Development of swine model for the evaluation of novel compounds in the prevention of postoperative adhesions

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Statement of Purpose: Adhesions following surgery represent a significant problem often resulting in pain, disability, and additional surgeries1-3. Compounds are available for the prevention of postoperative adhesions, but effectiveness is difficult to assess; current models of adhesion comparison are limited to qualitative methods with much potential bias4. Without an objective quantitative method for assessing adhesions, comparisons of adhesion barriers’ efficacy cannot be made; creation of a quantitative model suitable for testing adhesions depends on several principles. A technique must first be devised that reliably creates significant adhesions neither too strong to be prevented, nor too weak to be insignificant; significant adhesions are usually defined as dense, thick, and vascular5. The adhesions created must be physically appropriate for a quantitative analysis. And the adhesions should have clear validity for surgical methods under consideration; replicating adhesions following open or closed surgery. The method described here was created to meet the above criteria. For this model, swine were used because of similar organ size, healing mechanism, and weights to humans.

Methods: The primary focus of this research was the creation of an adhesion complex that was suitable to quantitative testing using the Material Testing System (MTS™ System Corp, Eden Prairie, MN) machine platform. Following a midline infraumbilical laparotomy, bowel packing and retraction, and adequate exposure of the uterine horns and adjacent pelvic sidewall, a salpingostomy is made using electrocautery 1cm caudal the uterus-fallopian tube junction. A 7cm 8fr. latex urinary catheter, reinforced with a coaxial internal semi-rigid 5fr. polypropylene catheter, is inserted until it lies entirely within the lumen of the uterus. A 10cm segment of 6.35mm ID latex rubber drain tubing is secured to the uterine-fallopian tube junction. A 7cm 8fr. latex urinary catheter, reinforced with a coaxial internal semi-rigid 5fr. polypropylene catheter, is inserted until it lies entirely within the lumen of the uterus. A 10cm segment of 6.35mm ID latex rubber drain tubing is secured to the uterine-fallopian tube junction. A 7cm 8fr. latex urinary catheter, reinforced with a coaxial internal semi-rigid 5fr. polypropylene catheter, is inserted until it lies entirely within the lumen of the uterus. A 10cm segment of 6.35mm ID latex rubber drain tubing is secured to the uterine-fallopian tube junction.

The significant advantage of this method is the ability to quantitatively assess the strength of the adhesion complex, minimizing the potential for bias.

Conclusions: The significant advantage of this method is that the adhesions are created in a manner appropriate for quantitative assessment using the MTS system. The ultimate utility of this technique lies with the testing and comparing of adhesion prevention techniques. A study is currently under way designed to demonstrate that this technique can quantify and compare treated and untreated adhesions, eventually resulting in a quantitative method for assessing the performance of potential adhesion barriers.

References: