

# UNUSUALLY DIFFICULT INTRAESOPHAGEAL BOUGIE INSERTION IN AN INTUBATED PEDIATRIC PATIENT

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## Introduction

The insertion of an intraesophageal bougie has been a common step in hiatal repair procedures. This process is similar to insertion of a gastric tube (GT) in anesthetized, paralyzed, and intubated patients that can be difficult. We report an unusually difficult intraesophageal bougie insertion in an intubated pediatric patient owing to esophageal stricture.

## Case Presentation

A 7-month-old male weighing 6.8 kg was scheduled for elective laparoscopic hiatal repair due to repetitive regurgitation. The patient had no past history of recent upper respiratory tract infection or deglutition difficulty. On physical examination, the patient had no anatomical throat variants other than malnutrition. Laboratory values were normal and an upper gastrointestinal contrast revealed the diagnosis of hiatal hernia (Fig. 1). Anesthesia was induced with atropine 0.5 mg, midazolam 0.5 mg, propofol 15 mg and remifentanyl 5 $\mu$ g. After intravenous administration of cisatracurium, the patient was uneventfully intubated with an uncuffed armored tracheal tube (ID: 4.0 mm). Her direct laryngoscopic view was grade 1 according to the Cormack and Lehane classification with no pharynx and throat deformity. Anesthesia was maintained with sevoflurane and remifentanyl. The patient received pressure-controlled ventilation with a peak inspiratory pressure of 20 cmH<sub>2</sub>O. The operation was otherwise uneventful. During the surgery, an intraesophageal bougie was requested to be inserted by a senior anesthesiologist in order to confirm proper wrap size and placement, as well as testing the security of the sutures holding the wrap in place. The placement of the intraesophageal bougie was attempted several times with no success. Various methods, including stiffening the bougie with ice water, using a guide wire, blind insertion of an endotracheal tube as an introducer, and direct laryngoscopy and assistance with Magill's forceps, failed to advance the bougie tip more than 14 cm to 15 cm from incisor into esophageal. Considering the inherent risk of esophagogastric perforation associated with this maneuver, the surgeons decided to proceed with the repair and fundoplication without the aid of a bougie. Towards the end of the surgery, an attempt was made to insert a gastric tube to facilitate gastric emptying, but the tube

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\* MM

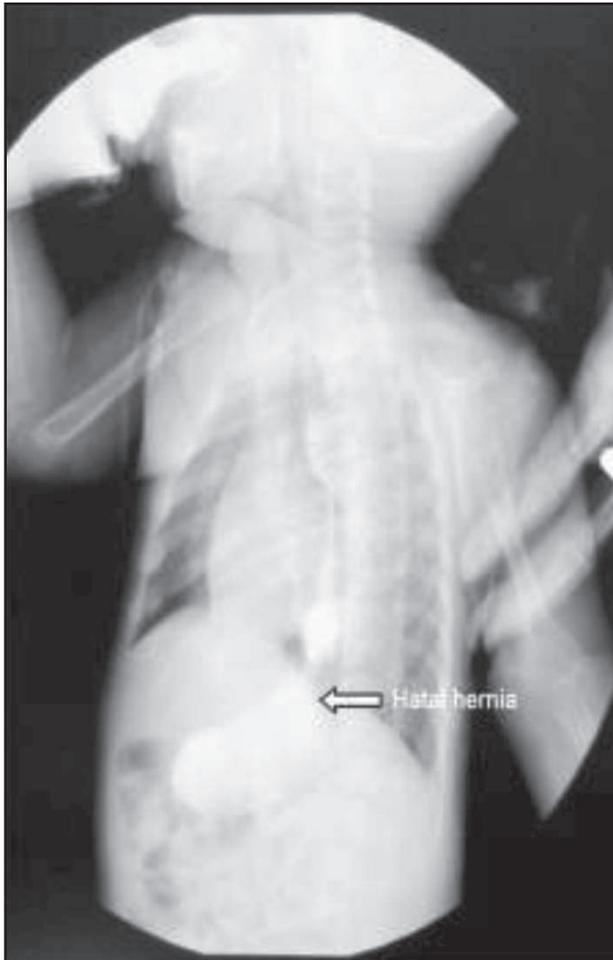
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Fig. 1

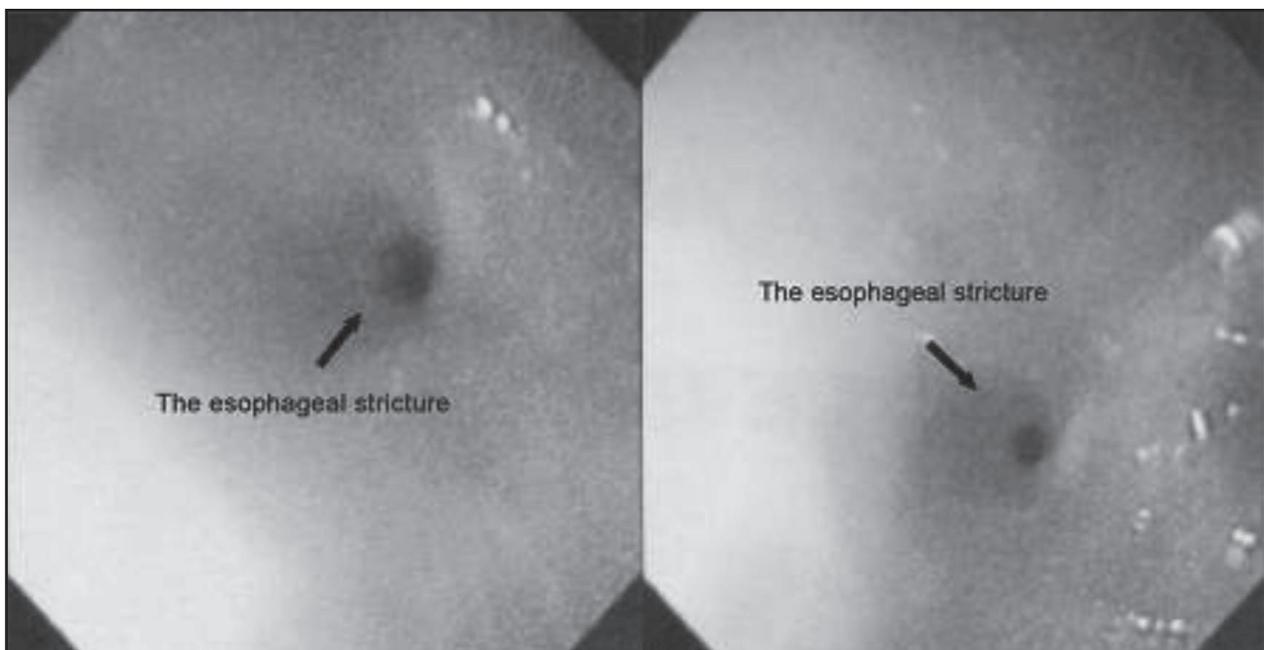
Preoperative upper gastrointestinal contrast revealed the diagnosis of hiatal hernia



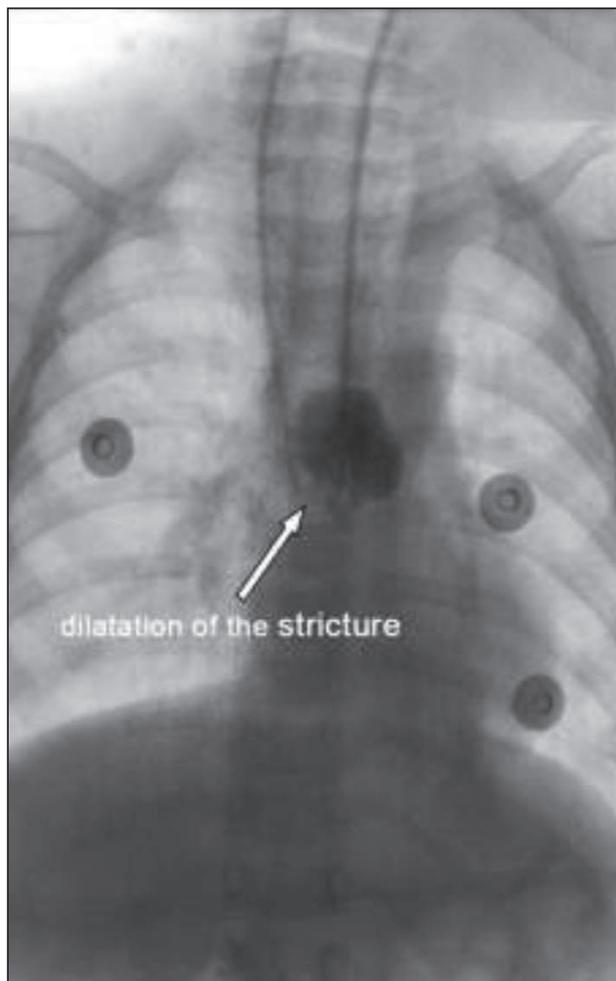
could only be inserted around 15 cm and no stomach contents could be quilted from the tube. After tracheal extubation, the patient was shifted to the PICU, and in order to further decompress the stomach, insertion of a nasogastric tube into the esophagus was attempted under direct visualization using a pediatric flexible fiberoptic gastroscopy and guide wire. Gastroscopy revealed confirmed an esophageal stricture located 15 cm from the incisors and a super slim endoscope with an outer diameter of 5 mm could not be pushed down owing to the stricture (Fig. 2). On follow-up in PICU, the child underwent a dilatation of the stricture by using a through-the-scope balloon (Fig. 3) and she was transferred to the ward on the 7th postoperative day in a healthy state.

Fig. 2

A super slim endoscope (outer diameter 5 mm) inserted until 15 cm from the incisors and could not be pushed down owing to the stricture



*Fig. 3*  
*The child underwent a dilatation of the stricture*  
*by using a balloon*



## Discussion

The use of an intraesophageal bougie has traditionally been an integral step in the repair of large hiatal hernia and fundoplication. Many times the passage of the bougie is not performed by the surgeon but rather by the anesthesiologist. This process is similar to insertion of a gastric tube (GT) in anesthetized, paralyzed, and intubated patients. The

piriform sinuses and the arytenoid cartilages are the most common sites of impaction during the insertion. Manipulations for improvement of insertion have included insertion of the bougie along the posterior or lateral pharyngeal wall, flexion of the neck and application of lateral patient's neck pressure<sup>1</sup> or turning the head to one side<sup>1,2</sup>. Other techniques involve the use of direct laryngoscopy and assistance with Magill's forceps, the use of a slit endotracheal tube, the use of a ureteral guidewire as a stylet, and the use of a gloved finger to steer the NGT after laryngeal impaction<sup>3-7</sup>. However, all of these techniques failed to advance the bougie through the esophagus in this patient because of the esophageal stricture. Pediatric esophageal stricture may occur following congenital esophageal atresia repair or as complications from reflux esophagitis, caustic ingestion, or restrictive Nissen fundoplication<sup>8</sup>. In this case, the patient had no past history of esophageal surgery, chemical injury or burns. Possible mechanisms include complication from reflux esophagitis, or esophageal tissue edema caused by intraoperative surgical injury.

Anesthetists should be aware of difficulties in inserting gastric tube or intraesophageal bougie in intubated patient, particularly in pediatric patients with upper gastrointestinal disease, and because of impaired cognition, anatomical factors, complications of gastrointestinal disease, and difficult intubation. Blind maneuvers for insertion of intraesophageal bougie can be traumatic and unreliable. Inadvertent intracranial introduction of a NG tube<sup>9</sup>, as well as cases of unintentional insertion of the NG tube into the trachea alongside a cuffed endotracheal tube, have been described<sup>10,11</sup>. A direct visualization technology can be used when insertion of a NG tube or intraesophageal bougie is necessary despite otherwise difficult conditions.

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