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CASE REPORT

Magnetic compression anastomosis for sigmoid stenosis treatment: A case report

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Abstract

BACKGROUND

Endoscopic balloon dilation is a minimally invasive treatment for colorectal stenosis. Magnetic compression anastomosis can be applied against gastrointestinal anastomosis. When combined with endoscopy, it offers a unique approach to the recanalization of colorectal stenosis.

CASE SUMMARY

We have reported here the case of a 53-year-old female patient who underwent a descending colostomy due to sigmoid obstruction. Postoperative fistula restoration was not possible in her due to sigmoid stenosis. Accordingly, endoscopic-assisted magnetic compression anastomosis for sigmoid stenosis was performed, and the sigmoid stenosis was recanalized 15 d after the surgery. Subsequently, a reduction colostomy was successfully performed after 10 d.

CONCLUSION

This case report proposes a novel minimally invasive treatment approach for colorectal stenosis.

Key Words: Colorectal stenosis; Endoscopy; Magnetic compression anastomosis; Magnamosis; Magnetosurgery; Case report

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Core Tip: Colorectal stenosis is common in clinical practice, for which endoscopic treatment is the preferred choice; however, most patients require multiple balloon dilation or even stent placement. Clinicians should consider the novel approach of endoscopic magnetic compression anastomosis in applicable cases of colorectal stenosis.

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INTRODUCTION

Colorectal anastomotic stenosis usually occurs after colorectal cancer surgery or even after radiation therapy for abdominal and pelvic tumors. Endoscopic balloon dilation or stent placement is the main clinical approach in such cases. However, some patients with severe stenosis often require multiple endoscopic treatments, albeit show poor outcomes. Re-surgery may incur a very high rate of restenosis and refrain patients from an opportunity to restore the stoma, which may seriously affect their quality of life. The combination of magnetic compression anastomosis with endoscopic technique provides a new minimally invasive treatment modality for rectal stenosis.

CASE PRESENTATION

Chief complaints

A 53-year-old female patient was admitted to our hospital on July 26, 2022, for sigmoid stenosis. The patient had undergone a descending colostomy in a local hospital for sigmoid obstruction 11 mo ago and had recovered well after surgery. One month ago, she was treated in the same hospital for a reduction colostomy. A colonoscopy revealed that her sigmoid was narrow (Figure 1), hence the reduction operation could not be performed. For further treatment, the patient was admitted to the Magnetic Surgery Clinic of the First Affiliated Hospital of Xi'an Jiaotong University.

History of present illness

At 11 mo ago, the patient underwent a descending colostomy in a local hospital for sigmoid obstruction and a colonoscopy 1 mo before the indication of sigmoid stenosis.

History of past illness

The patient was diagnosed with cervical cancer at a local hospital 9 years ago and has been clinically cured after multiple radiotherapy treatments. She has a history of hypertension for 1 year and diabetes for 2 years. Through oral drug treatment, her blood pressure and blood glucose levels were well-controlled.

Personal and family history

The patient did not have any relevant family medical history.

Physical examination

The patient's vital signs were stable, with no obvious abnormalities in the physical examination of both her lungs and heart; her abdomen was flat and soft, with no abdominal tenderness; Shifting dullness in the abdomen was negative, and bowel sounds were normal, and the descending colostomy stoma was visible in the left lower abdomen.

Laboratory examinations

The patient's hematology results were normal.

Imaging examinations

A small amount of contrast agent could enter the proximal intestinal tube through the stenosis, and the intestinal tube could be fully developed through the catheterization of the colostomy, indicating sigmoid stenosis (Figure 2).

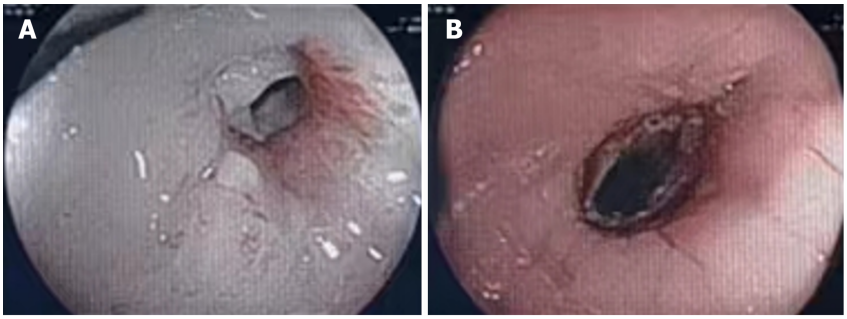

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Figure 1 Colonoscopy. A: Distal stenosis; B: Proximal stenosis.

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Figure 2 Colonography: Arrow points to the stenosis.

FINAL DIAGNOSIS

According to the medical history of the patient, imaging examination, and colonoscopy, sigmoid stenosis was clearly diagnosed.

TREATMENT

The patient underwent endoscopy-assisted magnetic compression anastomosis of sigmoid stenosis under intravenous anesthesia on July 27, 2022. After the patient was administered intravenous anesthesia, a colonoscopy was conducted in the right lateral position through the descending colostomy. A stenosis could be visible at a distance of 15 centimeters from the colostomy during colonoscopy. A zebra guide wire was next sent through the biopsy hole, and the lead end of the guide wire was passed through the narrow segment of the sigmoid colon into the distal intestinal. The daughter magnet and the parent magnet were inserted through the zebra guide wire at the end of the colostomy and the anal end, respectively, and the push tube was pushed close to the narrow section along the zebra guide wire, as such the parent and daughter magnets were automatically attracted (Figure 3A and B). After the X-ray images confirmed that the magnets were attracted (Figure 3C), the zebra guide wire was removed. After the operation, the patient was returned to the ward safely.

X-ray examination was performed weekly after the operation to monitor the positions of the magnets (Figure 4A and B). On the 15th day of the operation, the parent and daughter magnets were removed *via* colonoscopy (Figure 4C). The magnetic compression anastomosis was established under colonoscopy (Figure 4D). Finally, the patient underwent colostomy reduction 10 d later.

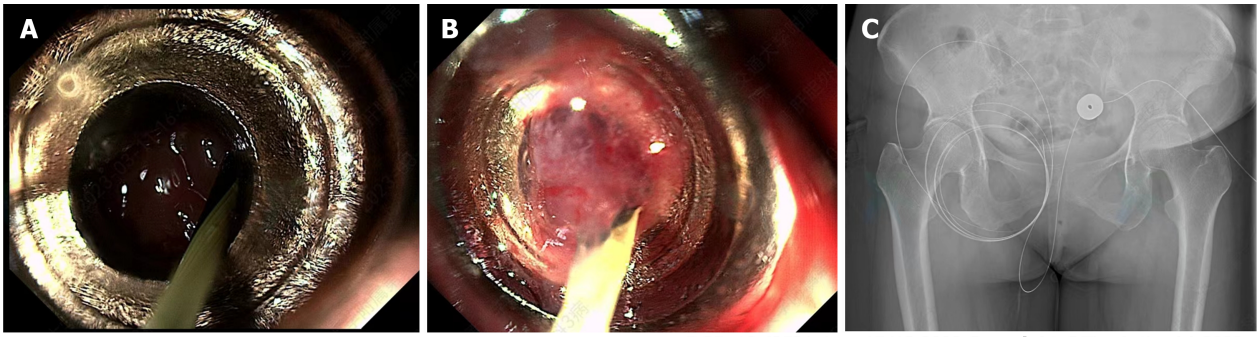

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Figure 3 Magnet placement process. A: The daughter magnet was inserted through the colostomy; B: The parent magnet was inserted through the anus; C: Intraoperative X-ray examination confirmed that the daughter and parent magnets were attracted.

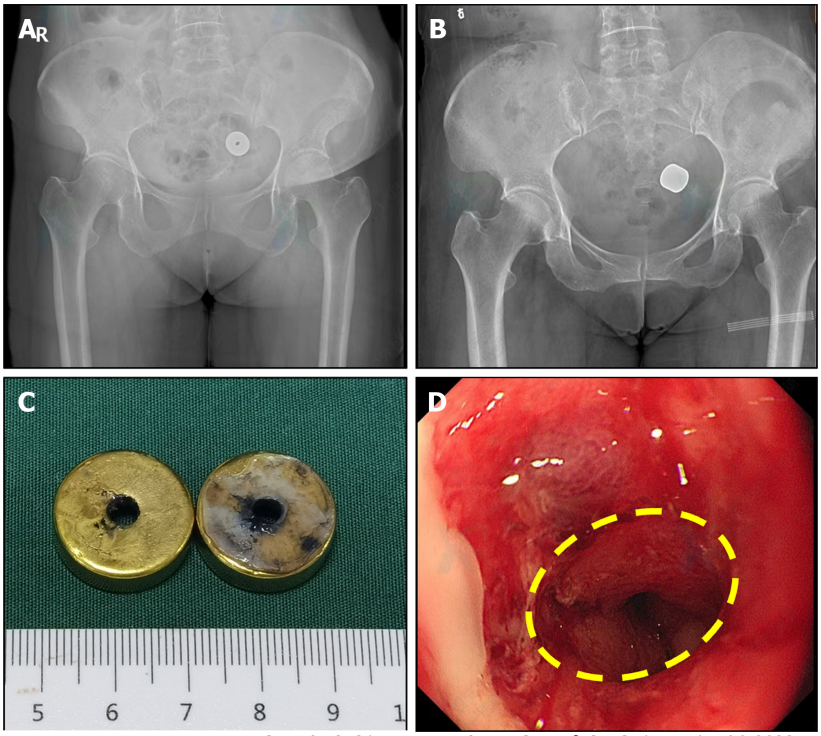

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Figure 4 Postoperative X-ray and colonoscopic observations. A: X-ray examination 1 wk after the surgery; B: X-ray examination 2 wk after the surgery; C: The magnet was removed by colonoscopy 15 d after the surgery; D: The anastomosis was detected on colonoscopy.

OUTCOME AND FOLLOW-UP

The 13-mo follow-up of the patient showed a generally good condition with normal bowel movements.

DISCUSSION

Colorectal stenosis is a common clinical disease, whose clinical treatment is mainly based on endoscopic balloon dilation or stent placement[1], it has the advantages of less trauma and not affected by enterostomy. However, some patients often require multiple endoscopic treatments. Patients who do not respond well to endoscopic therapy may face re-surgery or permanent indwelling. In 1978, Obora *et al*[2] was the first to report the use of magnets for vascular anastomosis research [2], and after more than 40 years of its development, magnetic compression anastomosis is being applied for digestive tract anastomosis[3,4], vascular anastomosis[5,6], and magnetic compression cystostomy[7]. The combination of magnetic compression anastomosis and endoscopic technique can transform some surgical operations into endoscopic ones, which offers unique advantages for the treatment of gastrointestinal stenosis[8].

This present case presented the following two characteristics: (1) The surgical procedure was simple, mainly because the zebra guide wire could pass through the narrow section of the intestinal tube and the length of the narrow section was small, because of which the magnetic force of conventional magnets met the requirements; (2) The parent and daughter magnets remained discharged for 2 wk. The shedding time of magnets during digestive tract magnetic compression anastomosis is closely related to the anastomosis site, magnetic force, inflammatory scar formation of the digestive tract, and other related factors. Owing to the limited clinical reports on such cases, it remains impossible to determine the reasonable time range of magnets excreted during the digestive tract magnetic compression anastomosis. In our previous large animal experiments, we found that gastrointestinal magnetic compression anastomosis could be established in 10–14 d after the surgery. Therefore, in the present case, we removed the magnets under the endoscope 15 d after the surgery, and the results indicated that the anastomosis was well-formed by this time; and (3) Based on the patient's history, we believe that the cause of the patient's sigmoid stenosis may be related to pelvic radiation therapy. Radiation enteritis is usually treated with medication or endoscopy, but this patient developed severe sigmoid stenosis and caused intestinal obstruction, and did not respond to medication or endoscopy. Presently, only a few cases have been reported in the literature using magnetic compression anastomosis to treat colorectal stenosis, and the relevant clinical application experience is limited. The successful implementation of this case thus enriches the clinical application experience of magnetic surgery and can provide valuable learning and reference significance for future applications.

CONCLUSION

This case report proposes a new approach for clinicians to treat colorectal stenosis. A combination of magnetic compression anastomosis with endoscopic technique can be potentially applied for the treatment of colorectal stenosis, considering the advantages of simple operation, non-trauma, and exact effect achieved through this procedure.

FOOTNOTES

Co-first authors: Miao-Miao Zhang and Yi Gao.

Co-corresponding authors: Xiao-Peng Yan and Yi Lyu.

Author contributions: Zhang MM and Gao Y contributed equally to this work and are the co-first author; Lyu Y and Yan XP designed the operational plan; Ren XY and Yan XP performed the endoscopic magnetic compression anastomosis; Dong FF assisted in patient care; Zhang MM and Gao Y wrote the manuscript; Zhang MM, Gao Y and Sha HC assisted in data collection and manuscript revision; all authors have read and approved the final manuscript.

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