Robot assisted microsurgery passes human clinical trial

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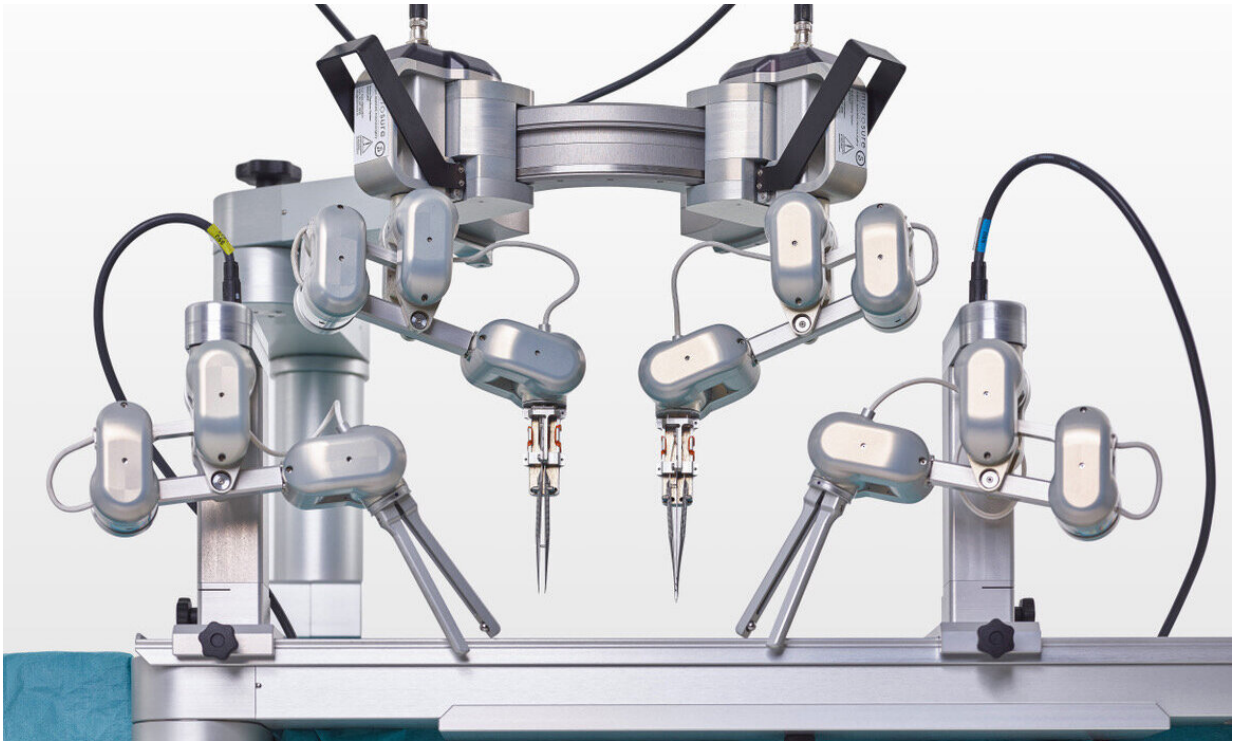

MicroSure's MUSA robotic platform. Credit: MicroSure.

A team of researchers working at Maastricht University Medical Center in The Netherlands has assessed the capabilities of a robot that assists with microsurgeries. In their paper published in the journal *Nature Communications*, the group describes how the robot works and how well it did in its first human trial.

Some types of surgery are much more difficult than others, and one of the primary reasons for the differences is the size of the tissue involved. Sewing tiny nerves together is much more difficult than reconnecting large parts of an intestine, for example. One of the reasons that operating on very small tissues is difficult is because of the tendency of the human hand to move slightly in undesired ways, jerking and shaking nearly imperceptibly. When operating on large body parts, this is generally not an issue, but with small tissues, the effects of hand movements are greatly magnified. Because of that, scientists have been developing robots that assist with surgery by mimicking the actions of a surgeon's hands, minus the shaking. In this new effort, the researchers tested such a robot called MUSA.

The clinical trial involved a single surgeon performing a procedure called lymphatico-venous anastomosis (LAS) on eight women. Four of the procedures were conducted without the robot, four with the robot assisting. LAS is performed to reconnect lymphatic tissue with blood vessels after patients undergo surgery to remove breast tumors. The vessels are extremely small, just 0.3 millimeters, and the surgery very difficult.

Using MUSA, the surgeon manipulated controllers that resemble surgical tools. The actions of the surgeon are mimicked by the robot using tools in its own hands. Such actions are mimicked precisely except for shaking or other undesired hand movements. The surgeon also manipulates a foot pedal for other actions such as operating the microscope through which the surgery is observed.

The results of all eight surgeries were assessed during the surgery and again three months later. The outcome of the surgery was nearly identical in all cases—full restoration of lymph node drainage. But the surgeon took nearly twice as long to perform the first surgery—his speed improved with each procedure as he became more accustomed to

working with the robot. The clinical trial was deemed a success because of the surgical outcomes, and because it showed that robot-assisted microsurgery in such cases is possible—a finding that suggests less skilled surgeons, or those with shakier hands could perform such surgeries in the future.

More information: undefined undefined et al. First-in-human robotic supermicrosurgery using a dedicated microsurgical robot for treating breast cancer-related lymphedema: a randomized pilot trial, *Nature Communications* (2020). DOI: 10.1038/s41467-019-14188-w