

Magnetic Compression Anastomosis: Immediate Patency and Foreign-Body-Free Healing With the Flexagon™ System

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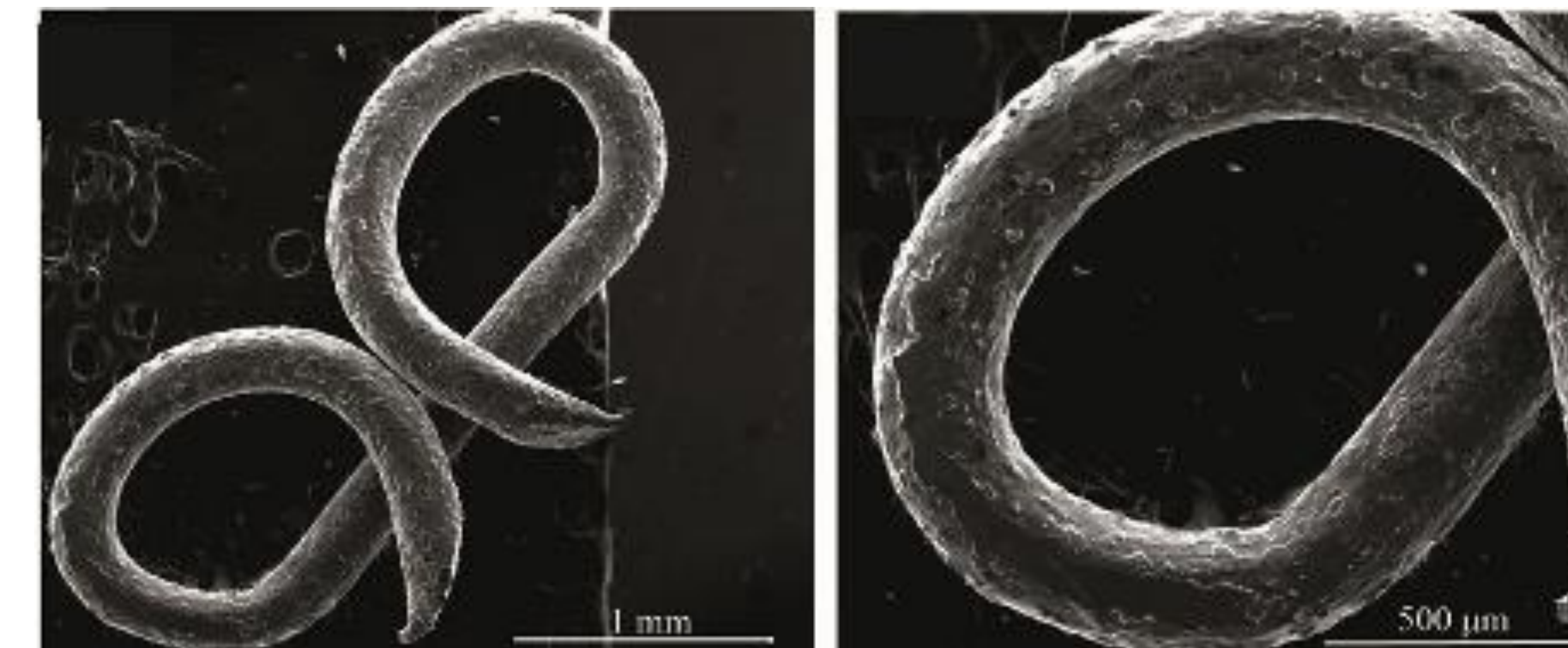
Background Anastomotic complications occur in 2–8% of minimally invasive gastrointestinal procedures, representing a leading cause of prolonged hospitalization and postoperative mortality.¹

The Problem Despite decades of evolution, neither staplers nor sutures have eliminated the risk of anastomotic leaks.² That are amplified during intracorporeal anastomosis construction. Staplers frequently require multiple firings, compounding the risk of staple-line failure. Critically, both methods rely on tissue perforation, creating bidirectional pathways for microbial infiltration and micro-abscess formation a fundamental vulnerability that persists even under optimal surgical technique.³

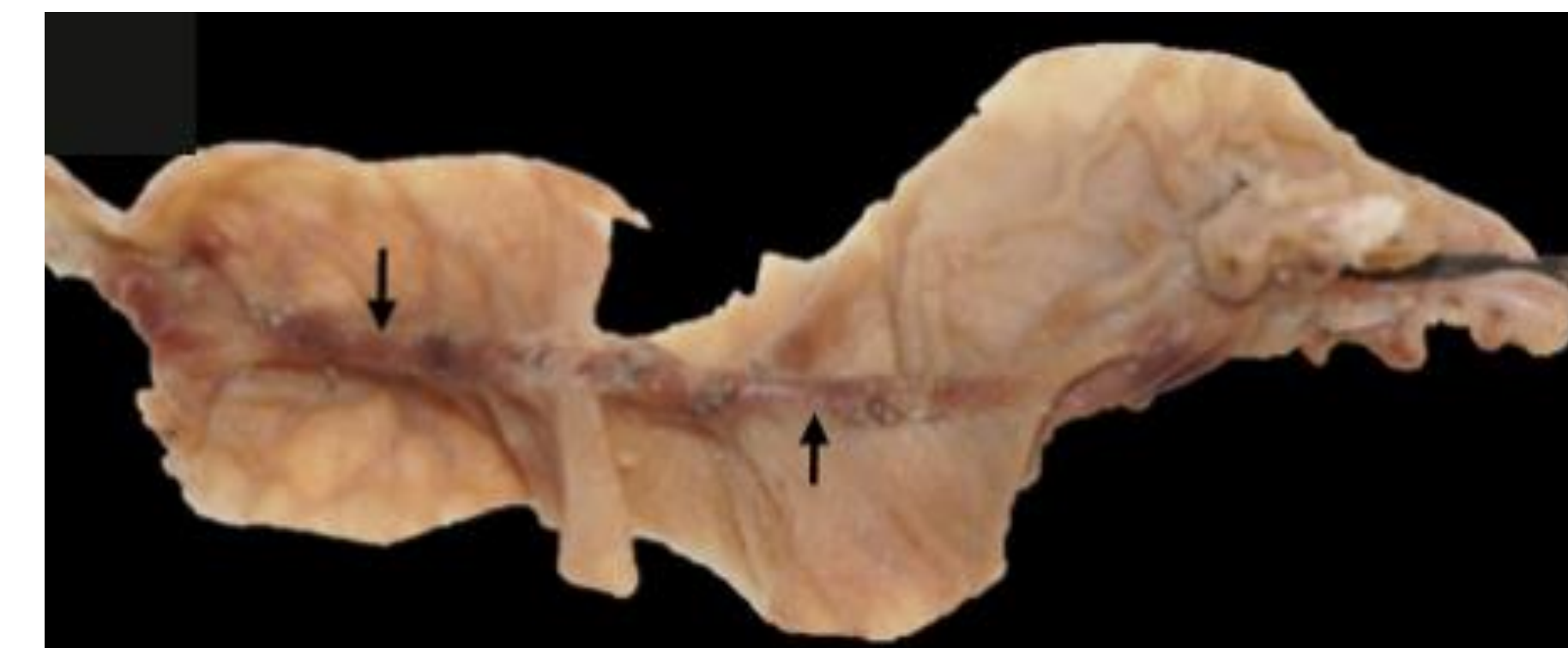
Proposal We present a novel application of an established concept: magnetic compression anastomosis⁴ with immediate luminal patency, enabling controlled tissue necrosis.⁵

* Offering remodeling without tissue perforation, while eliminating the transient obstruction that historically precluded this technique in colorectal surgery.⁴

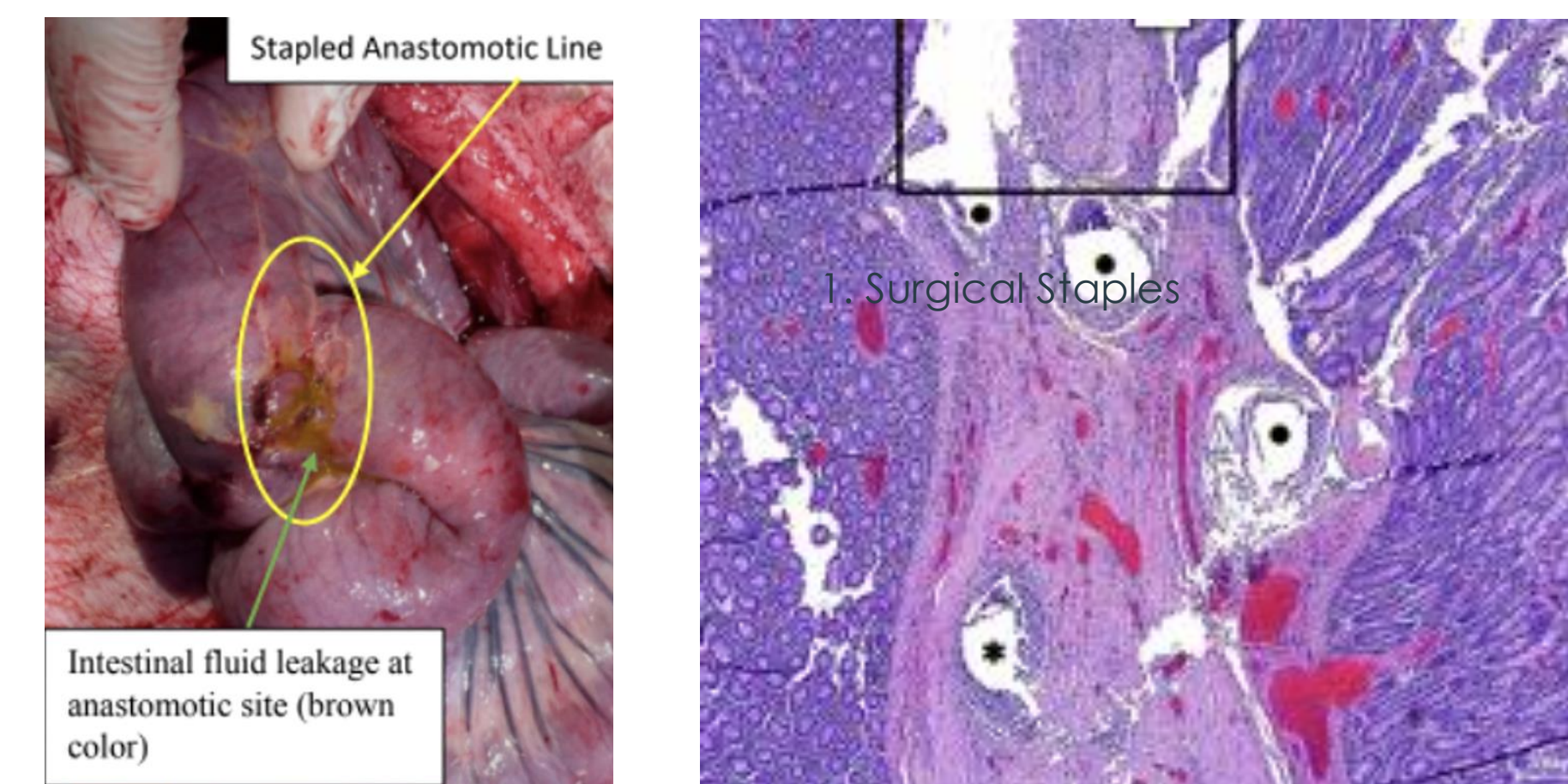
OTOLoc™+ Flexagon™ are delivered through a seamless, integrated laparoscopic or endoscopic system, compatible with robotic and laparoscopic platforms. Its simplicity facilitates standardization of intracorporeal anastomosis (ICA)



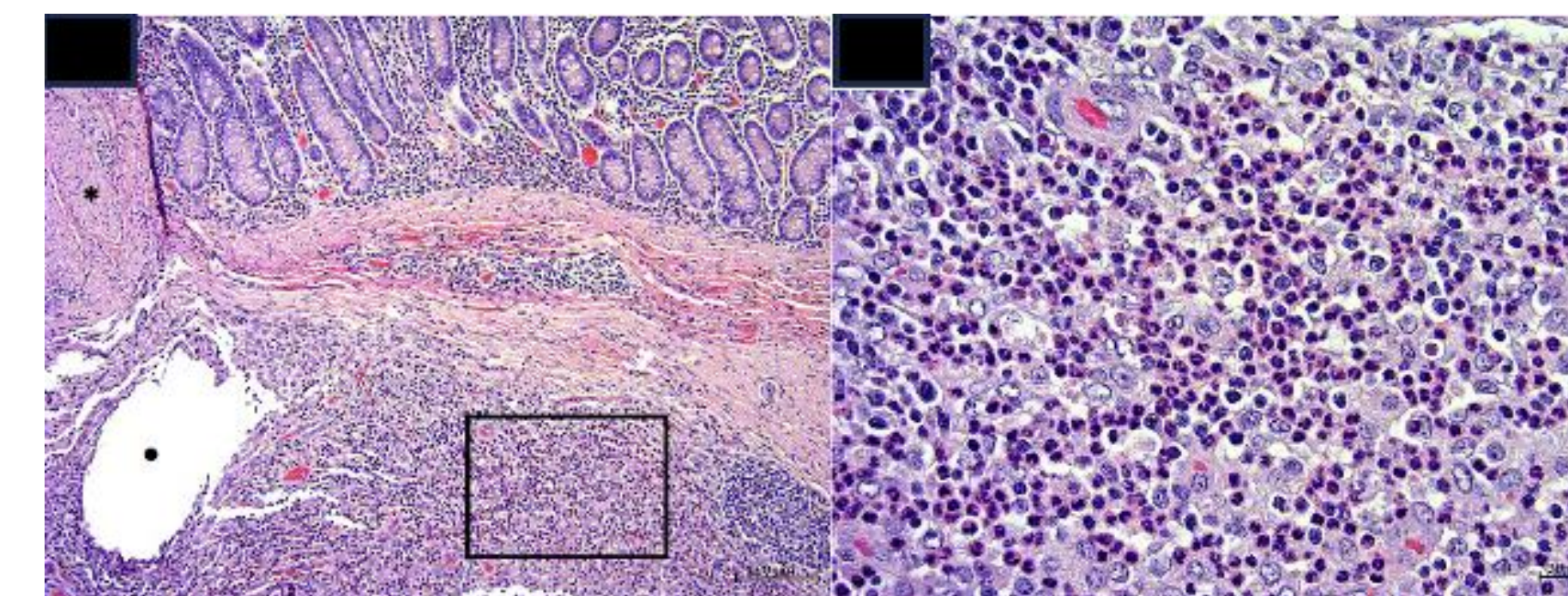
1. Surgical Staples



2. Bidirectional perforations



3. Staple line with micro abscesses 4a. Black dots represent staple perforations

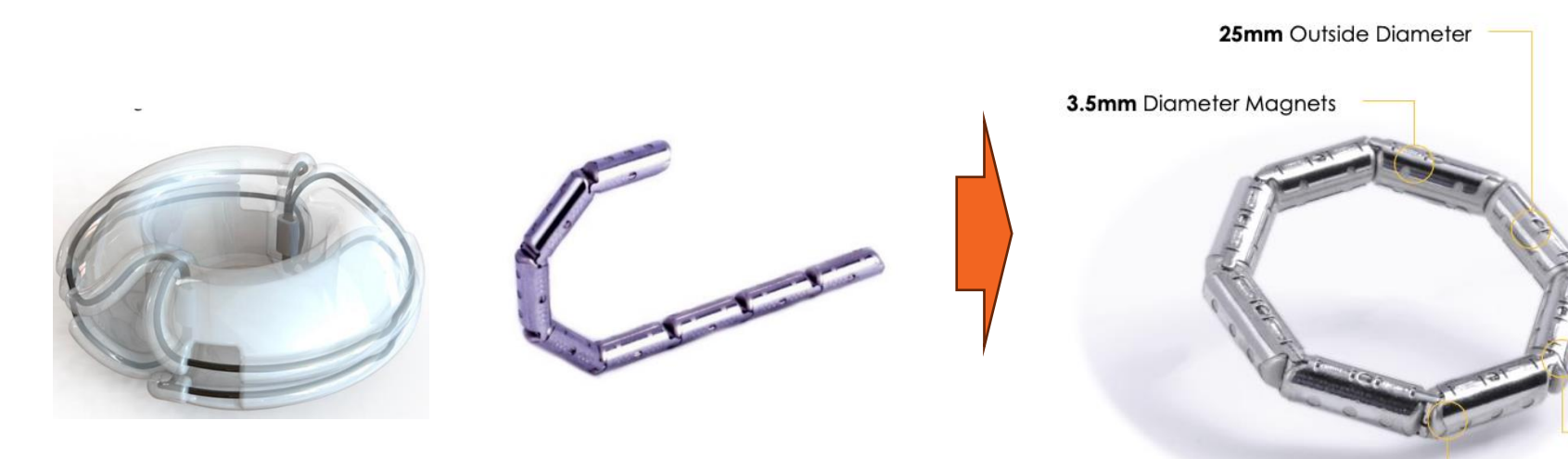


4 b. Inflammatory reaction with strong leucocytic aggregates

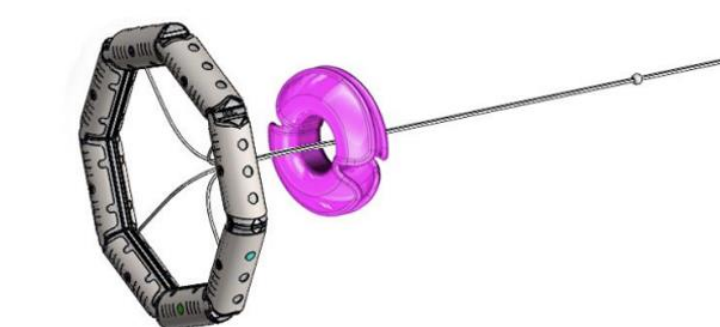
The device comprises two distinct components.

The OTOLoc™ is a latex-nitinol composite ring, deployed through the bowel defect, which maintains immediate luminal patency throughout the anastomotic remodeling process.

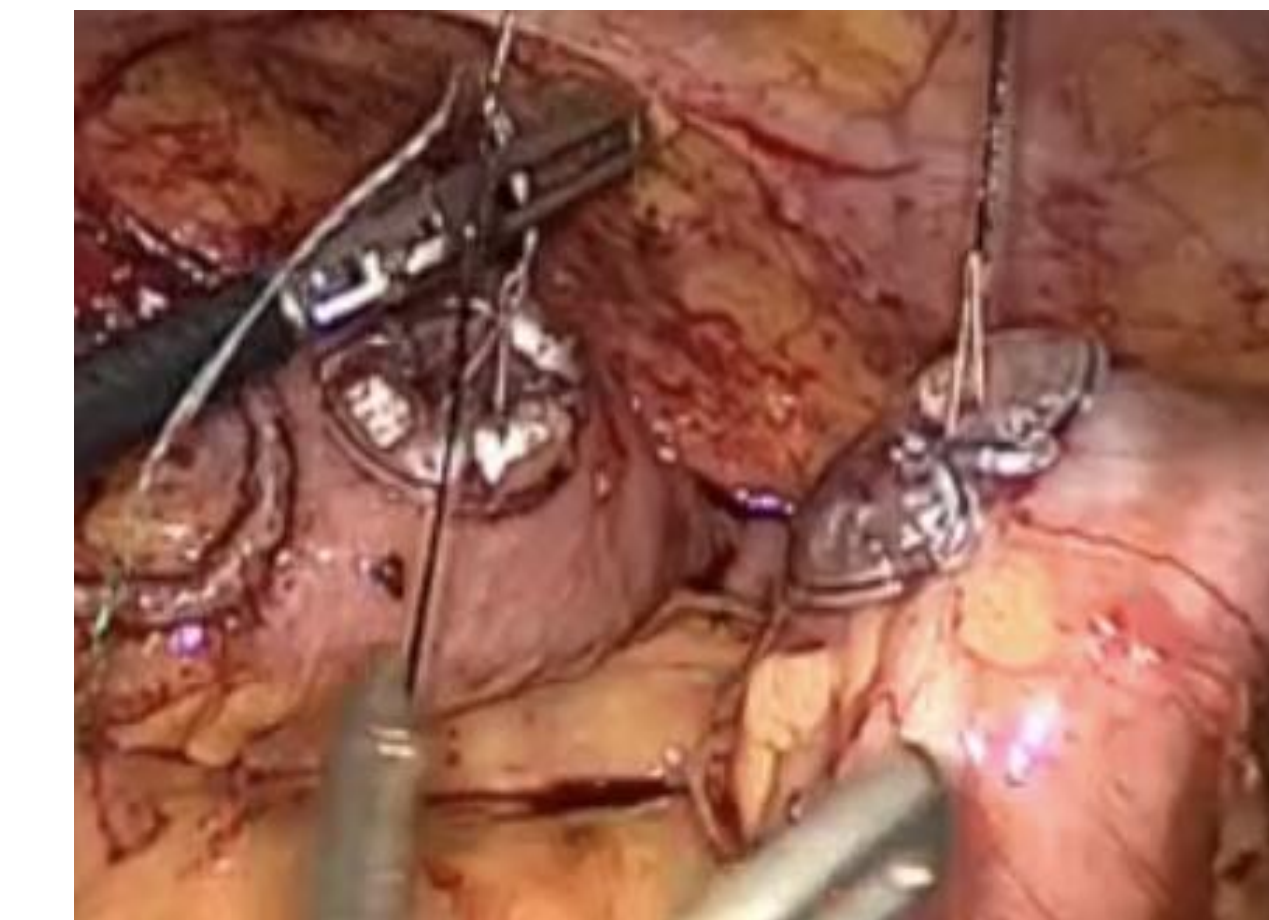
The Flexagon™ is a self-configuring magnetic component that approximates and compresses the tissue edges, facilitating progressive controlled necrosis, remodeling, and healing without sutures, staples, or tissue perforation.



OTOLoc™ Self-forming magnet (Flexagon™)



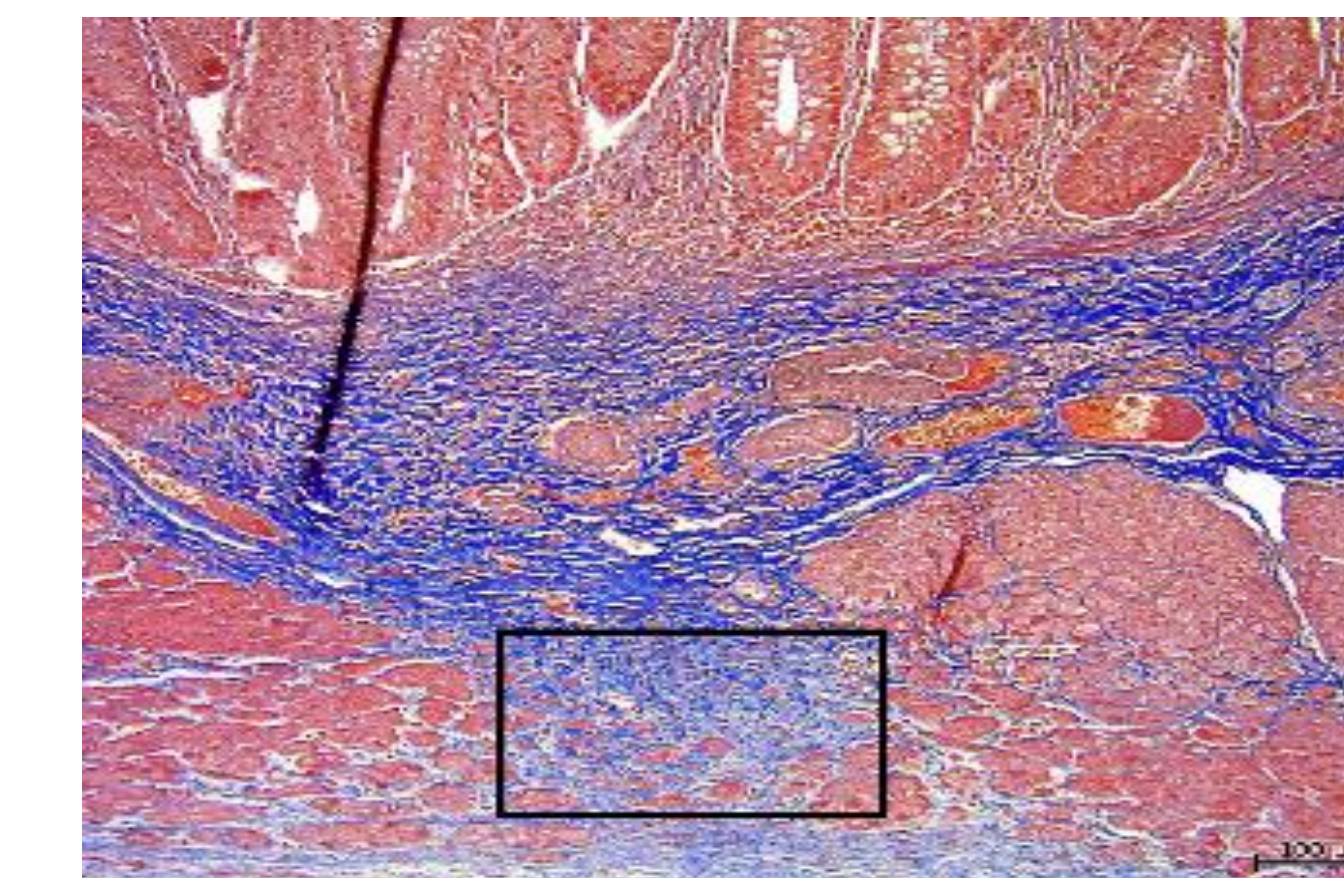
Coupled OTOLoc™ + Flexagon™



Anastomosis is created by deploying one component into each bowel limb, where mutual magnetic attraction generates sustained, uniform compression at the anastomotic interface.



Intracorporeal anastomosis: immediate, staple-free, and suture-free construction.



At the anastomotic site, a band of hypercellular collagen extends transmurally from the mucosa to the serosa, replacing myofibers within the tunica muscularis evidence of progressive tissue remodeling and structural healing (Masson's trichrome stain).

Advantages & Clinical Relevance This technology offers two key advantages. First, it enables rapid intracorporeal colorectal anastomosis construction, addressing a critical unmet need, as a significant proportion of surgeons worldwide face time constraints or technical barriers to performing intracorporeal anastomosis effectively.⁶

Second, by eliminating tissue perforation, it offers the potential for a less traumatic, biologically favorable anastomosis with a reduced risk of microbial infiltration.⁴

The technology has been validated across several cohorts internationally. Building on this evidence, the authors are currently conducting the first FDA-approved clinical trial in the United States, led at the primary author's institution.



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2. Shogan BD, et al. Anastomotic leak toward an understanding of its root causes. *Clin Colon Rectal Surg.* 2022;35(3):183–192. PMC8815793.

3. Gomes MT, et al. Investigation of leakage holes created by needle types used for closure of enterotomies. *Front Vet Sci.* 2018; PMC6243210. (Directly demonstrates that suture needle perforations create transmural leakage pathways proportional to needle size)

4. Buchberg BS, Masoomi H, et al. The use of a compression device as an alternative to hand-sewn and stapled colorectal anastomoses. *J Gastrointest Surg.* 2011;15(2):304–310.

5. Murphy JB. Cholecysto-intestinal, gastro-intestinal, entero-intestinal anastomosis and approximation without sutures. *Med Rec N Y.* 1892;42:665–676.

6. Hoogerboord M, Ellsmere J, Caycedo-Marulanda A, Brown C, Jayaraman S, Urbach D, Cleary S. Laparoscopic colectomy: trends in implementation in Canada and globally. *Can J Surg.* 2019;62(2):139–141. doi:10.1503/cjs.003118. PMC6440892. (Canadian multicenter perspective documenting slow adoption of laparoscopic colectomy and barriers including training gaps)