ORIGINAL ARTICLE

Endoscopic incisional therapy for an epithelialized coin in the proximal esophagus and self-assembling peptide hydrogel use in a toddler

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Children younger than 2 years old experience the greatest frequency of accidental ingestions, with coins being the most common foreign body ingestion.[1-3] Although esophageal foreign bodies typically are managed with endoscopic removal, retained foreign bodies may erode into the esophageal wall and damage adjacent structures.[2,4,5] Existing case reports describe open neck dissection for remotely ingested coins that migrate through the esophageal mucosa.[6]

This case details an endoscopic incisional approach for remotely ingested coin removal, which to our knowledge has not been previously reported. Further, it illustrates a lack of conductance damage through a metal coin while using electrosurgical tools.[7,8] Finally, it details the first published use, to our knowledge, of a self-assembling peptide matrix for pediatric endoscopic wound management.[9-11]

CASE PRESENTATION

An otherwise-healthy 12-month-old infant presented with acute-onset coughing, gagging, and solid food refusal. Given reassuring examination and oral fluid tolerance, further evaluation and radiographic imaging were deferred.

Six months later, he re-presented for symptomatic recurrence. A radiograph of the chest revealed a circular, radiopaque foreign body at the thoracic inlet (Figs. 1 and 2). The foreign body was not visualized endoscopically by gastroenterology and otolaryngology, prompting transfer to our institution.

Repeat rigid tracheobronchoscopy and rigid esophagoscopy did not visualize the foreign body. Flexible endoscopy identified the foreign body in the anterior esophageal wall through a 2-mm × 7-mm mucosal defect (Fig. 3).

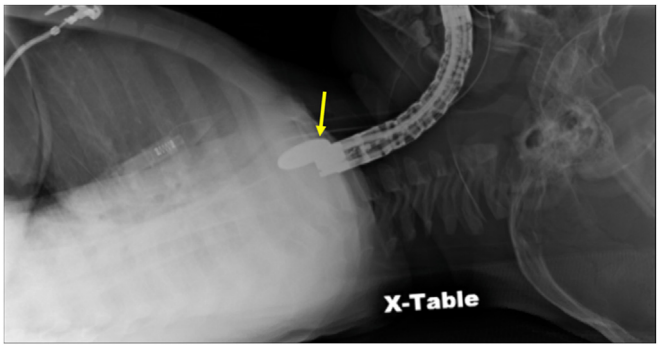

Figure 1. Lateral neck radiograph with a circular radiopaque foreign body (*yellow arrow*) adjacent to an endoscope that was unable to visualize the foreign body.

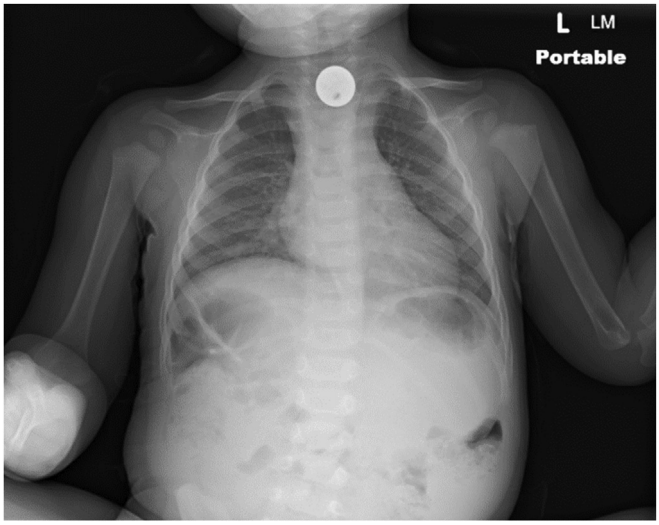

Figure 2. Circular radiopaque foreign body at the thoracic inlet.

PROCEDURE AND OUTCOMES

After discussion intraoperatively with our surgical team, endoscopic incisional therapy was pursued by a pediatric gastroenterologist and therapeutic endoscopist. The procedure can be viewed in Video 1, available online at www.

Abbreviation: POD, postoperative day.

2468-4481
https://doi.org/10.1016/j.vgie.2024.12.006

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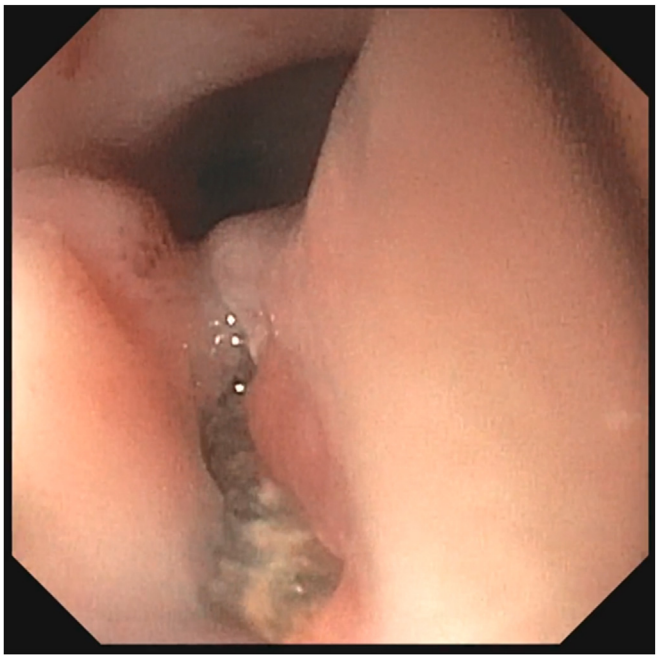

Figure 3. The identified foreign body in the anterior esophagus through a 7-mm × 2-mm mucosal defect in the anterior esophagus.

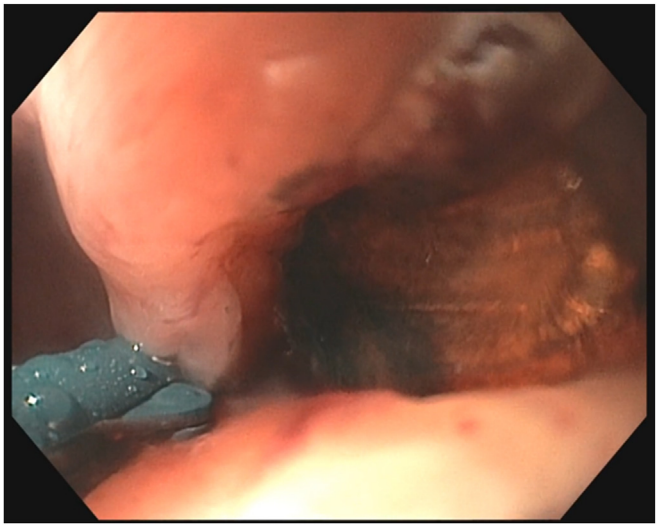

Figure 4. Electrosurgical scissors incising the distal mucosa overlying the foreign body.

videogie.org. The foreign body was freed from the esophageal wall using electrosurgical scissors and an electrosurgical needle knife (Fig. 4). The coin was removed and identified as a 19-mm U.S. penny (Fig. 5). Notably, the foreign body cavity showed no electrical conductance damage through the metallic foreign body (Fig. 6). Intraoperative esophagram showed contrast filling the cavity but no free-flowing leak.

The patient remained admitted and on antibiotics postoperatively. On postoperative day (POD) 4, repeat endoscopy with esophagram uncovered a 2-mm orifice leading to a cavity with small-volume purulent drainage (Fig. 7).

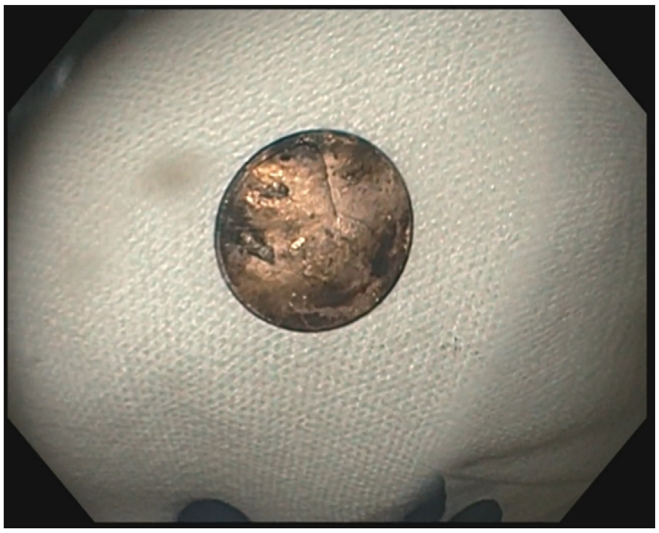

Figure 5. The foreign body after removal was identified as a 19-mm U.S. penny.

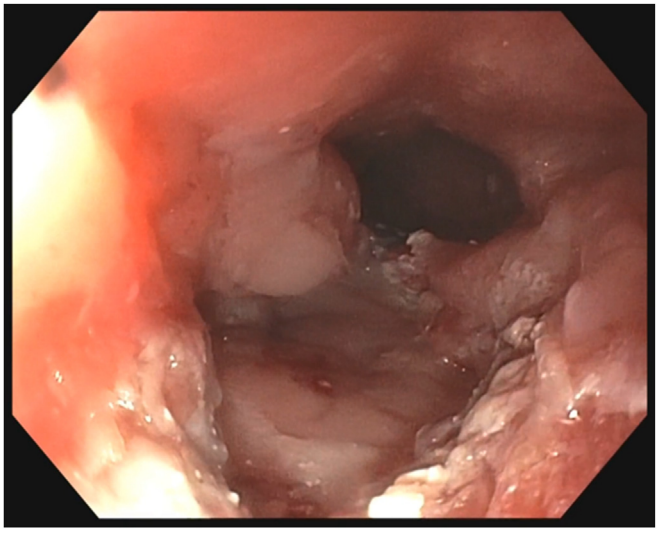

Figure 6. The esophageal cavity previously housing the foreign body, notably, without signs of conductance damage through the metallic coin.

As the orifice was proximal to the most dependent portion of the cavity, electrosurgical scissors marsupialized the cavity to improve drainage and healing. On POD 5, the patient was discharged on a liquid diet.

On POD 17, endoscopy and esophagram showed persistent contrast escape into a leak cavity. The cavity was vigorously flushed with saline and filled with a 2.5% synthetic RADA16 self-assembling peptide hydrogel (PuraStat; 3-D Matrix Medical Technology, Newton, Mass, USA) to promote cavity closure and wound healing (Fig. 8).[9]

He remained on a liquid diet until repeat endoscopy with esophagram on POD 25 showed well-healed esophageal mucosa and no sign of stricture or contrast leak (Fig. 9). This was reaffirmed on POD 58.

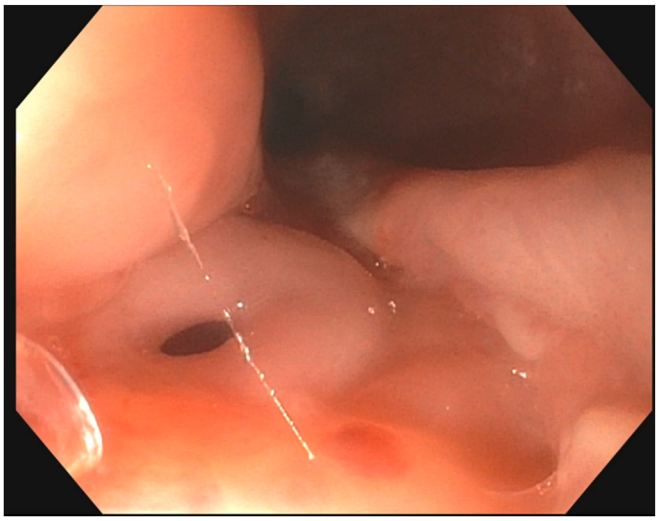

Figure 7. On POD 4, an orifice leading to a small cavity was noted. The cavity was marsupialized using electrosurgical scissors on POD 4. *POD*, Postoperative day.

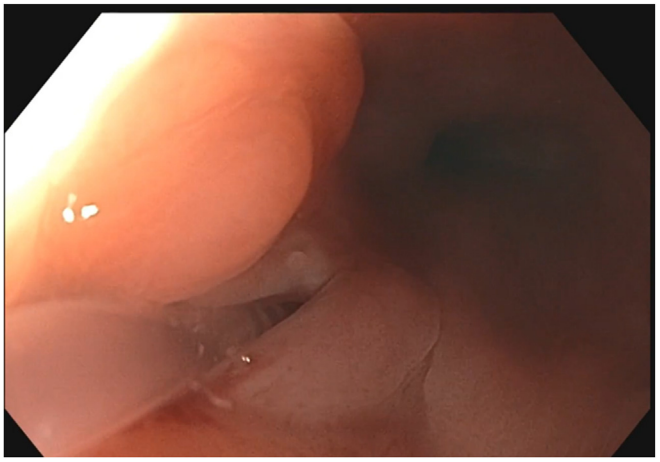

Figure 8. On POD 17, a persistent leak cavity was identified. This image depicts the injection of PuraStat, a 2.5% synthetic RADA16 self-assembling peptide hydrogel (3-D Matrix Medical Technology, Newton, Mass, USA), through the cavity orifice to promote lesional healing. *POD*, Postoperative day.

DISCUSSION

The historical approach of open-neck dissection carries inherent iatrogenic risk. This includes postoperative stricture and neurovascular damage. The endoscopic incisional approach significantly reduces these risks.

In addressing the orifice and leak cavity, several approaches were considered. Clip closure of the orifice was not pursued because of concern for closure of the chronically contaminated space without the ability to drain. Esophageal vacuum-assisted closure was deferred because of concern for poor cavity-to-sponge contact, need for

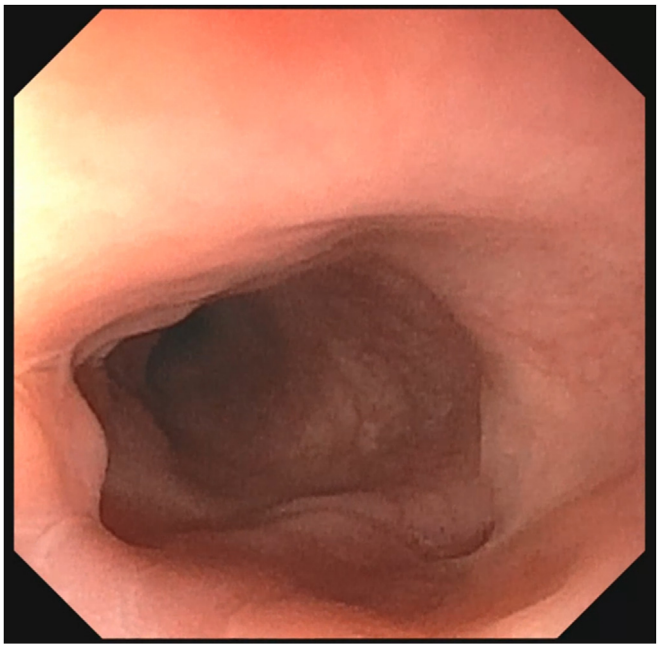

Figure 9. Interval endoscopy on POD 58 showing the well-healed esophageal mucosa without stricture or leak cavity. *POD*, Postoperative day.

parenteral nutrition, and possible prolonged intubation to tolerate therapy (given the lesion's proximal location might require trans-cricopharyngeus esophageal vacuum-assisted closure sponge placement). The proximal location also precluded stent use. Therefore, the self-assembling peptide hydrogel was used in the hope that it would promote cavity closure given its potential to serve as extracellular matrix scaffolding and promote wound healing.[9] Resolution of the persistent leak cavity within 7 days of PuraStat application suggests promotion of lesion healing.

CONCLUSIONS

This case highlights the utility of endoscopic surgical approaches to avoid more-invasive surgical procedures. The case also illustrates a lack of electrical conductance damage through the metallic foreign body and the potential utility of a self-assembling peptide hydrogel in the closure of a persistent leak cavity. Appropriately trained advanced endoscopists must work closely with their surgical colleagues to identify cases that will benefit from less-invasive endoscopic management options.

PATIENT CONSENT

The parents of the patient in this article have given written informed consent to publication of case details.

DISCLOSURE

All authors disclosed no financial relationships.

ACKNOWLEDGMENTS

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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