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A treatment program for babies with esophageal atresia in Belize

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ABSTRACT

Background: Children born with congenital anomalies in low- and middle-income countries often face a multitude of challenges. Access to pediatric surgical services is limited because of a lack of medical facilities, an adequate transportation system, and a lack of trained surgeons, anesthesiologists, and nurses, all of which leads to a high mortality rate.
Methods: This is a report of a 5-y collaborative effort between the World Pediatric Project, the Children's Hospital of Richmond at Virginia Commonwealth University, and multiple organizations within the country of Belize to provide care for infants born with esophageal atresia, with or without associated tracheoesophageal fistula.
Results: A total of six infants were transferred to our institution in Richmond, VA for operative correction of their esophageal atresia.
Conclusions: Caring for infants with congenital anomalies can be challenging, especially children from low- and middle-income countries. Through collaboration between countries and nonprofit organizations, life-saving international care can be provided to children for these conditions.

1. Introduction

Children have distinct surgical conditions and perioperative needs. Specific congenital anomalies, once thought incompatible with life, now are correctable surgical problems. Delivery of sustainable pediatric surgical care in low- and middle-income countries (LMIC) can be difficult due to resource and personnel challenges, knowledge gaps, and political and policy barriers, underscoring the disparities that exist and substantial burden that surgical disease continues to have in the current global health paradigm [1]. In the past 5 y, the role of surgery in global health has garnered greater attention from clinicians, surgeons, and public health specialists, including the importance of pediatric surgery [2–5]. Consequently, once viewed as too expensive and nonessential, the ability to provide pediatric surgical care in the context of global public health can prevent lifelong disability and death in pediatric populations [2]. Epidemiologic data on the backlog of pediatric surgical cases in LMIC settings are scarce; however, in 2010, congenital anomalies accounted for 26% of deaths in children in Belize, Central America aged <1-y [6]. Esophageal atresia (EA), tracheoesophageal fistula

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(TEF), and other variants occur in 1 in 2500 live births. Definitive management with surgical repair, for infants who are full-term and without associated anomalies, in general is excellent, whereas, without surgery they historically succumb to pulmonary complications [7]. The creation of collaborative partnerships within the so-called developing world, where there is poor access to pediatric surgical care, serve to create cooperation to develop infrastructure for long-term sustainability and promote the standards of pediatric surgery in these countries [8,9]. Established systems for surgical volunteerism ensure understanding of the specific population needs and streamline processes for effectively directed surgical intervention [10]. To our knowledge, this is the first experience describing an international referral program for EA and TEF repair. Here, we recount our 5-y collaborative effort between the World Pediatric Project (WPP), the Children's Hospital of Richmond (CHoR) at Virginia Commonwealth University, and several organizations within the country of Belize to provide medical and operative care for infants born with EA with or without an associated TEF.

2. Methods

After obtaining institutional review board approval (#HM20001047), we reviewed medical records of children with EA treated in conjunction with WPP, which is a nonprofit organization based in Richmond, VA that provides tertiary surgical care to children in Central America and the Caribbean. Referrals to WPP can be triaged as it has a 10-y history in the region. Through multiple contacts, pediatric clinics are notified of visiting surgical teams and, likewise, visiting surgical teams are made aware of infants with complex surgical needs. In addition, these children who need more complex surgical care are brought to Richmond, VA or St. Louis, MO for their operations. From 2009–2014, neonatologists and pediatric surgeons at our institution have collaborated with WPP to care for infants born in Belize with EA. Before 2009, only a few infants with EA, with or without TEF, have been offered surgical repair. Unfortunately, similar to those that were not offered repair, they have all died. Six infants with EA (five also with an associated TEF) were transferred to our institution for surgical repair during this period. These infants were diagnosed and stabilized in Belize. The main children's hospital, Karl Heusner Memorial Hospital, is in Belize city and receives referrals from all over the country; however, it has limited resources and supplies and only has a single pediatric surgeon from Cuba that usually stays for 2-y but, on occasion, will stay for one additional year. As the primary referral hospital for Belizean children, it has minimal capability for advanced pediatric surgical care. In regard to medications, such as those for acid suppression, the hospital does provide them to inpatients when they are available. Families pay for the medications once the patients are discharged from the hospital, if they can afford them. The infants were brought to the United States for operative care and were then returned to Belize completely recovered. During annual surgical mission trips to Belize, pediatric surgeons from CHoR examine them and they receive periodic updates from pediatricians in Belize on their progress.

3. Results

Patient characteristics and perioperative details are shown in Tables 1 and 2. A total of six infants, two boys and four girls, were transferred to our institution for operative correction of their EA since 2009 and have been monitored since surgery. After the first patient was transferred to our institution, multiple opportunities for improving the process were identified. A protocol was created to help diagnose infants with EA, outline initial management, and facilitate obtaining travel documents. Infants who were noted to have excessive drooling were required to have an 8F tube passed into the esophagus. This allowed for diagnosis on plain chest x-ray of EA if it was curled in the esophagus and identification of a TEF if gas was present in the gastrointestinal tract. The infant's head was required to be elevated to 30° at all time, and a 10F tube was placed into the esophagus with the tip at the end of the pouch on low intermittent suction to prevent aspiration. The

Table 1 – Patient characteristics.

Patient	Gender	Age at transfer	Age at surgery	History of prematurity	Length of postoperative stay after repair	Presentation	Comorbidities
A	Male	3 wk	6 wk	Yes	1 mo	Cyanosis, emesis	GERD, right atrium clot, fungemia, malnutrition
B	Male	4 wk	7 wk	No	1 mo	Aspiration	Aspiration pneumonia, malnutrition
C	Female	2 wk	4 wk	No	2 wk	Cyanosis, inability to pass nasogastric tube	None
D	Female	10 d	2 wk	No	3 wk	Vomiting, unable to feed	UTI
E	Male	20 d	5 wk	No	5 wk	Respiratory distress, inability to feed	Aspiration pneumonia, severe malnutrition, tongue tied
F	Female	2 wk	3 mo	Yes	4 mo	Tachypnea, tachycardia, feeding intolerance	Congenital pneumonia

GERD = gastroesophageal reflux disease; UTI = urinary tract infection.