First-in-human study of robotic supermicrosurgery: feasibility of a dedicated microsurgical robot in the treatment of breast cancer-related lymphedema

Abstract

Advancements in reconstructive microsurgery have evolved into supermicrosurgery; the ability to connect vessels with a diameter between 0.3 and 0.8 mm for the reconstruction of lymphatic flow and vascularized tissue transplantation. This type of surgery, however, is limited by the precision and dexterity of surgeon’s hands. Robot-assistance can help overcome these human limitations, thereby enabling a breakthrough in the field of supermicrosurgery. We report the first-in-human study of robot-assisted supermicrosurgery using a new microsurgical robotic platform. A prospective randomized pilot study was conducted comparing robot-assisted and manual supermicrosurgical lymphatico-venous anastomosis (LVA) in the treatment of breast cancer-related lymphedema. We evaluated patient outcome at one and three months post-surgery, duration of the surgery, and quality of the anastomosis. At three months, patient outcome improved. Furthermore, a steep decline in duration of anastomosis was observed in the robot-assisted group. Our pilot study proved the feasibility of robot-assisted supermicrosurgical anastomosis in LVA, indicating promising results for the future of reconstructive supermicrosurgery.