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Initial nonoperative management and delayed closure for treatment of giant omphaloceles

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Abstract

Purpose: Traditional treatment of giant omphaloceles with silo closure has been associated with respiratory insufficiency, hemodynamic compromise, dehiscence, and inability to close the abdomen with subsequent death. To minimize such complications, initial nonoperative management with delayed closure of the defect has been used.

Methods: Between January 1981 and December 2002, 111 patients with omphaloceles were treated. Twenty-two patients with giant omphaloceles (19 containing liver) underwent initial nonoperative management consisting of silver sulfadiazine dressing changes. After pulmonary and other comorbidities stabilized, the contents were gradually reduced with a loose elastic bandage, and delayed closure was planned at 6 to 12 months. The medical records of these 22 patients were retrospectively reviewed to determine the efficacy and safety of this technique in the setting of severe associated anomalies. Those 15 patients (n = 15) from the latter 10 years were further reviewed to determine additional end points (length of hospital stay, length of intensive care unit stay, duration of mechanical ventilation, time to feed, time to closure, and type of closure).

Results: Of the 15 patients treated during the latter 10 years, mean gestational age and birth weight were 38 ± 1.4 weeks and 3.1 ± 0.57 kg, respectively. Median length of stay after birth was 20 days (range, 5-239 days). Median time to full diet was 8 days (range, 4-80 days). Four patients were discharged on oral feedings only, 7 with combination oral/gavage, and 4 with tube feedings.

Pulmonary hypoplasia or pulmonary hypertension was present in 11 (50%) of 22 patients. There were 11 patients with major cardiac anomalies, 14 with a patent ductus arteriosus, and 8 with a patent foramen ovale. Three early complications (2 ruptured sacs and 1 bleeding sac) and 1 late complication (gastric necrosis) occurred in the initial nonoperative period. In addition, 4 patients were treated for line sepsis, 1 patient for acute renal insufficiency, and 1 for aspiration pneumonia. Three patients required tracheostomy and were discharged with home ventilators. There were no complications associated with the use of silver sulfadiazine. Of the 22 patients, 16 have undergone delayed repair, 2 did not require repair, 1 is awaiting repair, 2 died before closure, and 1 was lost to follow-up. Delayed closure was achieved at a median age of 14 months (range, 2-28 months) and mean weight of 8.8 ± 3.3 kg. Four patients required implantation of mesh for definitive closure. Median postoperative length of stay was 4 days (range,

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2-21 days). Postoperative complications included prolonged ileus, recurrent ventral hernia, and prolonged intubation. Overall mortality rate was 9.1%. One death occurred after diaphragmatic hernia repair, and 1 death was from overwhelming sepsis in the patient with a late gastric perforation.

Conclusion: The use of silver sulfadiazine dressing changes for initial nonoperative management of giant omphaloceles is a safe and effective bridge to delayed closure. We recommend this method as initial nonoperative management given the high incidence of associated cardiopulmonary malformations because it may facilitate enteral feeding, minimize respiratory compromise, and reduce morbidity and mortality.

Despite advances in neonatal critical care, surgical technique, and general anesthesia, special challenges still exist for the management of giant omphaloceles. Traditional treatment with initial silo placement and gradual reduction of abdominal contents into the abdomen is not always successful and has been associated with respiratory insufficiency, hemodynamic compromise, prosthesis infection, dehiscence, inability to close the abdomen, and even subsequent death [1-3]. To minimize such morbidity and mortality, alternatives to initial operative management have been explored. Various techniques include avoiding the use of foreign material by providing external compression to the intact omphalocele membrane, repairing the abdominal wall defect with biodegradable tissue, and initial nonoperative topical treatment of the omphalocele membrane with epithelialization followed by secondary repair of the ventral hernia [4-12]. The purpose of this study is to review initial nonoperative management of patients with giant omphaloceles using topical silver sulfadiazine to promote epithelialization of the membrane and delayed closure of the remaining fascial defect.

1. Materials and methods

Between January 1981 and December 2002, 111 patients with omphaloceles were treated at Children's Hospital and Regional Medical Center in Seattle. From this population, 22 infants had giant omphaloceles and were initially managed nonoperatively using silver sulfadiazine dressing changes. Giant omphaloceles were defined as those greater than 5 cm in size and contained liver within the sac. While maintaining integrity of the sac, these giant omphaloceles were painted topically with silver sulfadiazine daily to promote eschar formation and eventual epithelialization. The patient was discharged from the hospital when clinically stable, gaining weight on enteral feedings, and home caregivers were competent and comfortable with this wound care. Once associated comorbidities have stabilized, the abdominal contents were gradually reduced with a loose elastic bandage, and delayed closure was planned at 6 to 12 months of age.

These 22 patients were retrospectively reviewed to determine the safety and efficacy of this technique in the setting of severe associated anomalies and comorbidities. Comorbidities were identified based upon the documented *International Classification of Diseases, Ninth Revision* codes and diagnoses at discharge. Limited data were available from patients treated between January 1981 and March 1992 and included associated comorbidities, complications during the initial nonoperative period, and complications during and after definitive abdominal wall closure.

In addition, medical records of the 15 patients from the latter 10 years were further reviewed to determine additional end points, such as length of initial hospital stay, length of intensive care unit stay, duration of mechanical ventilation, time to enteral feeding, and time to closure. Patients who received their delayed closure at outside hospitals were excluded from the study, as were patients with cloacal exstrophy.

2. Results

Of the 15 patients treated during the latter 10 years, 9 patients (60%) were male and 6 (40%) were female infants. Fourteen patients were diagnosed with their omphalocele prenatally by ultrasound. One patient was lost to follow-up. The mean gestational age and birth weight were 38 $\pm$ 1.4 weeks and 3.1 $\pm$ 0.57 kg, respectively. Median intensive care unit stay after birth was 8 days (range, 2-191 days). Median length of hospital stay after birth was 20 days (range, 5-239 days). Median time to initiation of enteral feeds was 4 days (range, 1-19 days), and median time to full diet was 8 days (range, 4-80 days). Four infants were discharged to home on oral feedings only, 7 with combination oral/gavage, and 4 with tube feedings only. Nine patients required mechanical ventilation at some point before closure with a median duration of 71 days (range, 1-239 days). Three patients required tracheostomy and were discharged with home ventilators.

Of the 22 patients treated with initial nonoperative management, 11 (50%) patients were diagnosed as having pulmonary hypoplasia and/or hypertension. There were also 11 patients with major cardiac anomalies (7 ventricular septal defects, 2 atrial septal defects, 1 situs inversus, and 1 Tetrology of Fallot), 14 with a patent ductus arteriosus, and 8 with a patent foramen ovale. Additional comorbidities/anomalies included congenital diaphragmatic hernia (1), thoracic kidney (1), imperforate anus (1), Pentology of Cantrell (1), patent urachus (1), and cryptorchidism (3). Data regarding chromosomal abnormalities in this group of patients were not available.