Introduction and Objective

Congenital diaphragmatic hernias (CDH) and tracheoesophageal fistulas (TEF) in neonates are repaired with minimally invasive surgery (MIS) or open surgery. Little is known about the outcomes and characteristics of the patient populations that undergo surgery using MIS versus open repair.

CDH is when the diaphragm fails to close during development thus abdominal contents move into the chest cavity. TEF is an abnormal connection between the trachea and esophagus that occurs when the trachea and esophagus fail to form into two distinct tubes during development.

There is a current lack of data on patient outcomes who undergo MIS vs open repair for both CDH and TEF. The existing data are limited to single institution reports and center experience. There are no official guidelines for CDH and TEF operative approach. We lack of contemporary multi-institution data to guide decision-making when selecting surgical approach.

Methods

Data was obtained from the American College of Surgeons National Quality Improvement Program – Pediatric (NSQIP-P) Participant Use Files (PUFs) from 2012-2015 to identify neonates (up to 30 days old) who underwent CDH and TEF repair.

Children who underwent CDH or TEF repair using an open or MIS approach were identified. Patient characteristics such as birth weight, gestational age, ventilator dependence, cardiac risk factors, and ASA class were recorded.

Pre- and post-operative morbidities, postoperative complications, and 30-day mortality were analyzed using multivariable logistic regression adjusted for patient comorbidities to determine morbidity associated with open and MIS.

Results

We identified 1,142 neonates who underwent CDH (n=577) and TEF (n=565) repair.

Neonates who underwent open repair of CDH and TEF were more likely to have a higher incidence of preoperative comorbidities, including prematurity, cardiac disease, respiratory disease, and to be ventilator dependent (Table 1).

Despite these preoperative differences in characteristics, there was no significant difference in outcomes for those who underwent TEF repair and only a few select differences in those who underwent CDH repair.

Neonates who underwent open repair had slightly worse select outcomes (Figure 1). Median operative time was longer for both CDH (149 vs. 111 minutes, p=0.07) and TEF (139 vs. 116 minutes, p=0.002) with the MIS approach.

Multivariable logistic regression analysis adjusting for patient comorbidities showed that open versus MIS surgical approach was not associated with increased morbidity.

Conclusions

Neonates who underwent MIS repair for CDH and TEF had fewer comorbidities and better outcomes. This surgical approach was not associated with any adverse 30-day outcomes in the multivariable models.

This suggests that MIS repair of CDH and TEF may be safely performed in a subset of patients, but further research is needed to understand whether surgical approach affects the incidence of longer-term complications such as CDH recurrence or esophageal strictures.

NSQIP-P PUFs can be used to understand national trends, characteristics, and outcomes in children who undergo TEF or CDH repair using the open or MIS approach.

Presently, outcome data is limited and not generalizable. Data from this study can help physicians set expectations and can be used for preoperative counseling for these rare congenital malformations.

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References