

MAESTRO™: Dexterous Manual Surgical Manipulator

Summary

Inventors at Vanderbilt University have developed a non-robotic dexterous laparoscopic manipulator with a wrist providing seven-degrees-of-freedom. The device has a novel user interface that intuitively maps motion of the surgeon's hands to the tool's "hands".

Addressed Need

- ◇ Current laparoscopic instruments use a rigid connection between the surgical tool and the tool shaft.
- ◇ Modern surgical robots provide wrist articulation; this invention enables a cheaper and safer alternative in the form of a non-robotic tool.
- ◇ The key feature of this invention is an intuitive user interface for the surgeon.

Technology Description

The surgical manipulator offers surgeons a dexterous hand which can be used in procedures that would normally require the use of rigid laparoscopic or laparoscopic-type tool. The surgical manipulator can be suitable for use in laryngoscopic surgery, such as NOTES-based operations, trans-vaginal operations, and as a reach extension tool for working with obese patients.

Technology Features

- ◇ The symmetric design provides a natural mapping of surgeon hand motions to tool tip motions.
- ◇ The wrist control pivot can be placed within the span of the handles. This makes controlling the tool similar to using a pair of pliers.
- ◇ No return spring for operation.
- ◇ Tactile feedback from the gripping device is enhanced by the absence of a return spring.
- ◇ A motion compensation mechanism to compensate for the natural mirror image effects between the orientation of the user control and the distal forearm while maintaining the alignment between the user interface and the distal gripper.

Intellectual Property Status & Additional Material

- ◇ Issued US patent: [9,901,412](#)
- ◇ Publication: [Comparing a Mechanical Analogue with the da Vinci User Interface](#)
- ◇ Video of the [device in use](#)

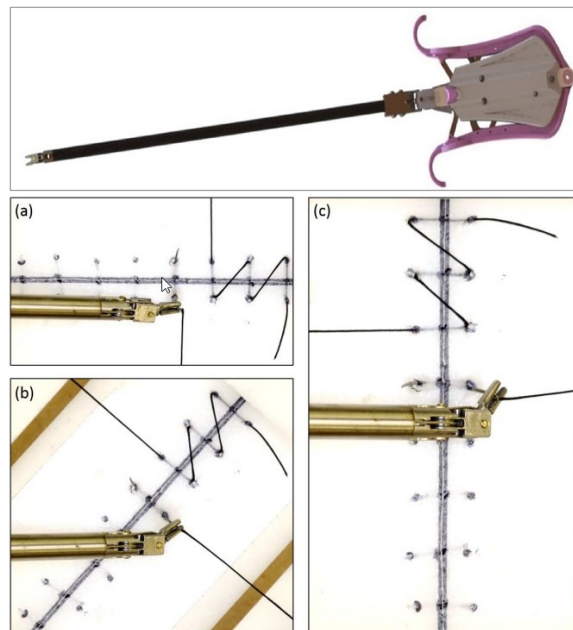


Figure 1: (top) CAD model of the dexterous tool, and (bottom) experiment showing the tool's ability to throw sutures at (a) 0°, (b) 45°, and (c) 90° angles.

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