A strategy for treatment of giant omphalocele

Kaan Sönmez, Esra Önal, Ramazan Karabulut, Özden Turan, Zafer Türkyılmaz, İbrahim Hirfanoğlu, Alparslan Kapısız, Abdullah C Başaklar

Ankara, Turkey

Background: **The management of giant omphalocele (GO) presents a major challenge to pediatric surgeons. Current treatment modalities may result in wound infection, fascial separation, and abdominal domain loss. We report a GO infant who required a delayed closure and was managed using sterile incision drape and polypropylene mesh.**

Methods: **A 3080 g full-term female infant was born with a GO. The skin was dissected from the fascia circumferentially without opening the amniotic sac and the peritoneum. Subsequently, two polypropylene meshes of 10 × 10 cm in diameter were sutured to each other. Inner surface of the mesh silo was covered with sterile incision drape. This texture was sutured to the fascial margin. Then, the skin was sutured to the mesh and the silo was closed from the side and above. On the 4th day the reduction was started using thick sutures without anesthesia. This procedure was repeated on every 3rd day. When it came closer to the skin margins, constriction was performed using right angle clamps, each time placed 2 cm proximally to the previous sutures in a circular manner. Silo was removed easily and the skin, subcutaneous layers, and fascia were then approximated on the 42nd day.**

Results: **The postoperative course was uneventful and the infant was well with left inguinal hernia repaired in the 3rd month.**

Conclusion: **The method we used can be performed at bedside and without the application of anesthesia, but should be tried on more patients to determine its effect.**

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Author Affiliations: Gazi University, Faculty of Medicine, Department of Pediatric Surgery, 06500, Ankara, Turkey (Sönmez K, Karabulut R, Türkyılmaz Z, Kapısız A, Başaklar AC); Gazi University, Faculty of Medicine, Department of Neonatology, 06500, Ankara, Turkey (Önal E, Turan Ö, Hirfanoğlu İ)

Corresponding Author: Ramazan Karabulut, Gezegen Sokak, 1/10, GOP, 06670, Çankaya-Ankara, Turkey (Tel: +90 312 2026210; Fax: +90 312 2230528; Email: karabulutr@yahoo.com)

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Introduction

Giant omphalocele (GO) refers to a liver-containing protrusion or an omphalocele sac of more than 5 cm in diameter.[1] The management of patients with GO remains a challenge. There are two options for the surgical treatment of GO: staged closure and conservative management. The staged closure can carry the same risk of primary closure by placing the abdominal contents under pressure, which may reduce cardiac output, hypotension, bowel ischemia, venous stasis, liver compression, feeding intolerance, infection and postoperative respiratory and renal failure. In contrast, non-operative treatment has the general advantage of completely avoiding abdominal surgery in the newborn period, which also diminishes the risks of tight abdominal closure as well as the complications observed with staged closure. The conservative approach normally leads to earlier enteral feeding, reduction in sepsis, and reduction in hospital stay.[1-3] We report a GO case that required a delayed closure and was managed using sterile incision drape and polypropylene mesh.

Case report

A 3080 g full-term female infant was born with a GO containing the entire liver, spleen, most of the small and large intestines, and stomach. Prenatal diagnosis was made by ultrasound. Immediately after delivery, endotracheal intubation was performed at the operating room electively due to compromised respiration and the baby was transferred to the neonatal intensive care unit. The infant was treated with intravenous antibiotics [ampicillin (Alfasilin, Fako) and gentamicin (Gentamin, Fako)] for 10 days followed by oral ampicillin (Alfasilin, Fako) for another 2 weeks. She was sedated and given a muscle relaxant to allow mechanical ventilation. No other congenital anomalies were found. A 10-F nasogastric catheter was placed in the stomach to decompress the

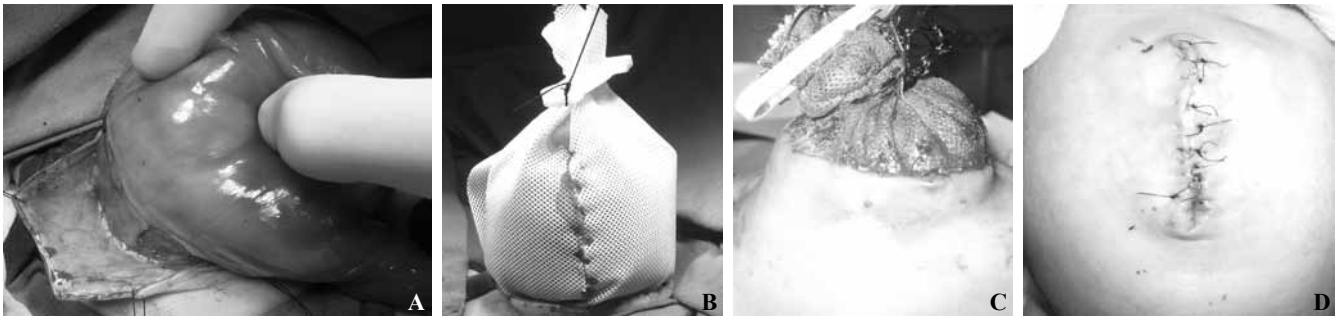

Fig. A: A 2-cm fascial border exposed via subcutaneous dissection without sac excision of the sac-skin margin. **B:** Prepared polypropylene mesh sutured to the fascial margin. The subcutaneous tissue was sutured to the mesh silo and the silo was closed from the sides and upper surface. **C:** Silo reduction using No. 2 thick sutures without anesthesia and discontinuing oral feeding. **D:** On day 42, the silo was removed easily and the skin, subcutaneous layers and fascia were approximated.

bowel, and an 8-F bladder catheter was inserted to monitor urine output. Heart rate, blood pressure, and oxygen saturation were also monitored. After several hours of stabilization with mechanical ventilation, initial procedure was done according to Pacilli modified technique for GO.[4] Anesthesia was maintained with sevoflurane (Sevorane, Abbott) in O_2/air mixture, remifentanil (Ultiva, GSK) infusion and bolus doses of atracurium (Tracrium, GSK). A circumferential incision was made on the skin at the edge of the defect. The skin was dissected from the fascia circumferentially to expose approximately 2 cm of the fascia without opening the amniotic sac and the peritoneum (Fig. A). Subsequently, two polypropylene meshes (Prolene, Ethicon Inc, USA) of 10 × 10 cm in diameter were sutured to each other. Inner surface of the mesh silo was covered with sterile incision drape. This texture was sutured to the fascial margin with 5/0 propylene two circularly continuous sutures with 1 cm intervals. Then, the skin was sutured to the mesh, and the silo was closed from the side and above (Fig. B). Remifentanil infusion was stopped before the extubation of the patient. She was extubated at the 12th postoperative hour and oral feeding started on the first postoperative day. On the 4th day the reduction was started using thick (No. 2) sutures without anesthesia and discontinuing oral feeding (Fig. C). This procedure was repeated every 3rd day. When it came closer to the skin margins, constriction was performed using right angle clamps, placed each time 2 cm proximal to the previous sutures in a circular manner. The suture was tied under these clamps circumferentially. Sequential reductions were performed in the neonatal unit without sedation. Each reduction procedure lasted 10-15 minutes. Early postoperative complications during reduction procedure included minimal dehiscence of the skin edge to mesh closure area.

This patient was hospitalized during the reduction procedure. At the age of 42 days, the infant went back to the operating room for silo removal which was accomplished easily and the skin, subcutaneous layers and fascia were then approximated (Fig. D). At discharge, her wound was healing well, and on follow-up at 3 months of age the infant was well. The left inguinal hernia was repaired in the 3rd month.

Discussion

The treatment of choice for omphaloceles is primary closure. However, large defects are still challenging pediatric surgery because of the disproportion between the omphalocele content and abdominal cavity. The introduction of the viscera into the abdomen can lead to severe complications, contraindicating this technique for GO.[3,5-8]

There are several treatment options for GO, including closure skin flaps, painting the sac with antiseptic solutions for epithelialization, placement of a prosthetic silo to allow gradual reduction, tissue expanders, and external compression with bandages or pneumatic devices.[9-19] Gradual reduction of the viscera by simple compression of the sac was performed at bedside, thus avoiding additional anesthesia and skin closures. However, there are still a unique subset of patients in whom complete reduction is not achieved before the development of complications of wound/fascial infection, dehiscence, enterocutaneous fistula, and systemic sepsis. To avoid these complications, various topical agents have been applied to the sac to promote eschar formation and epithelialization. In a study of outcomes of 30 infants with omphaloceles (including 7 GO patients), the presence of respiratory distress at birth was the only significant predictor of mortality. In infants born without respiratory distress, their overall mortality was 5.5%. In infants requiring positive ventilation at birth, the mortality was 67%. However, for those infants with omphaloceles managed nonoperatively, their mortality decreased to 25%.[1]

The silastic silo has been the standard surgical

treatment for GO. The objective of this method is to allow "gradual return" of the herniated viscera into the abdominal cavity without an excessive increase in intraabdominal pressure. This method is widely accepted, but it is associated with complications. First, it requires two operations; second, the placement of the silastic silo may cause fascial infection with disruption of the suture line, making it difficult to achieve fascial closure; and third, adhesions caused by the first operation make the second operation difficult.[7]

An ideal mesh should be flexible, nonerosive on intraabdominal organs, noncarsinogenic, and biologically inert. Polypropylene mesh has an irregular surface structure that erodes the abdominal viscera because of macroporosity. Intestinal adhesion to mesh potentially has important clinical implications for increasing postoperative morbidity and even mortality attributable to adhesive intestinal obstruction in the rat.[20] Animal studies have shown that composite meshes caused less adhesions to intraabdominal organs compared with non composite meshes.[21-24]

The procedure resembles that of Pacilli et al[4], differing in the aspect of placing the drape on the inner surface of the silo. This helps prevent the adverse effects of the polyprolene mesh mentioned above, so that whether the sac is ruptured or not is not taken into consideration. A plastic sheet was used to insert below the mesh when the amniotic sac was disrupted at birth to avoid adhesions between the mesh and intraabdominal organs. At the time of complete closure of the anterior abdominal wall defect the mesh was easily separated from the amniotic sac. Tense adhesions were present between the mesh and the rectus sheath which were separated by sharp dissection. Early postoperative complications after complete closure of the anterior abdominal wall defect included partial dehiscence of the skin closure and superficial wound infection in 5 patients which responded to medical treatment. Four patients developed a stitch abscess and required removal of sutures in 12 patients with GO.[4]

The presented method can be performed at bedside without the use of anesthesia, but should be tried on more patients to determine its efficacy. Disadvantage of this method is requirement of anesthesia for mesh removal. Advantages of this technique are the prevention of complications like mesh-related infections, abdominal wall defect and the developement of enterocutaneous fistulas. Owing to the adherence of the mesh to the fascial margin, more compression is provided during reduction and less silo detachment is seen.

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