Laparoscopic Magnetic Compression Anastomosis with Immediate Lumenal Patency in a Porcine Model

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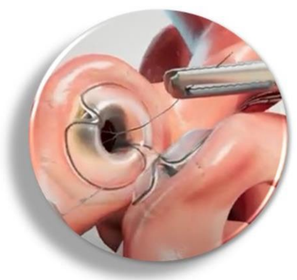
Introduction

- Magnetic compression anastomosis (MCA) systems represent a promising technology which may allow for faster and safer anastomoses between the intestine or other viscera than traditional stapled or sutured techniques
- One of the pitfalls with previous MCA systems is the lack of enteric continuity during magnetic anastomotic maturity, preventing immediate flow of nutrients and enteric contents
- We designed a novel self-forming magnetic (SFM) system which contains an immediately patent lumen prior to maturation of the compression anastomosis
- We aimed to evaluate this novel technology in a porcine model

Methods

- We utilized a novel endo-intracorporeal anastomosis (EIA) system with a patent central lumen that allows for both introduction of SFMs and allows for early passage of enteric contents
- The in vivo performance of the EIA implant and 25 millimeter SFM system was testing in a porcine model during laparoscopic small bowel to small bowel MCA
- Fluoroscopy and endoscopy were used to monitor the MCA system and anastomosis
- Following animal sacrifice, necropsy was performed to assess the anastomoses for gross anatomy, endoscopic patency, and histological characteristics

Laparoscopic Magnetic Compression Anastomosis



SFMs are laparoscopically deployed through previously inserted EIA systems in opposing loops of small bowel to form a complex



The two SFM-EIA complexes in opposing loops of bowel are mated to form a 25 millimeter compression anastomosis



In vivo, endoscopic view of SFM-EIA complex in a porcine model. The central lumen of the EIA allows for immediate passage of nutrients and enteric contents.

Endo-intracorporeal Anastomosis and Self-forming Magnet System



A



B



C



D

- A novel, self-forming magnetic (SFM) system can be introduced through a deployment device compatible with standard laparoscopic ports (Fig. A-C)
- The SFM is deployed through the central lumen of the endo-intracorporeal anastomosis (EIA) system (Fig. D), which protects the bowel wall during deployment and provides a channel for immediate patency during maturation of the compression anastomosis

Results

- Fifteen porcine subjects underwent laparoscopic division of the jejunum with subsequent end-to-end MCA using the EIA-SFM anastomotic system
- Technical success was achieved in each case, with each subject surviving until planned sacrifice
- Each animal was started on a liquid diet immediately post-procedure which was well-tolerated
- Fluoroscopic evaluation confirmed successful SFM-EIA complex migration from the anastomosis following MCA maturation with 100% success
- In each case, necropsy demonstrated well-formed anastomoses with appropriate remodeling to the lumenal size of the subjects' small bowel

Conclusion

- Utilization of the EIA implant resulted in efficient deployment of SFMs in a safe and reproducible manner with procedural success in each case
- The functional lumen of the EIA device provided immediate patency of the anastomosis site during the remodeling phase, allowing for early enteral nutrition
- Human studies are warranted to confirm these preliminary results in a porcine model