

# Capsule Endoscope Aspiration after Repeated Attempts for Ingesting a Patency Capsule

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## Key Words

Capsule endoscopy · Complication · Obscure gastrointestinal bleeding · Respiratory aspiration · Patency capsule

## Abstract

Capsule endoscope aspiration into the respiratory tract is a rare complication of capsule endoscopy. Despite the potential seriousness of this complication, no accepted methods exist to accurately predict and therefore prevent it. We describe the case of an 85-year-old male who presented for evaluation of iron deficiency anemia. He complained of dysphagia while ingesting a patency capsule, with several attempts over a period of 5 min before he was successful. Five days later, he underwent capsule endoscopy, where he experienced similar symptoms in swallowing the capsule. The rest of the examination proceeded uneventfully. On reviewing the captured images, the capsule endoscope was revealed to be aspirated, remaining in the respiratory tract for approximately 220 s before images of the esophagus and stomach appeared. To our knowledge, this is the first documented case of a patient who experienced capsule endoscope aspiration after ingestion of a patency capsule. This case suggests that repeated attempts required for ingesting the patency capsule can predict capsule endoscope aspiration. We presume that paying sufficient attention to the symptoms of a patient who ingests a patency capsule could help us prevent serious complications such as aspiration of the capsule endoscope. In addition, this experience implies the potential risk

for ingesting the patency capsule. We must be aware that the patency capsule could also be aspirated and there may be more unrecognized aspiration cases.

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## Introduction

Capsule endoscopy is a safe and well-tolerated procedure allowing the direct, noninvasive mucosal investigation of the small bowel. There are, however, a few limitations [1]. Capsule retention is a source of major concern because it may lead to intestinal obstruction or perforation. Patency capsules were developed to assess and assure the small bowel patency prior to diagnostic capsule endoscopy. Identical in size to the actual capsule endoscope, it is designed to dissolve on contact with intestinal fluids to avoid small bowel obstruction. In patients who successfully passed the patency capsule, there are no reported cases of capsule retention in subsequent capsule endoscopy procedures [2, 3].

Accidental capsule endoscope aspiration into the upper respiratory tract, which is a less anticipated consequence, has been reported with increasing frequency [4]. In most cases, patients expel the capsule endoscope from the respiratory tract on their own. However, in several cases, induced respiratory distress necessitates using general anesthesia to remove the aspirated capsule by bronchoscopy. There are no accepted means to accurately predict and therefore prevent capsule endoscope aspiration. Herein, we report a case of accidental capsule endoscope aspiration, preceded by repeated attempts to ingest the patency capsule. Presumably, repeated attempts for ingesting the patency capsule might have predicted capsule endoscope aspiration.

## Case Presentation

We present the case of an 85-year-old man with type 2 diabetes, hypertension, and atrial fibrillation who was referred to the hematology unit of our hospital for evaluation of anemia 2 months before. He was diagnosed with iron deficiency anemia; thus, he was recommended to cease the use of an antithrombotic agent, receive iron replacement therapy, and undergo investigation of the digestive tract. On presentation, he was asymptomatic and chair bound due to lower extremity muscle weakness with advanced age. He had blurred vision because of severe diabetes retinopathy, but he and his wife denied hemorrhagic vomiting, melena, and hematochezia. They also denied any history of cerebrovascular and neurodegenerative disorders. He had a distal gastrectomy with Billroth I reconstruction secondary to gastric ulcer at the age of 46. Physical examination showed a thin and frail-appearing male, pale palpebral conjunctiva, and no remarkable findings on chest and abdomen. Laboratory studies revealed the following: hemoglobin, 9.3 g/dl, which improved from 6.9 g/dl at last visit; leucocyte count, 5,400/ $\mu$ l; platelet count, 207,000/ $\mu$ l; serum iron, 44  $\mu$ l/dl, and ferritin, 480 ng/ml. Liver enzymes, kidney function test, and clotting function were within normal range. Esophagogastroduodenoscopy revealed atrophic gastritis of the remnant stomach, but no hemorrhagic lesion. There was no esophageal stenosis. Colonoscopy showed that some phlebectasia, approximately 2–3 mm in diameter, was scattered at the sigmoid colon, but these were not considered as the bleeding source. An abdominal computed tomography scan with dynamic contrast enhancement did not show any bleeding source in the small intestine.

The patient was diagnosed with obscure gastrointestinal bleeding. For further evaluation of the small intestine, capsule endoscopy was recommended. Because of his wish to avoid retaining the capsule endoscope, a patency capsule (PillCam Patency Capsule; Given Imaging, Yokneam, Israel) was administered; it was excreted intact within 30 h after swallowing. He complained of difficulty while ingesting the patency capsule: he had the sensation that it was lodged in his throat and hardly went down to the esophagus, failed to ingest it despite multiple attempts over 5 min, and never coughed during that time. Finally, he ingested it successfully by taking some sips of water as an aid by direction of the physician. Five days later, he underwent capsule endoscopy (PillCam SB 2 plus; Given Imaging). At that time, he experienced very similar symptoms in swallowing the capsule. He did not cough, and eventually, the capsule went down the pharynx. The rest of the examination proceeded uneventfully. On reviewing the study, the capsule endoscope entered the trachea shortly after administration and moved to the bronchus, where it remained for approximately 220 s before it popped up into the oral cavity. Images of the esophagus and stomach then appeared (fig. 1; online suppl. video 1, [www.karger.com/doi/10.1159/000441382](http://www.karger.com/doi/10.1159/000441382)). The exploration showed that the small bowel was intact. He denied any experiences of aspirating food, water, or tablets at his interview during his next visit to the outpatient clinic.

## Discussion

Our case experienced accidental capsule endoscope aspiration into the bronchus, preceded by patency capsule ingestion 5 days before. Recently, there has been an increasing number of reported capsular aspirations. In an early study, only 1 of 600 consecutive patients experienced this complication [5]. In a series of 733 capsule endoscopy procedures, 11 patients had difficulty or were unable to swallow the capsule. One patient aspirated the capsule, followed by spontaneous expulsion by coughing [6]. From 2003 to 2015, 29 cases of capsule endoscopy aspirations were reported. To our knowledge, this is the first report of a patient who experienced capsule endoscopy aspiration after a patency capsule was swallowed.

Here, patency capsule ingestion caused dysphagia during multiple ingestion attempts. This experience was similar to his later experience of capsule endoscope aspiration. A possible explanation of the repeated attempts for ingesting the patency capsule is that he was aspirating it into the respiratory tract.

Not all patients aspirating a capsule endoscope demonstrate severe manifestations. Of the previously reported aspirations, more than half of the patients presented with minor symptoms. Five patients remained asymptomatic for hours until the capsule endoscope was removed or expelled from the respiratory tract. Lucendo et al. [4] speculated that if a capsule endoscope is placed lengthways in the trachea, enough space for adequate oxygenation of the patient is left because the capsule endoscope has a size of 11 × 26 mm. The average anteroposterior and transverse diameters of an adult trachea are 16 and 14 mm, respectively. Dysphagia is a common symptom accompanying capsule endoscope aspiration and is reported in approximately one-third of aspirating patients. These patients took several or lengthy attempts to swallow the capsule, needed some sips of water as an aid, or complained that it was hard to swallow. Similar to our case, dysphagia was the only symptom that the 85-year-old patient experienced when he aspirated the capsule endoscope remaining in his respiratory tract for approximately 8 h [7]. The patency capsule has the same dimensions and shape as the capsule endoscope. Similar complaints during both patency capsule and

endoscope ingestion in our case suggest that the patient aspirated the patency capsule and capsule endoscope.

Another explanation of the repeated attempts for ingesting the patency capsule is that an underlying swallowing disorder could be present in the patient. Swallowing disorders are a potential risk factor for accidental capsule endoscope aspiration [1]. In the previous literature, emphasis has been placed on the importance of obtaining detailed medical histories especially in the geriatric population to prevent capsule endoscope aspiration. However, a patient's subjective symptoms cannot always predict capsule endoscope aspiration. Of 29 previously reported cases of capsule endoscope aspiration, at least 17 patients denied a history of dysphagia. Our patient was interviewed upon presentation and fully examined after capsule aspiration; no swallowing disturbance was revealed. The only prior indications of swallowing disorder were the multiple attempts for ingesting the patency capsule.

We presume that this patient's repeated attempts for ingesting the patency capsule, whether caused by its aspiration or indicative of occult swallowing dysfunctions, might have been predictive of the subsequent capsule endoscope aspiration. Patients who are highly likely to aspirate a capsule endoscope should not ingest it periorally but rather should have it placed into the duodenum via upper endoscopy. In such circumstances, delivery of the capsule endoscope has been reported using an oroesophageal overtube, a polypectomy snare, or foreign object retrieval devices. Some choose to use the delivery device to place the capsule endoscope into the proximal small bowel [8]. Shiff et al. [9] proposed that if a patient appears to have difficulty in swallowing the capsule endoscope after 2–3 attempts, the capsule should be placed endoscopically. In our case, the capsule endoscope aspiration could have been prevented if we paid enough attention to his complaint while ingesting patency capsule and took appropriate measures, including delivering the capsule endoscope into the duodenum endoscopically.

This case highlights the potential risk for ingesting the patency capsule. The patency capsule's designed dissolvability prevents its retention at an intestinal stricture, but it does not prevent its aspiration into the respiratory tract. To make an early diagnosis of capsule endoscope aspiration, the following precautions were recommended in previous literature [9, 10]. The capsule endoscope should be administered in areas where oxygen and other resuscitation facilities are accessible, if possible, in a physician's presence. Monitoring the patient in the early post-ingestion period should be routine. When a real-time video monitor is available, the passage of the capsule endoscope into the stomach should be confirmed before the patient leaves the clinic. Although there is no reported case of a patient who aspirated a patency capsule, our experience led us to believe that the same precautions should be observed when administering the patency capsule.

In conclusion, this is the first reported case of a patient who experienced accidental capsule endoscope aspiration preceded by ingesting the patency capsule. We presume that the repeated attempts he required when ingesting the patency capsule might have been predictive of the subsequent capsule endoscope aspiration. Paying sufficient attention to symptoms of the patient who ingests a patency capsule could help us prevent serious complications such as aspiration of the capsule endoscope. In addition, this experience implies a potential risk for ingesting the patency capsule. We must be aware that the patency capsule could also be aspirated and that there may be more unrecognized aspiration cases.

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## Statement of Ethics

The authors have no ethical conflicts to disclose.

## Disclosure Statement

The authors have no conflicts of interest to disclose.

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**Fig. 1.** Image from the capsule endoscope demonstrating that it was aspirated into the bronchus.