AlgoShield: preventing hernia mesh adhesions (Hadasit)

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Need:

Postoperative adhesions (fibrous bands of scar tissue) frequently occur following abdominal surgery and are a leading cause of intestinal obstruction. It has been estimated that more than 90% of patients who undergo abdominal operations will develop postoperative adhesions. The most severe complication of postoperative adhesions is small bowel obstruction, which has a 10% risk of mortality. Adhesion formation presents a considerable burden to health care and society and is associated with high workloads for hospitals and high costs.

In laparoscopic surgery the mesh is placed intra-abdominally and fixed to place by tacks therefore serving as a barrier preventing abdominal organs from protruding through the abdominal wall, as well as reinforcement to the abdominal wall strength. As foreign bodies, meshes are a specific lead point for adhesion formation hence the prevention of adhesions is of particular concern when they are placed intraperitoneally.

Meshes typically are coated with a sheet-like barrier shielding the mesh structure from the abdominal organs. These meshes however, are extremely expensive due to the coating materials and processing required for production. Nevertheless, even with these highly expensive meshes designed specifically for intraperitoneal use, adhesions are still encountered in differing degrees of extent and severity.

Innovation:

Our team is developing a low cost solution for intra operative mesh coating which will not only prevent adhesions to the mesh itself but also to the tacks holding the mesh in place, thereby reducing post-operative adhesions and subsequent complications, at a much lower cost. Using Alginate to coat a low cost prolene mesh at the time of surgery allows this to be possible. Alginate is a natural polysaccharide product extracted from brown seaweed, which has found numerous applications in biomedical science and engineering due to its favorable properties, including biocompatibility and ease of gelation. Alginate hydrogels have been particularly attractive in wound healing, drug delivery, and tissue engineering applications to date, as these gels retain structural similarity to the extracellular matrices in tissues. A specially designed laparoscopic instrument will be used for coating the mesh after its fixation.

Indication / Application:

General Surgery

Competitive advantages:

- Significant cost reduction – our method is based on simple low cost ($100) mesh coated with

low cost Alginate
- Low cost may increase laparoscopic procedure occurrence
- Our solution coats all implants prone to adhesions – both mesh and tacks
- Ability to cover mesh surrounding tissue to prevent adhesions in the proximity of the implant

Development stage:

Proof of concept was achieved in a series of live animal model studies

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