TRANSFORMATIONAL FLEXIBLE ROBOTIC PLATFORM FOR VENTRAL HERNIA REPAIR





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BACKGROUND:

Every year it is estimated that 750K ventral hernia repairs are completed domestically [1]. The field of hernia repair has undergone rapid change over the past 20 years and there is increased demand for less invasive techniques driven by better clinical and aesthetic outcomes [1]. Innovation has mainly been driven through enabling technologies in minimally invasive and robotic approaches, with significant developmental efforts on reduced- or single-port access.

A novel, small, cost-effective robotics platform has been developed that allows all instrument articulation to occur inside the abdomen by 2 flexible instrument arms inserted through a single <2.0 cm incision laterally in the abdomen. It is well documented that lateral incisions improve overall healing times and decrease the risk of incisional hernias due to the three (3) fascia layers, specifically when you limit the fulcrum effect.

The biomimetic instruments (with shoulder, elbow, and wrist joints) articulate inside the abdomen providing no fulcrum rotation about the point of entry into the abdomen. Consequently, the system has a minimal OR footprint as the robotic unit is stationary outside of the patient after docking.

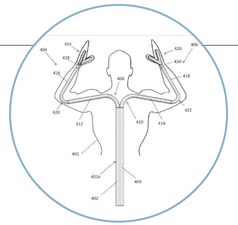
MATERIALS AND METHODS:

A transformative robotics platform has been developed that allows the articulation to occur inside the abdomen by 2 arms inserted through a single incision or natural orifice.

- System features miniature humanoid-shaped robotic arms that provide human level dexterity, multi-planar flexibility and 360 degrees of articulation for various access configurations.



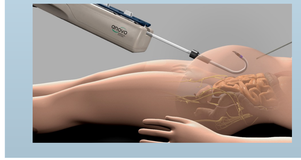
Various arm configurations



Humanoid arms mimic a surgeon's arms



Hominis Surgical System



RESULTS:

We performed the first lateral "reduced port" transversus abdominis release ventral hernia repair with implantation of mesh in the retro muscular space in a live, 70kg female porcine model with 15 mm Hg insufflation with the robotic system.

The robotic arms were entered laterally and retroflexed to perform an initial 7.5cm dissection of the peritoneum. The robotic arms progressed to create a 13cm deep dissection, creating a clear plane within which the mesh was placed, enabling full clinical potential benefits of the technique [2].

- The transformative and innovative design of **the shoulder, elbow and wrist joints of the instrument arms allow for their articulation to occur after entry into the abdomen,** enabling a feasible and effective approach to ventral hernia repair.







CONCLUSIONS:

With the rising costs associated with ventral hernia repair and the increasing number of ventral hernia repairs being performed domestically and globally, along with the growing number of robotic ventral hernias being performed, **the design of this new robotic technology has the potential to realize the clinical benefits of a reduced port approach while minimizing port side trauma and reducing the potential for hernia recurrence [2, 3].**

In addition, while traditional multiport robotics remains expensive and time consuming related to setup [4], **this single port robotic technology has the ability drive costs to be more in line with traditional laparoscopic approaches.**

Currently FDA authorized for benign hysterectomy, with salpingo-oophorectomy, with salpingectomy, salpingectomy, oophorectomy, adnexectomy, ovarian cyst removal.

TT and JB are consultants of Momentis
MC and MM are employees and shareholders of Momentis

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