

## Retained Capsule Endoscope

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**Background:** Capsule endoscopy was invented to visualize the entire small intestine in a non-invasive manner in adults. **Case characteristics:** 1 y, 9 mo-old boy presented with generalized edema for last 3 months. His routine investigations, including the upper gastrointestinal endoscopy, colonoscopy, and contrast enhanced computed tomography scan (CECT) were normal. In view of clinical suspicion of protein losing enteropathy, we planned capsule endoscopy. **Observation:** The capsule was not passed even after 3 weeks. Laparoscopy revealed impacted capsule in a dilated intestinal loop proximal to an ileal stricture. **Message:** Capsule endoscopy should be used judiciously in children.

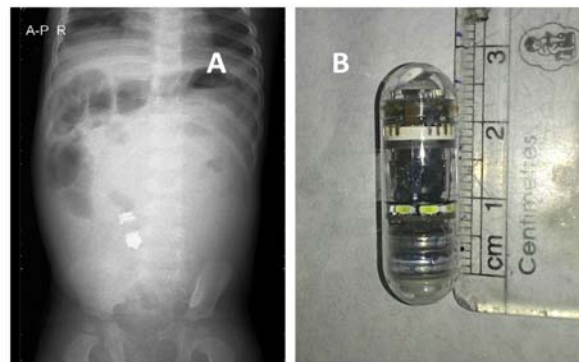
**Keywords:** Bowel obstruction, Capsule endoscopy, Complication.

Capsule endoscopy was invented to visualize the entire small intestine in a non-invasive manner. Later, its use was widened to include children [1,2]. However, capsule endoscopy CE has its own limitations in children, and should be used judiciously.

### CASE REPORT

A 21-month-old boy presented to us with generalized edema for last 3 months. Previously, patient was evaluated elsewhere and was treated for hypoalbuminemia with clinical improvement. On admission, child had anasarca and anemia. He weighed 10 kg and had a length of 74.5 cm (<3<sup>rd</sup> centile). His hemoglobin level was 5.1 g/dL, serum proteins were 3.7 g/dL, serum albumin was 1.5 g/dL, and serum globulins were 1.6 g/dL. Stool examination for ova, cysts and occult blood was negative. Paediatric Crohn's Disease Activity Index was 37.5, suggesting moderate disease activity. Further investigations including echocardiogram, upper gastro-intestinal (GI) endoscopy and colonoscopy, contrast enhanced computed tomography scan (CECT) were normal. In view of clinical suspicion of protein losing enteropathy, we planned capsule endoscopy. As the child was not able to swallow the capsule, it was placed under endoscopic guidance into the third part of duodenum using endoscopic basket. Child was discharged with advice of close follow up. We used the new version *CapsoCam SVI* (Capsovision, CA) of size 11 mm × 31 mm, which provides panoramic 360° images with a higher frequency of 20 frames per second for the first 2 h and thereafter 12 frames/s, with a battery life of 15 h.

In view of non-evacuation of capsule even after 3 weeks, we evaluated him with abdominal radiography and ultrasonography (USG) which revealed the retained capsule in the small bowel (**Fig. 1a**). A diagnostic laparoscopy was done which revealed impacted capsule in the dilated mid ileal loop proximal to the stricture. The capsule was retrieved (**Fig. 1b**) and segment of ileum including focal stricture, a short circumferential narrowing of 2 mm width, was resected and end-to-end anastomosis was done. The small bowel mesentery was normal without any significant lymph node enlargement. Gross examination of resected ileum did not show any ulcers. Histopathological examination of the resected segment of ileum revealed stricture without any ulcers with focal pyloric gland metaplasia with viable surgical margins. Surprisingly, the images captured by the capsule were all normal. Child is doing well for after year of follow-up.



**FIG. 1** (a) X-ray showing capsule endoscope in small bowel; (b) CAPSCOCAM Capsule endoscope.

## DISCUSSION

Indications for capsule endoscopy in children include evaluation of the small-bowel mucosa for evidence of Crohn's disease, occult bleeding, celiac disease, polyps, graft-versus-host disease, lymphangiectasia, and diseases contributing to growth failure or abdominal pain [2]. Capsule endoscopy is considered safe and well tolerated, and has been approved by the U.S. Food and Drug Administration for children  $\geq 2$  years of age [3]. American Societies for Gastrointestinal Endoscopy (ASGE) guidelines recommend its use in children as young as 2 years in special circumstances [3]. The primary limitations of performance of this procedure in pediatric patients include the inability to swallow the capsule or tolerate placement because of the inability to pass the upper esophageal sphincter or pylorus.

Fritscher and Ravens [4] tried the feasibility and safety of capsule endoscopy in a 1.5-year-old child. Another case report was published on successful use of the capsule in a 10-month-old infant weighing 7.9 kg [5]. In patients who are unable to swallow the capsule, the capsule can be placed endoscopically in the third part of duodenum, using retrieval nets, snares, or dedicated capsule placement devices to prevent migration back into the stomach [2,3,6].

The main risk associated with capsule endoscopy is capsule retention, which has been reported to occur in less than 1% of pediatric patients [3]. The International Conference on Capsule Endoscopy (ICCE) consensus defined the capsule retention as, having a capsule endoscope remaining in the digestive tract for a minimum of 2 weeks, or a capsule remaining in the bowel for a shorter period with symptoms requiring medical, endoscopic or surgical intervention [2,7]. A capsule retention rate of 1.4% was reported in a large series of 207 pediatric patients, which is similar to the rate in adults [8]. In the present case, histopathology revealed lamina propria infiltrated with neutrophils, lymphocytes and many eosinophils with a stricturous area showing focal pyloric gland metaplasia and submucosal fibrosis. This is the one of the earliest pathological findings for Crohn's disease [9]. Only a few such cases have been reported in India.

Role of laparoscopy in the detection of the retained capsule is well established. Moreover, definitive surgery to resect the pathologic stricture can also be performed. We retrieved the retained capsule with laparoscopy-assisted procedure, and we were able to carry out resection and anastomosis of the focally strictured ileal segment.

Newly designed non visualizing dissolvable capsule with two timer plugs has been developed in order to

minimize the risk of retention [10]. However, few cases of capsule retention requiring emergency surgery have even been described with this patency capsule [10]. A retained capsule may indicate unsuspected stricture, which might require surgical intervention.

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