Discussion: A Comparison of Robotically Assisted Microsurgery versus Manual Microsurgery in Challenging Situations

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I had the pleasure of reviewing "A Comparison of Robotically Assisted Microsurgery versus Manual Microsurgery in Challenging Situations" by Willems et al. The authors of this article aimed to compare the efficiency of robot-assisted microsurgery to traditional microsurgery in technically challenging situations. The technically challenging situation was defined as increased wound depth and small angles of exposure. The authors hypothesized that vascular anastomoses in challenging settings performed with robot-assisted microsurgery would be performed more quickly, with greater comfort and improved accuracy, compared with standard microsurgical techniques. Two investigators with no previous experience in surgery or microsurgery underwent a 40-hour traditional microsurgery course and a 40-hour da Vinci microsurgery course using the da Vinci robot (Intuitive Surgical, Inc., Sunnyvale, Calif.). Four wound configurations, plus a surface-level anastomosis control, were chosen using foam blocks. Two different wound depths were used (10 and 20 cm), with angles of exposure of either 20 or 30 degrees. An artificial vessel with a 1-mm outer diameter and a 0.1-mm wall thickness was used and a standard end-to-end anastomosis was performed. Power analysis assumed was an effective sample size of eight anastomoses per group per participant, making a total of 160 end-to-end microanastomoses. Manually performed anastomoses had a significantly better Objective Structured Assessment of Technical Skills score than robot-assisted microsurgery–repaired vessels ($p = 0.018$) overall. Robot-assisted microsurgery–assisted anastomoses did not require significantly longer time than those performed manually ($p = 0.173$), and the da Vinci system had a higher comfort rating compared with the manually performed anastomoses ($p < 0.001$) in specific settings. The authors concluded that manual surgery was superior to robot-assisted microsurgery in technically straightforward exposures. In difficult exposures, however, robot-assisted microsurgery had a shorter surgery time and a higher comfort rating with similar Objective Structured Assessment of Technical Skills scores.

Robotic surgery, likely synonymous with the da Vinci device, has made an entrance into plastic surgery.[1–3] However, in exploring the limits of plastic surgery, this article is timely and clinically relevant. The authors present a good overview of issues in performing anastomoses. The authors highlight how there are few articles at this point on this topic of robotic plastic surgery techniques. As noted, the authors chose to train two inexperienced people and let them perform anastomoses. To "avoid" the learning curve effect, they randomize the order of procedures performed. However, because both techniques have different learning curves, I am not sure that it is advantageous to do so. I believe the authors would have had additional impact if two very experienced microsurgeons (both in manually performed anastomoses and in those performed using the da Vinci system) would have also performed the anastomoses for the study. Notably, this would be a relatively straightforward follow-up study. With only 80 anastomoses performed per inexperienced researcher, one wonders whether they have already reached a plateau level in their experience.

Notably, the authors state that the Objective Structured Assessment of Technical Skills score was "recorded by the nonoperating participant." I would posit that data yielded by an inexperienced participant rating another inexperienced participant would have been significantly different from data obtained by an experienced microsurgeon. Unfortunately, the Objective Structured Assessment of Technical Skills scores are not blinded, which introduces inherent bias into the study. Of course, it is a challenge to blind these observations;

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