Esophageal Magnetic Compression Anastomosis in Esophageal Atresia Repair: When not to use magnets – our experience

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Introduction:

Esophageal magnetic compression anastomosis (EMCA) represents an innovative **minimally invasive** approach for establishing esophageal continuity in patients with esophageal atresia, especially **in patients with comorbidities** that increase the risk of a thoracoscopic or open operation. Over the last 5 years, we have demonstrated **favorable outcomes**, but have also encountered **cases in which EMCA was not successful**.

Methods:

A retrospective chart review of all patients who were scheduled for EMCA was performed. All patients who **failed magnet placement** and underwent **conventional repair instead** were identified. Patient characteristics, procedural data, and follow up data were analyzed.

Results:

From 2021 through 2024, **EMCA was attempted in a total of 15 patients** on an intention-to-treat basis. Placement of the **magnets failed in 3 patients (20%).** Every case showed specific characteristics that prohibited magnet coupling. In **case 1**, **metal clips** that had been placed during a prior lengthening procedure **precluded mating** of the magnets. In **case 2, an atretic lower pouch** was present and therefore the magnet could not be advanced towards proximal end of the distal pouch. In the **third case**, an **atypical bronchus** was interposed between the two esophageal pouches, creating distance and tissue between the upper and lower pouch.

Patient	1	2	3
Gender	male	male	female
Gestational age	38+5	36+1	37+3
Birth weight (g)	2900	2000	2530
EA type, Gross	B	C	C

Table 1: Demographic data.

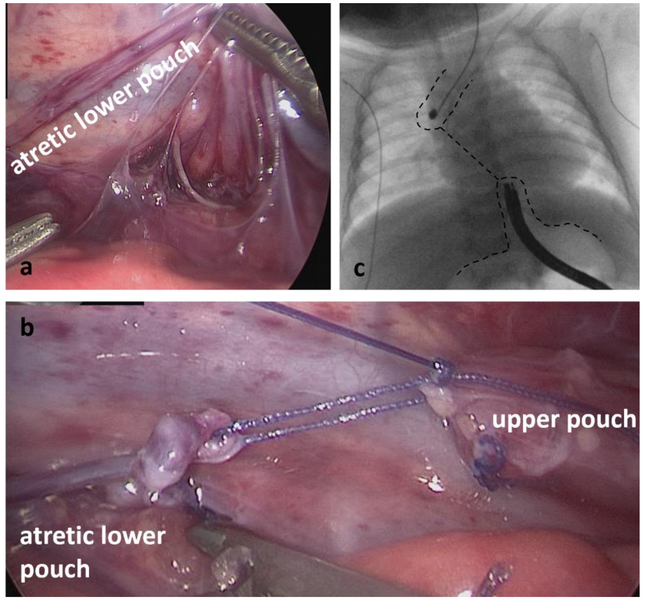


Figure 1: Patient 1: a + b) Intraoperative view during first thoracoscopy, atretic lower pouch marked. Approximation of both esophageal pouches shown. c) Gap-o-gram before 3rd traction procedure.

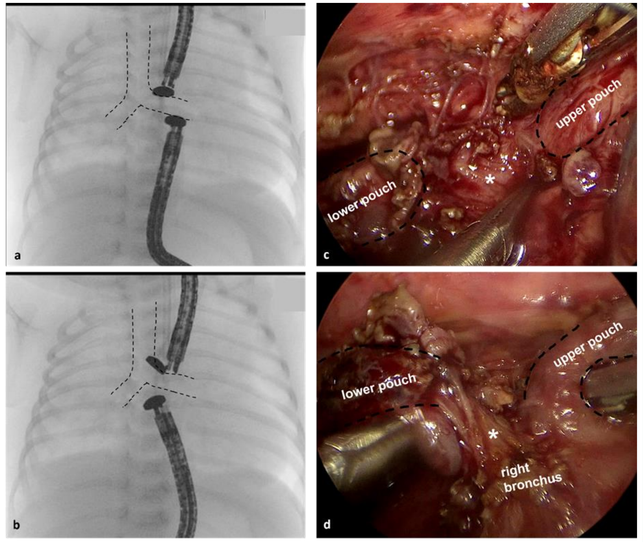


Figure 2: Patient 3: a+b) Intraoperative fluoroscopy images of attempted magnet placement. c+d) Thoracoscopic view. Interposition of the right bronchus and suture material (*) between the lower and upper pouch are clearly visible

Conclusions:

EMCA is a helpful alternative for EA patients with severe co-morbidities, but should not be performed when

- **Clips or other hardware** was placed on the pouch ends
- The **lumen is too narrow** to safely accommodate the magnet
- There are structures **or tissues between the pouches**

Patient	1	2	3
Procedures prior to intervention	- Gastrostomy, gastric perforation - Laparotomy and lavage - Thoracoscopy, closure of both fistulas, approximation of both esophageal ends - 2x Thoracoscopy, approximation of both esophageal ends	- Thoracotomy with closure of the tracheoesophageal fistula, traction procedure of the lower pouch, colostomy, gastrostomy - Recurrent fistula, open fistula closure, traction of both pouches - Thoracotomy and repeat approximation	- Thoracotomy with closure of tracheoesophageal fistula, approximation of both esophageal ends, gastrostomy
EMCA (number of attempts)	2	4	2
Reason for failure	Metal clips Distance between pouches	Narrow lower pouch, magnet could not be advanced through most distal lower portion of the esophagus	Atypical bronchus

Table 1: Procedural data.