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Robert M. Mondin, MD¹, Marcela Fandiño, MD¹,
Luthiana F. Carpes, MD¹, Judy Tang, MD¹, Lauren N. Ogilvie, BSc¹,
and Frederick K. Kozak, MD, FRCSC¹

Abstract

Objective: Ingestion of foreign bodies in the pediatric population is common and in the majority of cases involves spontaneous passage through the esophagus; however, they can become lodged in spaces of anatomical narrowing. Sharp foreign bodies are of particular concern due to a higher chance of perforation and other complications. The goal of this case report is to describe the safe removal of a chicken wishbone and 3 alternate options in the event that the initial choice was unsuccessful.

Methods: We report the case of a 2-year-old boy who presented to our pediatric tertiary center after unsuccessful endoscopic removal of a chicken wishbone from the esophagus.

Results: Radiologically, the wishbone was oriented with the tines pointing up. Endoscopic examination revealed the tips of both tines to be embedded deeply into the lateral walls of the esophageal mucosa. Esophagoscopy and protecting the sharp points of the wishbone were used to successfully extract the intact wishbone.

Conclusion: Previous techniques have involved cutting the bone; however, in this case, tension was so high that it was felt that cutting the bone would result in perforation. Proper management of such cases requires planning and often multiple strategies.

Keywords

endoscopic assessment, bronchoesophagology, foreign bodies, esophagus, pediatrics

Introduction

Foreign body ingestion is a common problem in the pediatric population. With respect to the esophagus, spontaneous passage of foreign bodies occurs 80% to 90% of the time.¹ In those cases where spontaneous passage does not occur, foreign bodies are most likely to become lodged in the esophagus at areas of anatomic narrowing including the postcricoid region and regions at the levels of the aortic arch, left bronchus, and diaphragm. Esophageal extraction is usually achieved endoscopically with less than 1% of cases requiring open surgical removal.^{1,2}

Various techniques have been employed for extraction of foreign bodies. In regard to the esophagus, extraction has been most successful with the rigid endoscope.³ Other techniques include advancement, balloon extraction during fluoroscopy, and the use of magnets.⁴ Endoscopy provides the added advantage of being able to see the extraction; this is essential when the foreign body is sharp.³

Ten percent of all foreign bodies have sharp edges that could cause further damage upon extraction.¹ Although this accounts for a small percentage of ingestions, sharp foreign bodies are responsible for more complications than any

others. The incidence of complications has been shown to be as high as 35%.⁵ Sharp foreign bodies in the esophagus are most often considered medical emergencies, and endoscopic removal should be attempted as soon as possible.

Case Report

A 2-year-old boy presented to the emergency department in the community following a choking episode while eating a boneless, skinless chicken breast. There was a witnessed episode of choking, apnea, and cyanosis relieved by abdominal thrusts and then followed by multiple episodes of vomiting. The patient continued to have ongoing symptoms of discomfort, odynophagia, and drooling. Evaluation in the emergency department included a chest radiograph with no

¹Division of Pediatric Otolaryngology, BC Children's Hospital, Vancouver, British Columbia, Canada

Corresponding Author:

Dr Frederick K. Kozak, MD, FRCSC, Division of Pediatric Otolaryngology, Department of Surgery, BC Children's Hospital, K2-184, ACB, 4480 Oak Street, Vancouver, BC, V6H 3V4, Canada.
Email: fkozak@cw.bc.ca



Figure 1. Lateral neck X-ray.

obvious abnormality noted, and the patient was discharged.

The patient returned the following day with ongoing symptoms, and neck radiographs were performed showing a wishbone in the cervical esophagus oriented with the tines pointing superiorly (Figure 1). Otolaryngology was consulted and esophagoscopy and bronchoscopy were performed. The bronchoscopy was clear, ruling out a bronchial foreign body. The esophagoscopy showed the wishbone lodged within the cervical esophagus with both tines of the wishbone embedded within the esophageal mucosa. There was significant concern of esophageal perforation with attempted removal, and surgery was abandoned. The patient was then transferred to our tertiary hospital center for definitive management.

A management plan was formulated with the first option to pass the esophagoscope down and over the most proximal tine of the wishbone. This would dislodge the tine from within the mucosa and entrap it within the distal portion of the esophagoscope. Following that, the esophagoscope would be moved to the opposite wall of the esophagus to locate the second tine, grasp it with optical forceps, and sheath it into the esophagoscope or cover the sharp point with the forceps, allowing us to remove the wishbone and esophagoscope in tandem.

If unsuccessful, 3 back-up plans were reviewed prior to the patient undergoing general anesthesia. The first included

a slipknot using a No. 2-0 suture. After dislodging the first tine from the esophageal mucosa with the scope, the optical forceps would be used to “lasso” the second tine with the suture and then pull it to the midline into the esophagoscope, resulting in protection of both tines into the scope. The second and third back-up plans were very similar to the first but included the use of an endo-loop designed for use in laparoscopic appendectomies followed by a polyp snare designed for use during colonoscopy (Figure 2).

Our management alternatives did not include pushing the wishbone down, cutting the wishbone in half, or cutting it into pieces. Due to the very high tension of the wishbone, cutting could have increased the potential for esophageal perforation. Pushing the wishbone down could have caused further pressure on the mucosa, potential perforation, and a more difficult extraction.

The initial plan was successful and we were able to extract the wishbone by sheathing 1 tine in the endoscope and controlling the second tine with the optical forceps. The forceps were able to pull the second tine into the endoscope and protect the sharp point, allowing us to remove the wishbone and endoscope in tandem without causing further damage to the esophageal mucosa. On repeat endoscopy, there were 2 superficial mucosal ulcerations due to the prolonged pressure of the wishbone. However, there was no evidence of perforation or any further damage (Figure 3). Following overnight monitoring and a chest radiograph that was negative for mediastinal air, our patient was discharged home in stable condition (Figure 4).

Discussion

Although not all foreign bodies impacted in the esophagus require urgent endoscopic removal, sharp foreign bodies may represent a medical emergency due to their high risk for perforation.^{1,5} Specifically, chicken bones are sharp foreign bodies that are frequently ingested by adults and to a lesser extent by children.⁴ They are recognized as one of the most common foreign bodies associated with pharyngo-esophageal perforation.⁶ Other potential complications include mucosal erosions and, in some rare cases, vascular fistulization.^{7,8}

Detection of foreign bodies is generally accomplished through radiological investigation, although they can be radiolucent and size can make them difficult to see. There are areas where they are more likely to be found such as the postcricoid region and regions at the level of the aortic arch, left bronchus, and diaphragm.¹ Absence of a foreign body on X-ray does not rule out the possibility of its presence, especially after a choking incident has been witnessed.³ A child with chest pain, dysphagia, drooling, or even respiratory symptoms, such as stridor, dyspnea, and cough, should be investigated to rule out an esophageal foreign body.² In the case of a negative radiologic finding and a significant

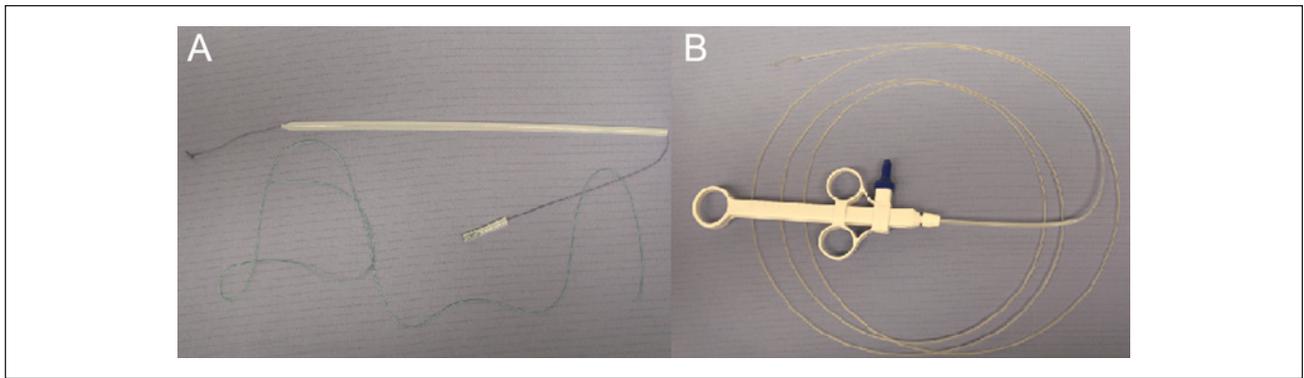


Figure 2. (A) Endo-loop and No. 2-0 suture “lasso” (B) with polyp snare.



Figure 3. (A) Endoscopic view, (B) proximal part of the wishbone, and (C) superficial mucosal ulceration visible after extraction.



Figure 4. Intact wishbone after extraction.

history of an ingested foreign body, it may be necessary to continue with further imaging or move straight to endoscopy to definitively rule out a foreign body.^{6,9}

Endoscopic removal of a wishbone has not been previously described, which led to our cautious approach. Scissors have been used to endoscopically cut a chicken

bone lying transversely within an esophagus.⁹ A Neodymium:YAG laser has also been used to cut a V-shaped chicken bone wedged in a bronchial tree.¹⁰ In our case, the wishbone was under such high tension that cutting the bone had the potential for esophageal perforation. Our concern with perforation should the bone break led us to develop methods to take advantage of the natural curvature of the bone and attempt to sheath both points. This strategy provides a natural protection for the sharp tines, similar to strategies where a tube is first inserted around the foreign body as a protector before extraction.¹¹ Our first plan was successful; by sheathing 1 tine and pulling the second into the esophagoscope with optical forceps, the tines were protected and the bone was safely removed as a unit.

Other back-up techniques were considered in the event that the initial plan was not successful. These involved the use of a lasso to remove the foreign body. A similar method has been previously described for removing foreign bodies from the ear canal.¹² The successful technique used for this case was specifically designed for the extraction of a wishbone with its malleable tines.

Our recommendation for the removal of aerodigestive foreign bodies is a stepwise approach. Appropriated endoscopic airway instruments must be set up and alternate

treatments planned in advance, all prior to taking the patient to the operating room.

Declaration of Conflicting Interests

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