Surgical outcomes for esophageal atresia at Hue Central Hospital

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Abstract

Background: Esophageal atresia is a congenital defect that requires prompt surgical treatment. Despite advances in neonatal care and surgical techniques, complications and mortality remain significant, especially in cases with other congenital anomalies. Few studies have evaluated esophageal atresia treatment results in Vietnam. **Objective:** This study aims to investigate the clinical features and treatment outcomes of esophageal atresia at Hue Central Hospital. **Materials and method:** 32 children diagnosed with esophageal atresia who underwent surgical repair at Hue Central Hospital from March 2019 to December 2023 were included. Data were collected from medical records, including demographics, clinical presentation, surgical procedures, postoperative complications, and treatment outcomes. Descriptive statistics were used, and complications were classified using the Clavien-Dindo system. **Results:** The study included 15 males and 17 females. The average gestational age was 36.6 ± 2.3 weeks, and the mean birth weight was 2256.3 ± 240.9 grams. Surgery was performed an average of 4.7 ± 3.2 days after birth. Type C esophageal atresia was the most common subtype, while 6.2% had Type A. Primary anastomosis was done in 90.6% of cases, and 9.4% required staged repair. The average hospital stay was 25.4 ± 15.7 days. Postoperative complications occurred in 43.7% of patients, with anastomotic stricture, pneumonia, and anastomotic leakage being the most common. The overall mortality rate was 15.6%, with 3 deaths due to cardiac anomalies and 2 due to respiratory problems. 71.9% of patients were discharged in stable condition. **Conclusion:** 84.4% survival rate observed in this study showed positive results in resource-limited settings. Prompt diagnosis, timely surgical intervention, and enhanced perioperative management are essential for improving outcomes in esophageal atresia. Further research is needed to refine the approach to managing esophageal atresia.

Keywords: *esophageal atresia, tracheoesophageal fistula, primary anastomosis.*

1. BACKGROUND:

Esophageal atresia, a congenital anomaly characterized by the discontinuity of the esophagus, represents a significant challenge in pediatric surgery, necessitating prompt diagnosis and intervention to ensure optimal patient outcomes. The incidence of esophageal atresia is approximately 1 in 3000 live births [1], with approximately 90% are associated with distal tracheoesophageal fistula (TEF) [2, 3]. The improvements in survival rates are attributed to advancements in neonatal intensive care, anesthesia, ventilation, nutrition, antibiotics, and surgical techniques. Mortality is mostly involving coexisting severe, life-threatening anomalies. Early surgical intervention, improved surgical materials, and refined techniques also contributed to the improved outcomes [4].

The current standard of care emphasizes immediate repair following the initial reconstruction of esophageal atresia in infancy [4]. Common complications of esophageal atresia treatment include anastomotic leakage, anastomotic stricture, gastroesophageal reflux disease, and recurrent tracheoesophageal fistula. Fortunately, many of these issues can be addressed through conservative management, especially when identified early. As such, it is essential to effectively manage these early complications in order to minimize long-term morbidity [5]. In Vietnam, many major hospitals and centers have performed surgical interventions for patients with esophageal atresia with positive outcomes, however, there are still few published studies evaluating the treatment outcomes of this condition in Vietnamese population. This study aims to (1) describe clinical characteristics of patients with esophageal atresia and (2) evaluate the treatment outcomes of esophageal atresia at Hue Central Hospital.

2. MATERIALS AND METHOD:

This is a retrospective descriptive study, including children diagnosed with esophageal atresia and underwent surgical repair at Hue Central Hospital from March 2019 to December 2023. Treatment method was surgical reconstruction of esophageal continuity and fistula closure, depending on the specific situation encountered. All procedures were performed via open surgery using the retropleural

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approach. Data was collected from medical records, including demographic information, clinical presentation, diagnostic findings and classifications, surgical procedures performed, postoperative complications, and treatment outcomes. Descriptive statistical analysis was performed including means and standard deviation, frequency and percentage, as appropriate. Data were analyzed using IBM Spss Statistics, version 27. Complications were classified based on Clavien-Dindo classification [6]. Ethical approval has been obtained from the Institutional Review Board of Hue Central Hospital.

3. RESULTS:

A total of 32 patients with esophageal atresia were treated at Hue Central Hospital. There were 15 males and 17 females, with the mean gestational age at birth of 36.6 ± 2.3 weeks and the mean birth weight of 2256.3 ± 240.9 grams. Patients had surgery on the mean day of 4.7 ± 3.2 after birth. 15 patients (46.9%) presented with other congenital anomaly. Primary anastomosis was achieved in 29 patients, while staged repair was performed in 3 patients. Mean of hospital stay was 25.4 ± 15.7 days. *Table 1* showed demographic characteristics of the patients.

Table 1. Demographic characteristics

		Incidence (%)	Mean (SD)
Gender	Male	46.9	
	Female	53.1	
Gestational age (weeks)			36.6 ± 2.3
Birth weight (grams)			2256.3 ± 240.9
Age at time of surgery (days)			4.7 ± 3.2
Congenital anomolies		46.9	
Primary anastomosis		90.6	
Hospital stay (days)			25.4 ± 15.7

Regarding Gross classification, 30 out of 32 (93.8%) patients were classified as type C (EA with distal TEF), while the rest 6.2% were classified as type A (isolated EA) (*Table 2*).

Table 2. Grass Classification

Type	Number of patients	Incidence (%)
A	2	6.2
C	30	93.8
Total	**32**	**100**

Treatment outcomes were summarized in *Table 3*, with 23 patients (71.9%) of patients discharged in stable condition, while 28.1% of patients got worse after surgery. Despite small sample size, there were significant differences in outcomes between patients with no comorbidities and those with multiple comorbidities ($p<0.05$).

Table 3. Treatment Outcomes

Outcomes		Number of patients	Percent (%)
Improved		23	71.9
Worsened		4	12.5
Deceased	Severe cardiac anomalies	3	9.4
	Respiratory insufficiency	2	6.2
		32	**100**

14 patients (43.7%) developed complications, with the most common complications including anastomotic leakage (5/32), pneumonia (7/32), and anastomotic stricture (9/32). 5 patients (15.6%) died during the treatment, in which 3 were due to severe associated cardiac anomalies and 2 were due to respiratory insufficiency. *Table 4* summarized complications classified according to Clavien-Dindo classification.

Table 4. Surgical complications according to Clavien-Dindo classification

Grade	Description	Complication	Incidence (%)
I	Any deviation from the normal post-operative course, with no need for pharmacological treatment, surgical or radiological interventions with some allowances)	Anastomotic leak	4 (12.5%)
II	Pharmacological treatment not allowed in Grade I, the need for blood transfusion or TPN	Pneumonia	1 (5%)
III	Any surgical/endoscopic/radiological intervention		
IIIa	General Anesthesia not needed		
IIIb	General Anesthesia needed	Anastomotic strictures needing dilatation	9 (28.1%)
		Major leak needing re-surgery/ gastrostomy	1 (3.1%)
IV	Life threatening complications	Pneumonia/Cardiac Anomalies	6 (18.8%)
V	Death.	Respiratory insufficiency/ Severe cardiac anomalies	5 (15.6%)

4. DISCUSSION

This study highlights a positive response to esophageal atresia treatment at Hue Central Hospital, with over 80% survival rate. The result is consistent with other studies in developed countries, which typically range from 85% to 90% [7, 8]. However, a notable number of cases worsened or resulted in mortality, demonstrating the challenges in managing EA, particularly in resource-limited settings of developing countries [9, 10, 11, 12]. In our study, the mortality rate was 15.6% which were comparable to other reports in developing countries [12], but higher compared to reports in developed countries [13, 14].

46.9% of patients in our study presented other congenital anomaly, in which cardiac anomaly was the most common. This incidence was similar to studies published by other researchers [2, 14]. The associated congenital anomalies have been proven to contribute to a higher mortality rate [9, 12]. In our study, despite the small sample size, significant differences in outcomes were observed between patients with no comorbidities and those with multiple comorbidities. In developing countries, increased rates of mortality can stem from delayed diagnoses, low birth weights, prematurity, high rates of aspiration pneumonia, severe congenital defects, and high perioperative morbidity [15, 16]. Early diagnosis and intervention are therefore essential for reducing mortality.

The high incidence of Gross type C esophageal atresia in our study aligns with findings from other studies. The relatively low birth weight (2256.3 ± 240.9 grams) and gestational age (36.6 ± 2.3 weeks) observed in our study underscore the prematurity and associated complications often encountered in neonates with esophageal atresia [17].

Postoperative complications were observed in 43.7% of the patients in our study, with anastomotic leakage, pneumonia, and anastomotic stricture being the most common. These complications are well-documented in the literature and can significantly impact patient's long-term outcomes [18].

The mean duration of hospital stay in our study was 25.4 ± 15.7 days, which accommodates other studies [19, 20], reflecting the complexity of managing neonates with esophageal atresia and the need for prolonged postoperative care and monitoring.

Surgical repair is still the primary treatment in EA. In our study, patients underwent surgery on the mean day of 4.7 after birth. Primary anastomosis was achieved in 90.6% of patients, while staged repair was performed in 9.4% of cases. Current literatures support primary anastomosis for the majority of EA cases due to better outcomes and shorter hospital stays. However, staged repair may be considered in long gap EA or severe comorbidities cases [9, 13].

5. LIMITATIONS

Several limitations should be considered when interpreting the findings of this study. First, the retrospective nature of the study may be subjected to missing data. Second, the sample size of our study was relatively small, which may limit the statistical power of the analyses. Third, our study

was conducted at a single center in Vietnam, which may limit the generalizability of the findings to other settings. Fourth, the follow-up period was relatively short, which may not capture long-term outcomes and complications associated with EA repair. Finally, the relatively short study period from 2019 to 2023 may not capture the evolution of management strategies and long-term outcomes associated with esophageal atresia.

6. CONCLUSIONS

Esophageal atresia is a complex congenital anomaly that requires a multidisciplinary approach to management. Surgical repair is the main treatment, with primary anastomosis being the preferred approach whenever feasible. Postoperative complications can significantly impact patient outcomes, highlighting the importance of vigilant monitoring and timely intervention. Further studies with larger sample sizes and longer follow-up periods are needed to validate our findings and and optimize management approach for esophageal atresia.

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