Intervention: Percutaneous laparoscopy using 5-mm end effectors.

Measurements and Main Results: We present a descriptive technique involving a novel method for minimally invasive surgery with theoretical advantages over current micro-laparoscopy technology. A standard 10/12mm trocar is introduced through a midline port. Lateral 2.9mm instruments are placed percutaneously through the abdominal wall and attached to an end effector (e.g., grasper, scissors) introduced through the midline trocar. These effectors have similar grip force, jaw aperture, and shaft rigidity to those of standard 5-mm instruments. Thus the surgeon obtains the function and performance of traditional multi-port laparoscopy using smaller percutaneous punctures.

Conclusion: Percutaneous laparoscopy is feasible in a porcine model and has the potential to translate into advantages of more flexible instrument placement, better cosmesis, and reduced pain for patients.

591 Percutaneous Trocarless Minilaparoscopy: Establishing Feasibility Limits of Extracorporeal Exchange of 5 mm Interchangeable Tips on 2.9mm Instrument Shafts in a Thin and Obese Woman

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Study Objective: To characterize the limits of absolute and clinically usable distance between trocarless percutaneous instruments and an umbilical port for assembly of a novel percutaneous surgical device.

Design: Cadaver Study.

Setting: Tertiary Care Center.

Patients: Female Cadavers.

Intervention: Percutaneous minilaparoscopy.

Measurements and Main Results: The abdomens of a thin (BMI 21) and obese (BMI 37) fresh cadaver were marked at 3cm intervals extending radially from the umbilicus. Pneumoperitoneum was created and linear expansion recorded. Expansion was greater in superior and inferior quadrants in obese and thin specimens. Abdominal wall thickness was uniform in all quadrants in the thin specimen (0.5-0.75cm) but was greatest in the lower quadrants (3.0cm-5.0cm) in the obese specimen. The 2.9mm percutaneous instrument shaft was inserted along marked intervals with extracorporeal assembly of interchangeable 5mm tips through the umbilical port. The minimum absolute distance from the 5mm and 12mm umbilical port was recorded. Minimum clinically usable distance, defined as the distance assembly could be completed without struggle or excessive force, was 4cm and 6cm in thin and obese specimens respectively.

Conclusion: Minimum absolute feasibility and clinically usable distance was directly related to abdominal thickness and distance from the umbilical exchange port. In patients with a thin or thick abdominal wall, the minimum clinically usable distance was 4cm and 6cm respectively although shorter distances were possible. Placing the camera through an additional 5mm left upper quadrant port allowed exchange at shorter distances.