Coc Cer Derg/Turkhis J Ped Surg 2022;36(1): 60-63
doi: 10.29228/JTAPS. 53679

Case Report

Çocuk Cerrahisi Dergisi
Turkish Journal of Pediatric Surgery
Volume 36 Number 1 2022

Successful Thoracoscopic Repair of Isolated Tracheoesophageal Fistula using Hem-o-lok Polymer clips: A Case Report

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ABSTRACT

Tracheoesophageal (TE) malformations represent a real challenge to all paediatric surgeons and paediatric intensivists even in advanced paediatric surgical facilities. These anomalies include a wide spectrum of anatomical alterations resulting in respiratory difficulties and feeding impairment most commonly in the first few hours after birth. The third most common configuration of which is diagnosed when an isolated TE fistula happened without any esophageal discontinuity, this is called H-type, Vogt IV, and Gross E. Usual clinical presentation is recurrent aspirations, choking, and cyanosis after feeding. A high index of suspicion accompanied by an experienced radiologist, and rigid bronchoscopy could usually lead to the diagnosis. The classical surgical approach is usually via the right cervical route rather than thoracotomy, and more recently, the thoracoscopic repair. In this report, we describe a successful repair of an isolated TE fistula in a 11-month-old male infant presented with history of frequent chocking upon feeding and recurrent pneumonia. Five days of nasogastric feeding and stabilization were enough to make this patient fit for right thoracoscopy under general anaesthesia. Hem o Lok polymer clips were applied on each side of the fistula, then the fistula was divided with scissors. Smooth postoperative period at our paediatric ICU, and the patient was sent home with full feeding on the 6th postoperative day. Then follow up visits were scheduled to see the patient within 10 days, one month, two months, four months, and one year and two years, he was completely free from any respiratory complaints, and he is thriving well. In conclusion, despite being infrequent, isolated TE fistula represents a real diagnostic and therapeutic challenge in paediatric surgery. Thoracoscopic repair becomes increasingly used in many centres globally with obvious safety. Hemo-o-lok polymer clips can be a safe option to seal both ends of TE fistula before its division endoscopically.

Keywords: *Tracheesophageal Fistula, Thoracoscopy, Hemo-o-Lok clips*

Geliş/Received: 30.09.2021
Kabul/Accepted: 01.10.2021
Published online: 01.04.2022

Cite as: Alhasani AA. Successful Thoracoscopic Repair of Isolated Tracheoesophageal Fistula using Hem-o-lok Polymer clips: A case Report. Coc Cer Derg/Turkish J Ped Surg 2022;36(1): 60-63. doi: 10.29228/JTAPS. 53679

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This case report was presented as an E-Poster in PAAFIS 2021 congress held in Ankara, Turkey on September 24th-25th 2021.

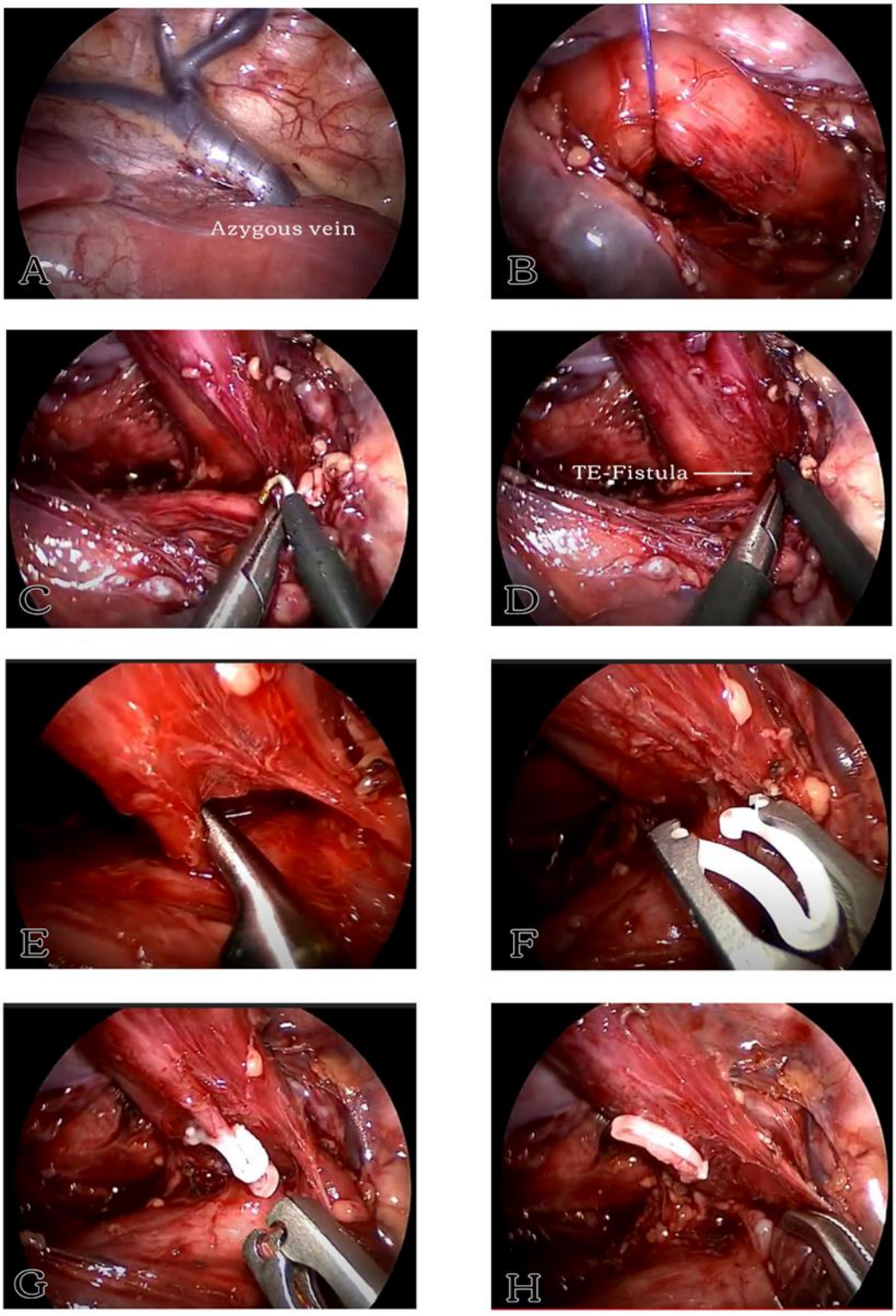
Introduction

Tracheoesophageal (TE) malformations represent a real challenge to all pediatric surgeons and intensivists even in advanced pediatric surgical facilities. Generally, the incidence of this type of anomaly is 1 in 2500–3000 live births [1], and the exact etiology is unknown, but many genetic, chromosomal, and environmental factors could play a role [2]. TE malformation could be an isolated anomaly, but it may be seen as a part of a constellation of malformation like VACTREL, Feingold, and CHARGE [3,4]. Vogt, Ladd, and Gross are the main classification systems for TE malformations [3,5,6]. An isolated TE fistula happened in 4% of cases and called H-type, Vogt IV, and Gross E [7].

The usual presentation is recurrent attacks of aspiration, choking, and cyanosis after feeding, often with abdominal distension [8,9]. The diagnosis of isolated TE fistula can be difficult, but generally, a high index of suspicion, CT scan, and rigid bronchoscopy could identify the fistula [9,10]. The classical surgical approach is via the right cervical route rather than thoracotomy [11], but recently, the thoracoscopic approach starts to be increasingly used [12,13].

This work aims to document the first thoracoscopic repair of an isolated TE fistula in Iraq and to show that Hem o Lok clips is useful, effective, and safe.

Figure 1. Identification and preservation of Azygous vein



Case Presentation

An 11-month-old male infant presented with a history of frequent choking upon feeding and recurrent pneumonia necessitating prolonged hospitalization. Many attempts to look for isolated TE fistula using diagnostic radiology failed to confirm the clinically likely diagnosis.
Dramatic clinical relief when nasogastric tube feeding was documented by the responsible pediatrician who had consulted a chest surgeon to perform a rigid bronchoscopy under general anesthesia. The diagnosis was confirmed by visualization of the H-type TE fistula.
Then the patient was referred to our pediatric surgical department at Basrah Children Specialty Hospital, where the exclusion of other possible associated congenital anomalies had been done.

The patient was admitted and nasogastric tube feeding was established for preventing choking, controlling bronchopneumonia, and providing enteral nutritional support before the proposed surgical intervention. Five days later, right thoracoscopy was done under general anesthesia using a 5 mm telescope with initial CO_2 insufflation pressure of 5 mmHg reduced to zero after right lung deflation.

Identification and preservation of Azygous vein (Figure 1) were followed by separation of the esophagus from the trachea by blunt dissection, retraction of the esophagus upward using Nylon thread looped around the esophagus and fixed to the chest wall (Picture B). Blunt dissection continued in the cephalic direction (Picture C) reaching the thoracic inlet at which the TE fistula was identified (Picture D) and cleared using a right-angled dissector (Picture E).

Hem o Lok polymer clips (Picture F) were applied on each side of the fistula (tracheal and esophageal) (Picture G), then the fistula was divided sharply with a scissor (Picture H). Good hemostasis was ensured, 10 Fr. Chest tube was placed, and port sites were closed and dressed.
A smooth and uneventful postoperative period was observed at the pediatric ICU in our department. Nasogastric tube feeding was started after 24 hours, and gradual oral feeding was commenced on the 3rd Postoperative day after removal of the nasogastric tube. No choking was reported postoperatively. The chest tube was removed after confirming full lung expansion, and the patient was sent home with full feeding on the 6th postoperative day. The patient was seen after 10 days, one month, two months, four months, and one year and two years, he was completely free from any respiratory complaints, and he is thriving well.

Discussion

However, its rare condition, isolated TE fistula can represent a diagnostic and surgical challenge. The surgical approach to access and manage this type of malformation depends on hospital facilities, the level of the fistula, and the surgeon's experience [1,7].
Right cervical, right thoracotomy, and thoracoscopic approaches were the available surgical options in literature [11], each one has its well-known advantages and disadvantages [12,13,14]. Generally, the minimally invasive technique has been increasingly used in the last decade for its attractive results [14].
The core of such type of intervention is to divide the TE fistula after securing both oesophageal and tracheal sides, and this can be achieved by simple ligation, endoscopic stabling, or endoscopic clipping [15,16]. Every single option had been carefully reviewed regarding its safety, learning curve, and cost.
The current case of isolated TE fistula was managed using thoracoscopy and clipping using Hem-o-Lock clips (Weck Closure Systems, Research Triangle Park, NC), which is non-absorbable polymer clips with lock engagement, and was firstly used in 1999. Its security and safety made it a viable option for endoscopic ligation in laparoscopic and thoracoscopic surgeries [17,18,19].
In our patient, TE fistula was found to be at the thoracic inlet level, Toczewski et al had published their experience in the thoracoscopic repair of isolated TE fistula, in which the level of the fistula was at or below the thoracic inlet [11]. Fistula at a higher level was reported by Laffan EE, Daneman A, Ein SH, et al [20].
Securing the TE fistula during thoracoscopy could be done via ligation or clipping with or without sectioning of the fistula. In Cuestas G et al case series, they used ligation of both ends of the fistula with PDS thread rather than clipping [21], while clipping of both ends before sectioning (like what was done in the current case) was frequently seen in the literature [22,23]. Surgeons who were preferring clipping of the fistula usually use titanium clips, I could not find a published case of thoracoscopic repair of an isolated TE fistula in which Hem o Lok clips were used.
Postoperatively, our patient had an uneventful recovery and a remarkable improvement in his respiratory status. Aziz et al had published a case report of successful neonatal thoracoscopic repair of an isolated TE fistula [16], while Toczewski et al had a retrospective review of 12 cases of isolated TE fistula repaired successfully via thoracoscopy, the results were excellent, apart from a single case of prolonged postoperative chylothorax for which another thoracoscopy was required to be fixed [11]. Another study was published by S. Rothenberg in 2017 enrolling 6 patients of isolated TE fistula who were managed thoracoscopically, one of them experienced partial tracheal disruption by endotracheal re-intubation, and it was repairer thoracoscopically [15].

Conclusion

Despite being infrequent, isolated TE fistula represents a real diagnostic and therapeutic challenge in pediatric surgery. Thoracoscopic repair becomes increasingly used in many centers globally with obvious safety. Hemo o Lok polymer clips can be a safe option to seal both ends of TE fistula before its division thoracoscopically.

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