical routine was an important step in that process and with the implementation of the Flex® Robotic System, the scientific community is moving ahead.

Biography

Stephan Lang is a Professor of Otolaryngology at the University of Duisburg-Essen and Chair of the Department of Otorhinolaryngology and Head and Neck Surgery at the University Hospital in Essen, Germany. His field of expertise is in tumor immunology and advanced tumor surgery as well as middle ear and skull base surgery. He has investigated the role of transoral robot assisted surgery (TORS) for head and neck lesions using different systems. His research interests are focused on the analysis of tumor-host interaction, tumor escape mechanisms and the development of therapeutic strategies designed to overcome tumor mediated immunosuppression. Currently, he is analyzing the role of mesenchymal stromal cells, regulatory T-cells and granulocytes in cancer progression. He has published more than 160 peer-reviewed papers in scientific journals.

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