

Stent for the management of Esophageal Stenosis by caustics in pediatrics

Stent para el manejo de las Estenosis Esofágicas por cáusticos en pediatría

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What do we know about the subject matter of this study?

Esophageal stenosis secondary to caustic ingestion is a pathology with great morbidity, which usually involves repeated esophageal dilatations. Stents have emerged as an alternative or complement to its treatment.

What does this study contribute to what is already known?

This case report provides evidence of a viable alternative in the treatment of recurrent esophageal stenosis secondary to caustic ingestion, such as the use of silicone-coated metallic stents.

Abstract

Esophageal stricture is one of the most serious complications of caustic ingestion in children, and may occasionally recur or be refractory to management with repeated dilations. **Objective:** To present a case of the use of a silicone-coated metallic stent in a child with recurrent esophageal stricture secondary to caustic ingestion. **Clinical Case:** A 6-year-old boy with accidental caustic ingestion, with evidence of Zargar grade IIIA esophagitis in all three portions of the esophagus and a 3 cm prepyloric gastric ulcer that received initial treatment with antibiotics and corticosteroids. After 21 days, the esophageal lumen diminished in relation to the healing process, which required serial dilations. Later, he developed a punctal stenosis, so it was decided to place two silicon-coated metallic esophageal stents, which were kept for 4 months, without new stenosis episodes. **Conclusions:** The silicone-coated metallic stent is an alternative for the treatment of recurrent esophageal stricture due to caustic ingestion in children.

Keywords:

Esophageal Stenosis;
Stents;
Caustic Ingestion;
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Introduction

Caustic ingestion is one of the main causes of benign esophageal stenosis in children, most of them secondary to accidental intake, due to the ease of acquiring these solutions for domestic use. Alkaline ingestion is the most frequent, generating liquefactive necrosis, and inducing a more serious lesion than that caused by acids (coagulative necrosis)¹.

80% occurs in children under 5 years of age, with a peak incidence between the first and third year of age, and is more frequent in males than females, with a 1.3:1 ratio^{1,2}. According to the severity of the lesion, several complications may occur; one of the most feared is esophageal stenosis, which has repeated dilatations as the first-line treatment³⁻⁵.

The objective of this report is to present a successful case of the use of a silicone-coated metallic stent as an alternative to repeated dilations in a child with recurrent esophageal stenosis secondary to caustic ingestion.

Clinical Case

A 6-year-old boy, previously healthy, was admitted due to accidental ingestion of caustic, with sialorrhea, oropharyngeal and epigastric pain, vomiting, and subsequently hematemesis and ulcers in the oral mucosa. The following day, he underwent upper gastrointestinal (UGI) endoscopy which showed Zargar grade IIIA esophagitis in all three portions of the esophagus (Figure 1), with a 3-cm prepyloric ulceration. A nasojejunal tube was placed endoscopically, and started the administration of antibiotics, sucralfate, and oral corticosteroids.

21 days after ingestion, an esophagogastroduodenoscopy was performed, which showed a decrease in the esophageal lumen associated with irregularity of the walls, affecting the entire esophageal length, related to a scarring process (figure 2). Six days later, a new UGI endoscopy was performed, finding the esophagus with concentric stenosis 11 cm from the upper dental arch (figure 3) that prevented the introduction of the endoscope. Dilatation was performed with Savary-Gilliard plugs N° 5, 7, and 9, achieving tearing and permeability to the passage of the endoscope, finding that the stenotic area was 10 cm long (11 to 21 cm from the upper dental arch), with gastric mucosa already healed. The patient was discharged from the hospital with a dilatation plan every 20 days.

Due to difficulties with the health care provider, it was not possible to comply in due time and form with the stipulated dilation plan and he was readmitted after 5 weeks due to dysphagia, observing by UGI endoscopy

the same stenotic area, which was progressively dilated with Savary-Gilliard plugs N° 5 and 7. Post-surgery, he presented subcutaneous emphysema due to distal perforation, which was treated conservatively. 12 days later, an esophagogram showed an irregular walled thoracic esophagus with around 75% concentric decrease of its lumen at T3 level, with an approximate length of 10 cm. Given the risk of a new complication, it was decided to insert two self-expanding nitinol stents coated with silicone, which were placed without complications, one below the other (figure 4), and anti-reflux measures and proton pump inhibitor were indicated. Four days later, the patient was discharged from the hospital with a 3-month stent removal plan, with monthly radiological follow-up.

The patient did not comply with the monthly controls, attending at 3 months, with hyporexia associated with dysphagia. The chest X-ray showed partial migration of one of the stents into the gastric cavity. He underwent a new UGI endoscopy and fluoroscopy, and during the procedure, a new dilatation was performed with Savary-Gilliard plugs, one of the stents was removed and the other one was repositioned in the residual stenosis area.

He was reevaluated the following month with UGI endoscopy and fluoroscopy, achieving stent removal after 4 months. The cardia and distal third of the esophagus were normal, presenting changes typical of the stent in the proximal and middle thirds (figure 5). The following day he tolerated the oral route adequately, without pain, vomiting, nor bleeding, so he was discharged and continued controls by pediatric gastroenterology, without relapses.

Discussion

The initial approach to the patient with esophageal stenosis caused by caustics is repeated dilatations, with a dilating plug or balloon, via endoscopy or fluoroscopy, with variable frequency schedules. Perforation is one of the most feared complications, reaching up to 0.5% of cases⁶. The interval between dilations affects the response and the number of additional dilation sessions, therefore, they should be performed systematically. Endoscopic management represents a challenge since approximately 40% are recurrent or refractory to treatment.

According to Kochman's criteria, stenosis is classified as simple stenosis (straight, symmetrical, and concentric, allowing the passage of the endoscope, with less than 2 cm in length), complex (tortuous, asymmetrical, preventing the passage of the endoscope or greater than 2 cm in length), refractory (failure to reach an adequate diameter in 5 sessions with 2-week intervals),

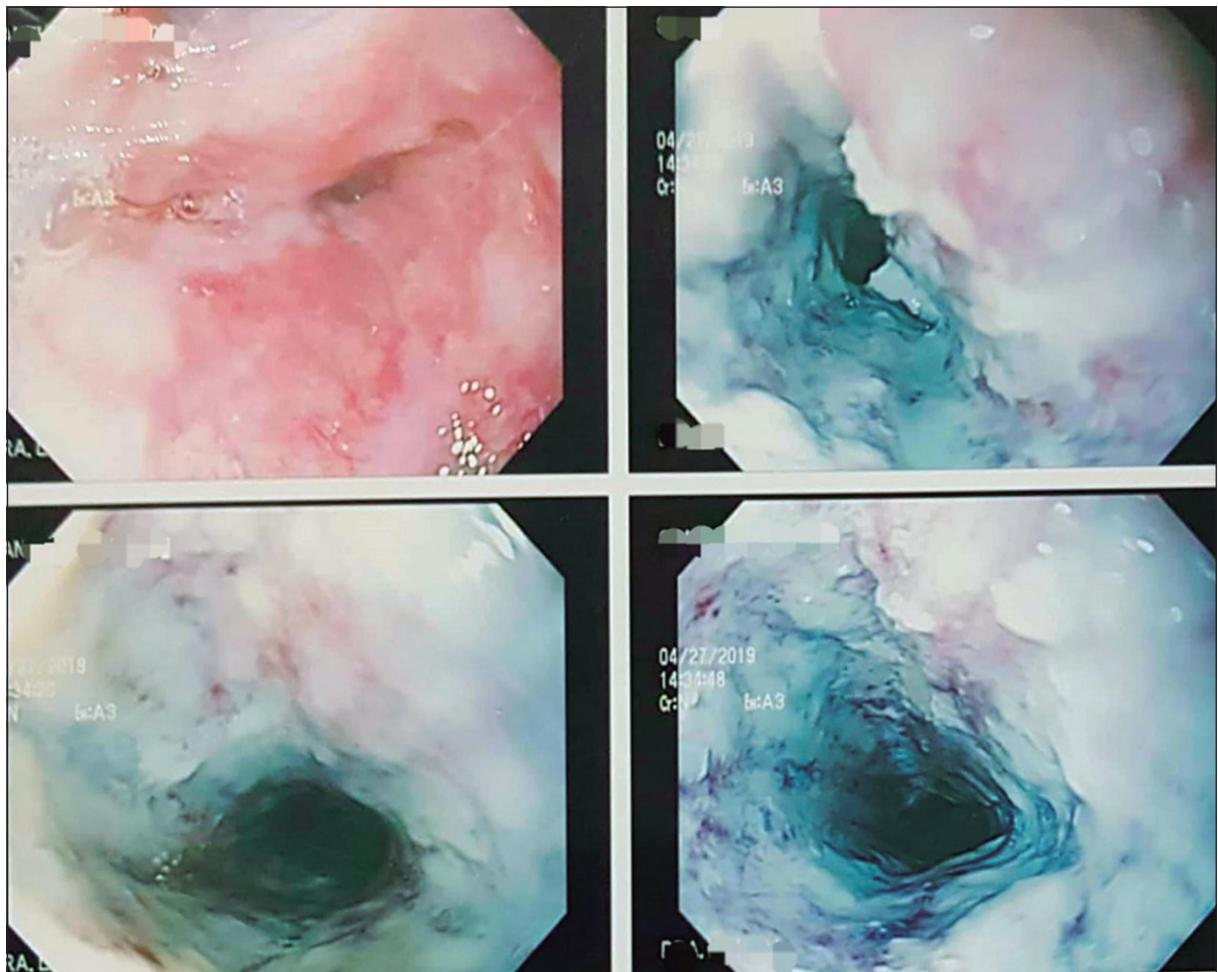


Figure 1. Initial upper gastrointestinal endoscopy: Zargar 3A esophagitis in the three portions of the esophagus.



Figure 2. Esophagogram performed 21 days after caustic ingestion, showing decreased esophageal lumen.

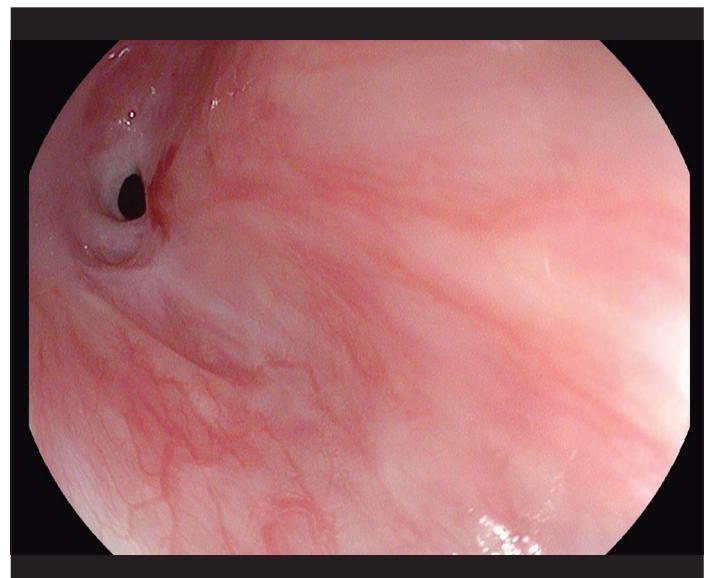


Figure 3. Upper gastrointestinal endoscopy, showing concentric esophageal stricture.

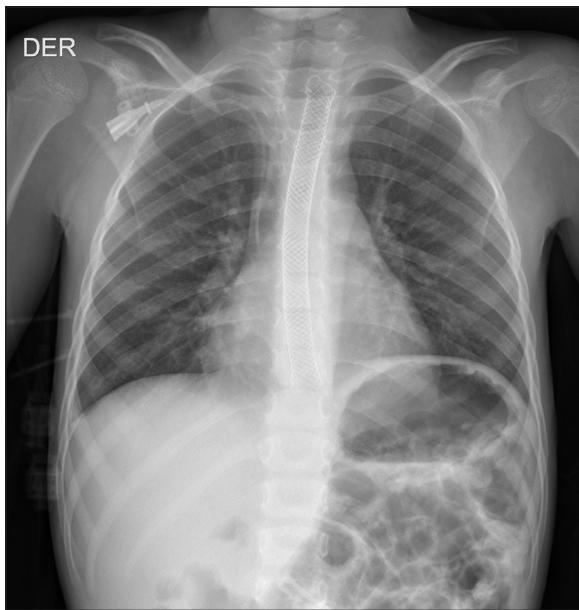


Figure 4. Chest X-ray after insertion of the 2 self-expanding esophageal stents.

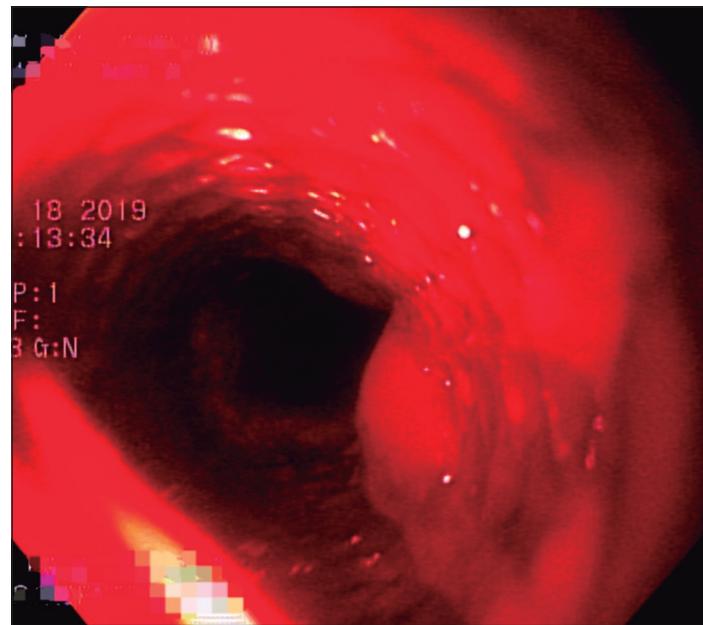


Figure 5. Upper gastrointestinal endoscopy after stent removal.

and recurrent (reaches an adequate diameter, but fails to maintain it for 4 weeks)⁶.

Esophageal stents generate radial force to maintain the esophageal lumen, contributing to prolonged dilatation (weeks to months), which allows remission of the inflammatory process and remodeling of stenosis, minimizing the risk of recurrence. The use of these systems has been proposed and used for more than 30 years in adult patients⁷. Their use has been massified and perfected over time, both in technique, materials⁸, and indications⁹, promoting their use in other areas of the digestive tract and in benign pathologies, such as acid-peptic disease and lesions caused by caustics, which are sometimes very difficult to manage in terms of preserving the lumen.

The use of stents is part of the therapeutic approach with the most evidence in the population over 18 years of age, as a measure against recurrence, refractoriness, or in order to avoid repeated interventions and reduce the risk of complications. Over the years, considerable experience has been accumulated, which has motivated many groups to extrapolate these techniques to pediatric patients with stenosis refractory to the usual approach. The mainstay of treatment for esophageal stenosis is dilatation, with a success rate of 58 to 96%¹⁰. It is precisely this refractory 4% that has required the formulation of different approaches, including stent placement.

In benign esophageal pathology, the use of different types of stents has been reported, among them, self-expanding plastic stents with higher reports of migration^{11,12}, self-expanding metallic stents which

can cause injury when removed, and self-expanding biodegradable stents with more evidence in adults and the advantage of avoiding reintervention for removal¹², but with poor short-term results due to the inadequate radial force generated^{13,14} and, finally, self-expandable nitinol stents coated with silicone are described as an effective alternative, with the advantage of having a lower possibility of migration and trauma upon removal^{15,16}, although in some series high migration rates (35-70%) have been reported¹⁷.

In the clinical case analyzed, the latter type of stent was used, which was initially designed for the dilatation of tracheal stenosis. They have an advanced technical design and there is a great deal of experience in adults, which currently makes them the most indicated choice. In our patient, two bile duct stents were available in order to cover the length of the lesion, which was considered complicated as it was more than 2 cm, and the diameter was chosen based on body weight¹⁸. There are reports that multiple stents have been used at the same time or repeated insertions have been performed¹⁹. The benefit of stents has been widely demonstrated in adults, with complete relief of dysphagia in approximately 40%, but with a high recurrence rate after removal (69%), particularly in patients with long stenoses⁶. The length of time the stent can last is not clearly established, which in most cases is removed in 4 to 8 weeks²⁰.

In pediatrics, there is limited evidence on their use, given the occasional use due to the small number of cases, based on retrospective series of cases and expert opinion²¹. Neither have specific devices been developed

ped, which means that adult stents, because of their large size, cannot be used in infants which is the most affected population. The use of endovascular or endotracheal prostheses, some of them not authorized for esophageal use²², has been chosen, which do not offer sufficient length, making it necessary to place more than one device, which facilitates their migration. Their early use, after the second dilatation and not as an alternative to repeated dilatations, has not yet been defined.

In most reports, topical corticosteroids or mitomycin are used together, an approach that was not performed in this patient. It should be noted that frequently, despite the use of the stent, patients often continue to require dilatations or eventually need gastric ascent, which in our case was not necessary.

Conclusions

The therapeutic approach in pediatric patients with refractory esophageal stenosis due to caustic ingestion is complex and must be individualized, usually using proton pump inhibitor and recurrent dilations. Esophageal stents have proved to be beneficial in adults, but with high recurrence rates after removal. This case adds to the available evidence on the safety and benefit of the use of nitinol stent with silicone coating for the treatment of esophageal stenosis due to caustics in children, as a special indication for patients who have presented esophageal perforation after dilatations.

References

1. Rafeey M, Ghojazadeh M, Sheikhi S, Vahedi L. Caustic Ingestion in Children: a Systematic Review and Meta-Analysis. *J Caring Sci* 2016;5(3):251-65. Available from: <http://dx.doi.org/10.15171/jcs.2016.027>.
2. Kurowski JA, Kay M. Caustic Ingestions and Foreign Bodies Ingestions in Pediatric Patients. *Pediatr Clin North Am* 2017;64(3):507-24. Available from: <http://dx.doi.org/10.1016/j.pcl.2017.01.004>.
3. Alberca-de-las-Parras F, Egea-Valenzuela J, Navalón-Rubio M. Manejo de las estenosis esofágicas refractarias en edad pediátrica. *Rev Esp Enferm Dig*. 2016;108(10):627-35.
4. Woynarowski M, Dądalski M, Wojno V, Teisseire M, Hurkała L, Płowiecki E. Double Lumen Polyamide Tube-stent for the Treatment of Recurrent Postcorrosive Esophageal Stenosis. *J Pediatr Gastroenterol Nutr*. 2017;64(5):696-700.
5. Vandenplas Y. Management of benign esophageal strictures in children. *Pediatr Gastroenterol Hepatol Nutr*. 2017;20(4):211-5.
6. Fuccio L, Hassan C, Frazzoni L, Miglio R, Repici A. Clinical outcomes following stent placement in refractory benign esophageal stricture: A systematic review and meta-analysis. *Endoscopy*. 2016;48(2):141-8.
7. Valbuena J V, Olarte H. Prótesis peroral Endoscópica en el tratamiento de cáncer de esófago y cardias. *Rev colomb gastroenterol*. 1987;17:22.
8. Chan ACW, Shin FG, Lam YH, et al. A comparison study on physical properties of self-expandable esophageal metal stents. *Gastrointest Endosc* 1999;49(4):462-5.
9. Hindy P, Hong J, Lam-Tsai Y, Gress F. A comprehensive review of esophageal stents. *Gastroenterol Hepatol (N Y)* 2012;8:526-34.
10. Michaud L, Gottrand F. Anastomotic strictures: Conservative treatment. *J Pediatr Gastroenterol Nutr* 2011;52 Suppl 1:S18-9.
11. Foschia F, De Angelis P, Torroni F, et al. Custom dynamic stent for esophageal strictures in children. *J Pediatr Surg* 2011;46(5):848-53.
12. Vidales Mostajo GS, Abril Barreda MJ. Stent biodegradable como tratamiento de la estenosis esofágica benigna refractaria. *Rev Gastroenterol Peru* 2019;39(2):164-70.
13. Kochhar R, Samanta J, Basha J, et al. Biodegradable Stents for Caustic Esophageal Strictures: Do They Work? *Dysphagia*. 2017;32(4):575-82.
14. Karakan T, Utku OG, Dorukoz O, et al. Biodegradable stents for caustic esophageal strictures: A new therapeutic approach. *Dis Esophagus*. 2013;26(3):319-22.
15. Bakken JC, Wong Kee Song LM, De Groen PC, Baron TH. Use of a fully covered self-expandable metal stent for the treatment of benign esophageal diseases. *Gastrointest Endosc*

Ethical Responsibilities

Human Beings and animals protection: Disclosure the authors state that the procedures were followed according to the Declaration of Helsinki and the World Medical Association regarding human experimentation developed for the medical community.

Data confidentiality: The authors state that they have followed the protocols of their Center and Local regulations on the publication of patient data.

Rights to privacy and informed consent: The authors have obtained the informed consent of the patients and/or subjects referred to in the article. This document is in the possession of the correspondence author.

Conflicts of Interest

Authors declare no conflict of interest regarding the present study.

Financial Disclosure

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2010;72(4):712-20.

- 16. Cano FM, Vargas JR, Sánchez BV, Montes IH. Uso de prótesis autoexpandibles en estenosis esofágicas en niños. *Cir Pediatr*. 2012;25:207-10.
- 17. Repici A, Vleggaar FP, Hassan C, et al. Efficacy and safety of biodegradable stents for refractory benign esophageal strictures: The BEST (Biodegradable Esophageal Stent) study. *Gastrointest Endosc* 2010;72(5):927-34.
- 18. Bott T, von Kalle T, Schilling A, et al. Esophageal Diameters in Children Correlated to Body Weight. *Eur J Pediatr Surg*. 2019;29(6):528-32.
- 19. Alonso V, Ojha D, Nalluri H, de Agustín JC. Empleo de stents autoexpandibles de nitinol en el manejo pediátrico de la estenosis cáustica esofágica refractaria. *Rev Esp Enferm Dig*. 2017;109(10):728-30.
- 20. Zheng J, Chang Z, Liu Z, et al. Retrievable Z-stents for the treatment of refractory corrosive esophageal strictures in children. *Eur J Pediatr Surg*. 2015;25(2):160-4.
- 21. Pierre R, Neri S, Contreras M, et al. Guía de práctica clínica Ibero-Latinoamericana sobre la esofagitis cáustica en Pediatría: Aspectos terapéuticos. *Rev Chil Pediatr* 2020;91(2):289-99.
- 22. Rico FR, Panzer AM, Kooros K, Rossi TM, Pegoli W. Use of Polyflex Airway stent in the treatment of perforated esophageal stricture in an infant: a case report. *J Pediatr Surg* 2007;42(7):e5-8.