Case Series – Minimally Invasive Endoscopic Repair of Tracheoesophageal Fistula using Chemocauterization with Trichloroacetic Acid

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Abstract

Aim - This case series describes our experience using 50% trichloroacetic acid (TCA) for the management of tracheoesophageal fistula (TEF).

Methods - The authors conducted a retrospective chart review of patients with TEF who underwent endoscopic chemocauterization with 50% TCA between 2023-2024 at a tertiary care medical center.

Results – Two of two (100%) patients with TEF were successfully repaired endoscopically with topical 50% TCA application, each requiring three treatments at approximately one-month intervals. The efficacy was well demonstrated by subsequent bronchoscopy at 6-month follow up. There were no significant complications from the endoscopic treatment.

Conclusion - Here we present our experience with a minimally invasive endoscopic approach for management of TEF using chemocauterization with 50% TCA. This technique is a safe alternative to an open surgical ligation which is associated with significant risk of morbidity. Though this is a described treatment option in other parts of the world, to our knowledge, this treatment method has not been reported in the American literature. We would like to build evidence for its use as a safe and effective treatment method in the United States.

Introduction

Esophageal atresia (EA) with tracheoesophageal fistula (TEF) is one of the most common congenital anomalies affecting the upper digestive and respiratory systems in newborns, with an incidence of approximately 1 in 2,400 to 1 in 4,500 live births (1). These malformations are classified into five distinct phenotypes, with Type 1 representing isolated esophageal atresia without a fistulous connection to the trachea, while the remaining four phenotypes involve varying degrees of tracheoesophageal fistulation (2).

Spontaneous closure of a TEF is exceedingly rare, and surgical intervention is typically required. While primary operative ligation remains the standard of care, alternative, less invasive approaches—such as stenting and clipping—have been explored, though these methods are generally limited to small fistulas (3). For larger defects, open surgical correction is usually necessary.

Among the emerging techniques, the use of 50% trichloroacetic acid (TCA) for chemical obliteration of TEF has been documented in the literature through case reports from various international centers (4-9). However, to date, there is no published evidence of TCA being utilized for TEF management in the United States.

Here, we present a case series of two patients who underwent TCA chemical obliteration of a TEF, either as an initial intervention or as a reintervention, at a single tertiary pediatric hospital in the United States.

Discussion / Conclusion

TCA, commonly used for chemical skin peels, is considered safe when applied in small amounts as it is neutralized by tracheobronchial secretions and does not pose a risk to the airway. Despite the need for repeated general anesthesia, this procedure appears to be safe, effective, and reproducible—supported by retrospective data from various international groups.

We present our experience with a minimally invasive endoscopic approach for the management of TEF using chemocauterization with 50% TCA. We observed successful treatment outcomes in both primary and recurrent TEF cases and believe this method could serve as a safe alternative to open surgical ligation, which carries a significant risk of morbidity.

It is important to acknowledge the limitations of this case series. Additional cases, long-term follow-up data, and information on potential side effects will be essential to further validate the safety and efficacy of this treatment method in the United States.

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Case Presentation

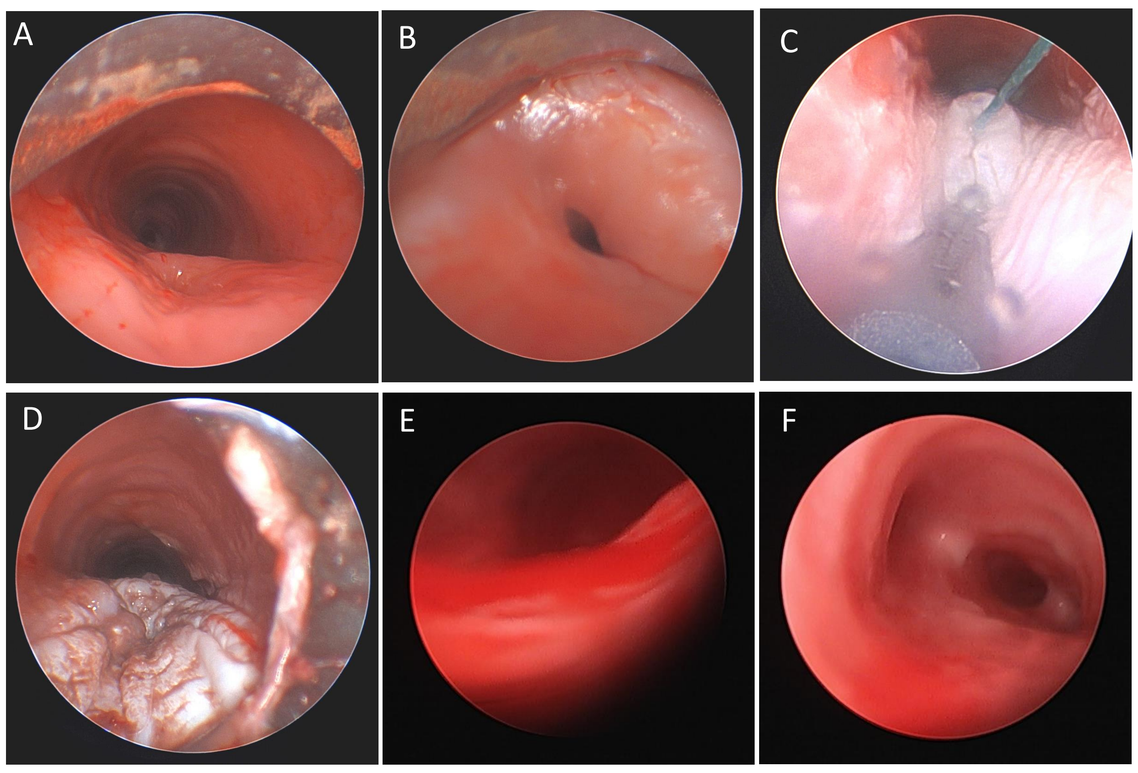

Figure 1. 7 months old patient with primary TEF, H type, who had undergone chemocauterization with TCA three times (6/28/23, 7/14/23, 8/01/23) with resolution of TEF.
(A-B) Initial evaluation shows 2 mm TEF midway between the subglottis and the carina.
(C-D) A pledget soaked in 50% TCA was placed on the opening and held for 20 seconds. Sufficient mucosal chemocauterization was observed.
(E-F) Fistula was no longer seen by the third application. Appropriate granulation tissue was seen over the previous fistula tract.

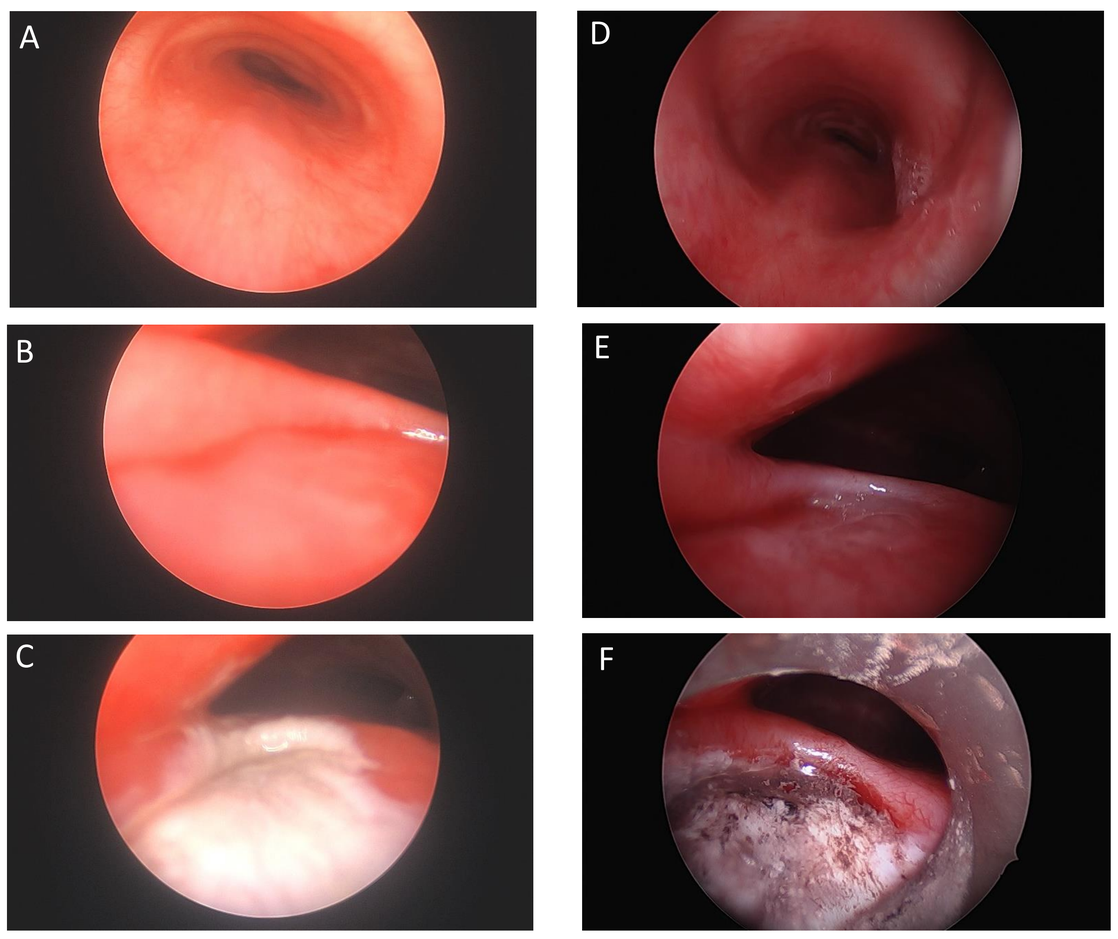

Figure 2. 17-year-old patient with VACTERL syndrome who had undergone repair of H-type TEF as an infant who presented with recurrent pneumonia. CT evaluation showed possible recurrent TEF (rTEF). Although there was no definitive leakage demonstrated on esophogram. He was taken to OR for chemocauterization with TCA three times (01/08/24, 02/09/24, 04/10/24).

Initial evaluation of trachea showing significant tracheomalacia (A) with approximately 5mm blind pouch at the site of previous TEF repair (B). Appropriate chemocauterization achieved by applying 50% TCA soaked pledgets at the site of TEF (C).

Second look one month after initial chemocauterization with TCA (D). Small flap in the posterior left trachea was again noted, shallower in depth (B). Appropriate chemocauterization achieved by applying 50% TCA soaked pledgets at the site of TEF (C).

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