

APPLICATION OF Y-Z DEFORMABLE MAGNETIC RING FOR RECANALIZATION OF TRANSANAL SINGLE-ACCESS RECTAL STRICTURE

Miaomiao Zhang, Yingying Zhuang, Jianqi Mao, Mingyan Gong, Yuhan Zhang, Aihua Shi, Yi Lyu, **Xiaopeng Yan***

E-mail: yanxiaopeng99@163.com

Department of Hepatobiliary Surgery, The First Affiliated Hospital of Xi'an Jiaotong University

Introduction

Magnetic compression anastomosis (MCA) has been reported to have remarkable clinical outcomes. Here, we tested the applicability of a Y-Z deformable magnetic ring (DMR) for non-surgical manipulation of rectal stenosis (RS) in a beagle dog model under a transanal single-access condition.

Materials and methods

The Y-Z DMR consists of two semicircular magnetic rings (outer diameter: 32 mm, inner diameter: 22 mm, height: 5 mm). The two ends of the semicircle magnetic ring are called the control end and the joint end, respectively, and the control end was used to connect the control line (1-0 silk wire) by adhesive.

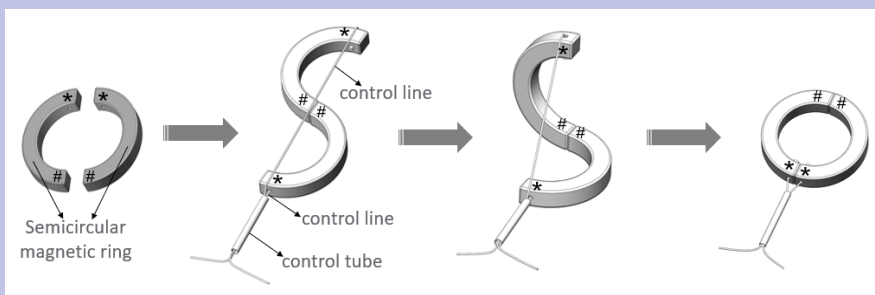


Figure 1. Schematic diagram depicting the Y-Z DMR process.

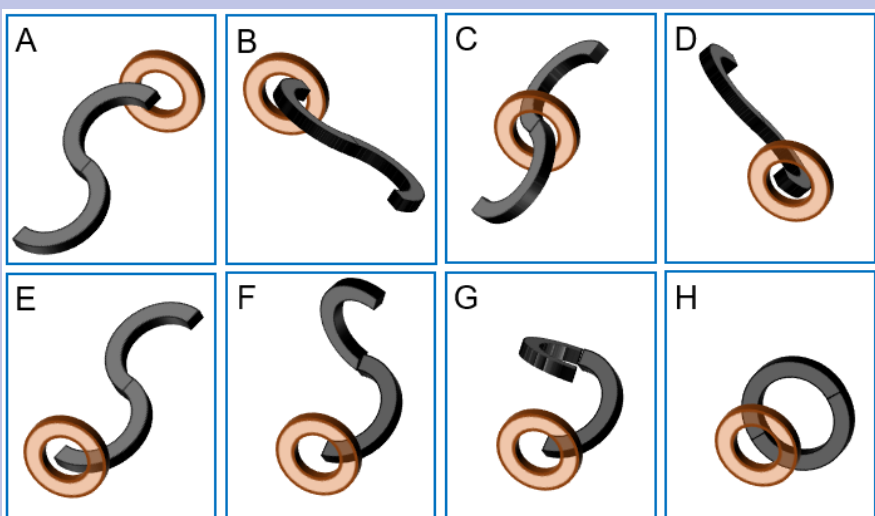


Figure 2. Schematic representation of the state of the Y-Z DMR through the narrow lumen.

This study is a feasibility verification experiment; hence, there was no control group, and all eight beagle dogs were included in the study group. Under an open abdomen, the model of rectal stenosis was prepared through partial ligation with silk thread. The inner diameter of the rectum at the stenosis was approximately 4 mm. The Y-Z DMR was placed into the proximal and distal ends of the stenosis through the anus.

Results

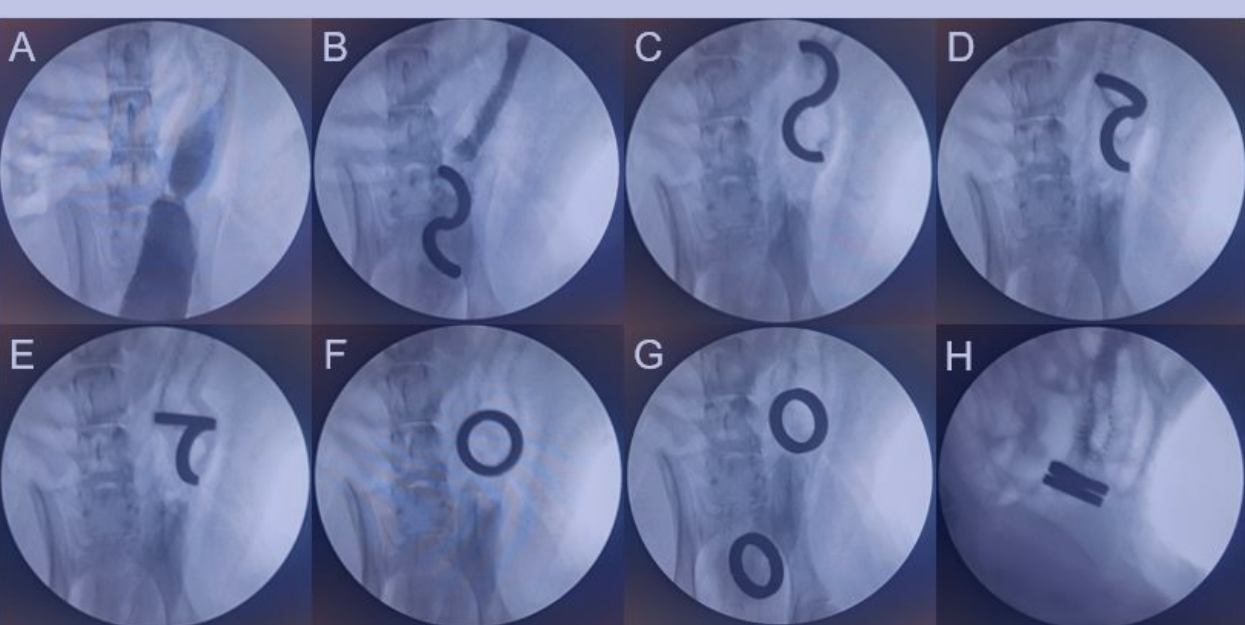


Figure 3. Operational process. (A) Rectography demonstrating rectal stenosis. (B) The “S”-shaped magnetic ring was inserted into the distal rectum. (C) The “S”-shaped magnetic ring was inserted into the proximal rectum. (D,E) The “S”-shaped magnetic ring during deformation. (F) The magnetic ring in the proximal rectum was completely transformed into an “O”-shape. (G) A distal magnetic ring was placed transanally. (H) The magnets at both ends of the rectal stenosis attracted to each other.

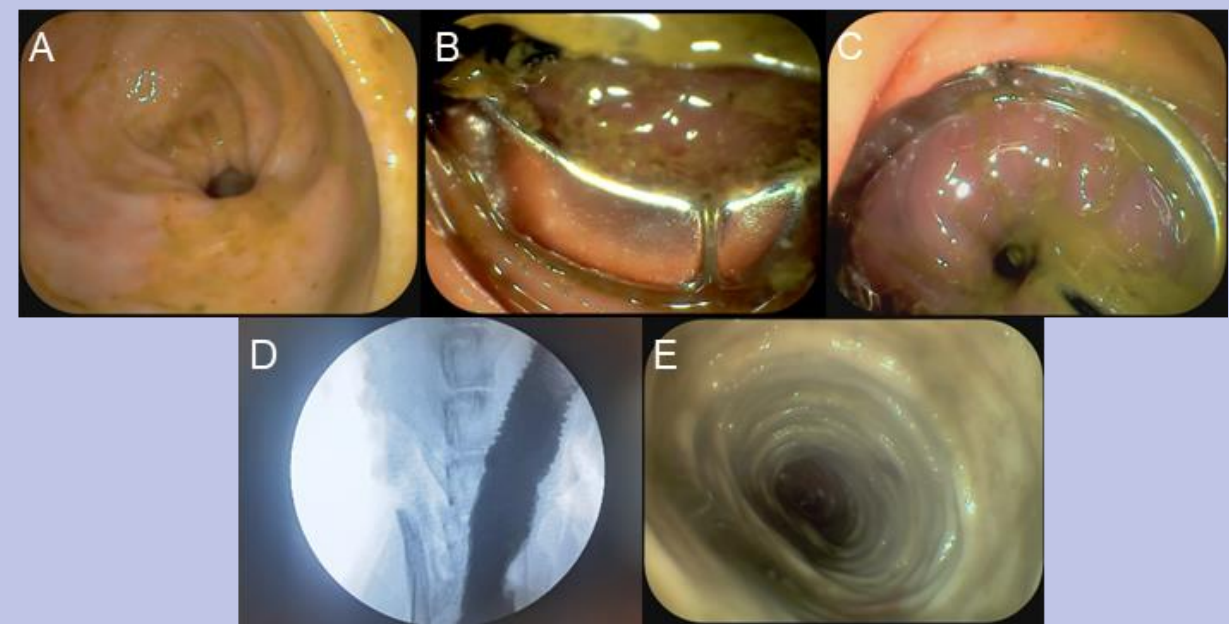


Figure 4. Colonoscopy. (A) Rectal stenosis observed by endoscopy. (B,C) The magnets at the distal end of the rectum observed endoscopically. (D) Rectography was performed after the magnets were excreted. (E) Colonoscopy showing good rectal patency after the magnets were excreted.



Figure 5. The magnets expelled from the body. (A,B) Magnets in the upper and side view. (C) Magnets and necrotic rectal tissues.

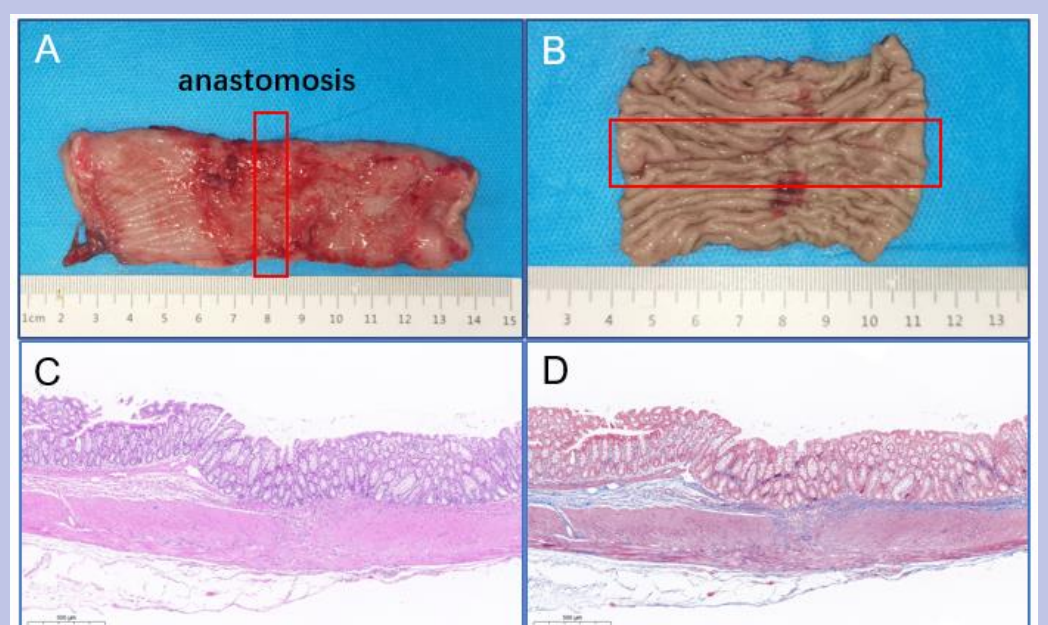


Figure 6. Gross and histological observation of anastomosis. (A) The serosal surface of the rectal anastomosis. (B) The mucosal surface of the rectal anastomosis. (C) The anastomosis stained with HE (2×). (D) The anastomosis stained with Masson (2×).

Conclusion

In conclusion, the Y-Z DMR can be successfully inserted and properly formed in an animal model. AS following rectal cancer surgery under a single transanal pathway can be effectively treated with magnetic anastomosis technology.