



Contents lists available at ScienceDirect

International Journal of Surgery Case Reports

journal homepage: www.casereports.com

Report of video-capsule endoscopy disruption producing episodic small bowel obstruction after prolonged retention



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ARTICLE INFO

Article history:

Received 27 August 2014

Accepted 20 October 2014

Available online 23 October 2014

Keywords:

Capsule endoscopy

Crohn's disease

Foreign body

Inflammatory bowel diseases

Intestinal obstruction

ABSTRACT

INTRODUCTION: Wireless video-capsule endoscopy is a procedure which provides direct visualization of the gastrointestinal tract, particularly the jejunum and ileum. Capsule retention is the main risk associated with capsule endoscopy, occurring at a significantly elevated incidence in patients with known or suspected Crohn's disease.

PRESENTATION OF CASE: A case of a prolonged retained capsule with subsequent fragmentation producing a multicentric complete small bowel obstruction in a 39 year old male patient who had undergone wireless video capsule-endoscopy approximately three years prior. Management required surgical resection of the strictured jejunum and removal of retained capsule fragments under fluoroscopic guidance.

DISCUSSION: Although capsule endoscopy is capable of diagnosis, evaluation, and monitoring inflammatory bowel disease, understanding the elevated risk for capsule retention is important in this population. Specifically, prolonged capsule retention appears to increase the risk of capsule disruption, and likely the potential for intestinal perforation.

CONCLUSION: Patients should therefore be carefully selected for monitoring based upon treatment compliance and offered early endoscopic or surgical intervention in the setting of questionable compliance due to the risk for capsule disruption and subsequent intestinal perforation.

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1. Introduction

Wireless video capsule-endoscopy (VCE) is a valuable method for evaluating the gastrointestinal tract, which was first approved by the FDA in 2000.¹ The PillCam SB (Given Imaging, Duluth, Georgia) is the sole approved VCE available in the United States, measuring 1.1 cm × 2.6 cm and consists of a plastic capsule encasing a metal oxide silicon chip camera, lens, six light-emitting diodes (LED), two silver dioxide battery sources, and an ultra-high frequency radio-transmitter. Along with double-balloon endoscopy (DBE), capsule endoscopy allows for direct visualization of small intestinal lesions and monitoring of chronic disease.¹ Current applications and contraindications to the use of capsule endoscopy are shown in Table 1. In particular, potential benefits of capsule endoscopy in the setting of Crohn's disease are to diagnose lesions absent on initial imaging, monitor the activity of disease, identify post-operative exacerbations, and screening for neoplastic or infectious lesions in established disease.²

Although the VCE is a relatively small device, capsule retention is a significant complication that is often under-recognized. Capsule retention is more likely to occur in patients with established contraindications shown in Table 1. In particular, Crohn's disease has been shown to increase risk of capsule retention more than any other established risk factor with an incidence up to 7.3%.^{3,4} Although spontaneous passage of a retained capsule has been described after a brief period, the associated incidence of small bowel obstruction requiring eventual intervention for capsule extraction via double-balloon endoscopy or surgical resection has been shown to be approximately 7.3%.^{2,3}

In the setting of retained VCE, the most significant complication that must be evaluated for is intestinal perforation. While the morbidity and mortality for intestinal perforation secondary to a retained VCE is significant, to date there have only been three cases reported since the original FDA approval.^{5–7} In each reported case active Crohn's disease was noted at the site of the capsule-associated intestinal perforation, suggesting thinning and friability as a predisposing pathophysiologic event to the perforation. Despite multiple components, to date there is only a single case report of mechanical failure in the device allowing capsule fragmentation.⁸ If capsule fragmentation occurs however, the risk for intestinal perforation would likely significantly increase risk of intestinal perforation. We report a single case of a patient with a

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Fig. 1. Computed tomography imaging findings of the patient presenting with acute abdominal pain found to have partial small bowel obstruction with stricture-type Crohn's disease. An incidental finding of intra-luminal metallic foreign bodies within the mid-jejunum and proximal ileum proximal to stricture points was also made.

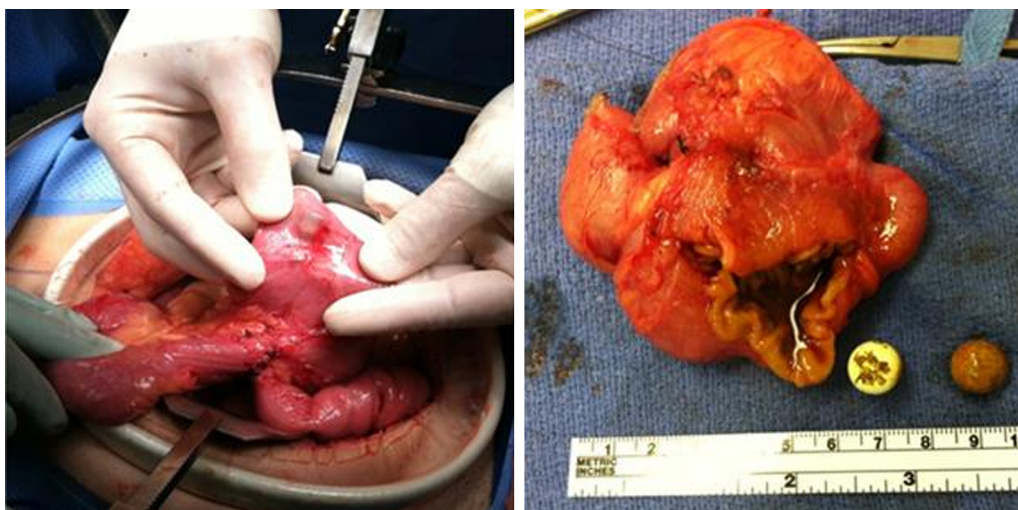


Fig. 2. Findings at the time of surgical exploration demonstrated a fragmented video-capsule endoscopy capsule with inability to pass beyond strictured regions of the jejunum and ileum. Management required resection of the stricture point at the previous enteroenterostomy and removal of the capsule fragments.

retained capsule endoscopy for three years with evidence of multicentric small bowel obstruction secondary to capsule fragments located at strictured small intestine.

2. Presentation of case

A 39 year old male presented to the Emergency Department with an acute episode of sharp abdominal pain, nausea, and bilious emesis for approximately 48 h. He reportedly had multiple similar episodes in the past which had been determined to be partial small bowel obstructions. CT of the abdomen demonstrated intestinal wall thickening from the mid-jejunum to the terminal ileum with a visible stricture in the distal jejunum, as shown in Fig. 1. Dilated small bowel loops were located proximal to a previous enteroenterostomy where a metallic object was located. An additional metallic object was present within the distal jejunum. A diagnosis of partial small bowel obstruction was made based on clinical and radiologic imaging, which appeared to be secondary to intra-luminal foreign bodies located at a jejunal stricture.

The patient had been previously diagnosed with Crohn's disease by colonoscopy at approximately age 18 and had required two previous surgeries for enterectomy of stricture disease. He had resisted continued disease-modifying medications and continued to have episodes of abdominal pain. Approximately 3 years prior to the presenting episode he had undergone a VCE procedure to evaluate activity of his Crohn's disease by a local gastroenterologist. The patient reported that he was unable to pass the capsule and due to non-compliance with follow-up did not present for further evaluation. He denied noticing passage of the capsule between its placement and the presenting episode. He subsequently had developed episodes of sharp abdominal pain similar to his previous episodes of small bowel obstructions which resolved after several days of self-management.

The patient underwent urgent exploratory laparotomy for structuring Crohn's disease with small-bowel obstruction and retained capsule. At exploration he was found to have a previous loop enteroenterostomy at the mid-jejunum with a stricture located at the anastomosis and a capsule fragment located at the stricture

Table 1

Summary of American Society of Gastrointestinal Endoscopy (ASGE) indications and contraindications for wireless video-capsule endoscopy (VCE).

Indications	Contraindications
Obscure gastrointestinal bleeding	Known or suspected gastrointestinal obstruction, stricture, or fistula
Suspected Crohn's disease	Cardiac pacemaker or implanted electronic medical devices
Suspected small intestinal tumors	Known swallowing disorders
Surveillance of polyposis syndromes	Pregnancy
Suspected or refractory mal-absorptive syndromes	

proximally as shown in Fig. 2. An additional capsule fragment was located distally at an additional stricture point within the proximal ileum. The capsule fragments were removed through enterotomy and resection of the strictured jejunum was performed, with subsequent side–side enteroenterostomy. Pathology of the resected strictured jejunum demonstrated focal scarring without active disease foci. Post-operatively the patient was monitored and demonstrated return of oral feeding tolerance and complete resolution of pain. He was evaluated for incidental findings of liver masses on admission imaging and diagnosed with multiple small hepatic hemangiomas. He was seen in outpatient follow-up and has remained symptom free.

3. Discussion

Wireless VCE represents an important evaluation method for the jejunum and ileum due to the significant length, generally inaccessibility to traditional endoscopic methods, and low sensitivity and specificity of traditional imaging modalities. The American Society for Gastrointestinal Endoscopy (ASGE) developed and published recommended indications and contraindications for VCE in 2006, Table 1.¹ An important contraindication included in these guidelines is the presence of a stricture or small bowel obstruction. A previous study by Cheon et al. demonstrated that diagnosed or suspected Crohn's disease is associated with a statistically significant risk of capsule retention compared to all other causes of retained VCE capsules.⁴

There have been reported successes in spontaneous passage of retained VCE capsules in patients with Crohn's disease.^{9,10} In the presence of suspected active Crohn's disease with absence of findings concerning for intestinal perforation or non-resolving small

bowel obstruction a reasonable approach may be treatment with immunosuppressant therapy.¹⁰ However, without clear evidence of active Crohn's disease, clinical findings concerning for bowel perforation, or failure to progress on immunosuppressant therapy the evidence clearly supports prompt surgical intervention to prevent complications associated with free intestinal perforation.^{5,6,11}

4. Conclusion

To date VCE capsule disruption has not been a well-established risk factor. There are now only two documented cases of capsule disruption; both which occurred after capsule retention of approximately three years.⁸ In both patients the etiology for prolonged retained VCE capsule was poor treatment compliance and loss of follow-up. Although neither patient was found to have intestinal perforation, both patients were known to have multi-centric small bowel obstructions. Increased sites for small bowel obstructions likely places the patient at increased risk for vascular compromise and subsequent perforation compared to the population. Due to this risk we propose physicians include the ability for reliable patient follow-up if capsule retention occurs during the decision-making process for patients and early consideration for surgical or endoscopic intervention in patients with concern for non-compliance.

Conflict of interest

The authors have no conflict of interest to report.

Funding

None.

Ethical approval

The information contained for this study was deemed exempt from IRB review by the Orlando Health IRB office.

Author contributions

NAR and CDF performed the patient care as well as conceptual work, data collection, and data analysis for the manuscript. NAR performed the initial manuscript preparation. NAR and CDF performed critical revisions and final approval of the manuscript.

Key learning points

- Wireless video-capsule endoscopy is associated with elevated risk for capsule retention and intestinal obstruction in the setting of Crohn's disease.
- Prolonged video-capsule endoscopy retention may predispose to capsule fragmentation and intestinal perforation.

Acknowledgements

The authors wish to thank Dr. Enrique Santa Ana for his assistance with the management of this patient.

References

1. Mishkin DS, Chuttani R, Croffie J, Disario J, Liu J, Shah R, et al. ASGE technology status evaluation report: wireless capsule endoscopy. *Gastrointest Endosc* 2006;**63**(4):539–45.
2. de Melo Jr SW, Di Palma JA. The role of capsule endoscopy in evaluating inflammatory bowel disease. *Gastroenterol Clin North Am* 2012;**41**(2):315–23.
3. Atay O, Mahajan L, Kay M, Mohr F, Kaplan B, Wyllie R. Risk of capsule endoscope retention in pediatric patients: a large single-center experience and review of the literature. *J Pediatr Gastroenterol Nutr* 2009;**49**(2):196–201.
4. Cheon JH, Kim YS, Lee IS, et al. Can we predict spontaneous capsule passage after retention? A nationwide study to evaluate the incidence and clinical outcomes of capsule retention. *Endoscopy* 2007;**39**(12):1046–52.
5. Palmer JS, Marenah K, El Madani F, Jain K, Gupta S. Small bowel perforation following capsule endoscopy: a case report. *Ann R Coll Surg Engl* 2011;**93**(6):e69–70.

6. Yitzhak A, Bayme M, Perry ZH, Mizrahi S. Small bowel perforation after capsule endoscopy in a patient with occult gastrointestinal bleeding and undiagnosed Crohn's disease. *Am Surg* 2012;**78**(3):E159–61.
7. Um S, Poblete H, Zavotsky J. Small bowel perforation caused by an impacted endocapsule. *Endoscopy* 2008;**40**(Suppl. 2):E122–3.
8. de Magalhaes Costa MH, da Luz Moreira A, Zaltman C. Wireless capsule endoscopy fragmentation in a patient with Crohn's disease. *Clin Gastroenterol Hepatol* 2011;**9**(11):e116–7.
9. Triantafyllou K, Kalli T, Danias NG. Spontaneous resolution of capsule endoscope retention in a normal small bowel after 2.5 years. *Endoscopy* 2010;**42**(Suppl. 2):E87–8.
10. Vanfleteren L, van der Schaar P, Goedhard J. Ileus related to wireless capsule retention in suspected Crohn's disease: emergency surgery obviated by early pharmacological treatment. *Endoscopy* 2009;**41**(Suppl. 2):E134–5.
11. Bai Y, Gao J, Song B, Zhou YQ, Zou DW, Li ZS. Surgical intervention for capsule endoscope retained at ileal stricture. *Endoscopy* 2007;**39**(Suppl. 1):E268–9.

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