

CASE REPORT

Management of gastroschisis using standard urobag as silo

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ABSTRACT

The management of gastroschisis is a challenging problem for pediatric surgeons the world over. There are so many different options ranging from primary closure to staged closure using various kinds of silo. Silos are expensive and not available everywhere. A cheaper and easily available urobag has been tried for staged reduction with more than satisfactory outcome. We reported three cases of gastroschisis in preterm and low birth weight infants managed by this method.

Keywords: gastroschisis; silo; urobag

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Introduction

Gastroschisis (GS) is the most common abdominal wall defect among newborns and the incidence is increasing worldwide, affecting 4–5/10,000 newborns. Once considered a fatal condition, the survival rate is now close to 90% in overall cases due to various types of silo usage for staged reduction of the intestines into the peritoneal cavity^[1]. However, the management of gastroschisis still remains a challenge due to prolonged hospital stays. Primary closure is feasible only in very small number of cases, and staged repair with the use of silo is a mainstay of treatment^[2].

Case reports

Case 1

A 1.8 kg male neonate of Day 2, born preterm (GA 32 weeks) at a peripheral center via normal vaginal delivery, was referred to us. Vitals were normal at the time of birth, based on Apgar scores. The child was transferred with the intestines packed in a plastic bag, brought by the attendants themselves and was received in a fairly reasonable condition without an IV line. On arrival at the neonatal intensive care unit (NICU), the child was thoroughly examined. There was herniation of the gut through an approximately 4-cm defect in the anterior abdominal wall, lateral and to the right of umbilicus. No other anomaly was detected at birth.

Bowel loops were thick and matted together with a scaphoid abdomen. Initial resuscitation was done with normal saline bolus and nasogastric suction. Temperature was maintained in the infant warmer. Gentle saline wash of the bowel loops was done just before starting the IV antibiotics. Bowel loops were temporarily packed into a sterile urobag. 24 h after stabilization, the baby was brought to the operation theater. After the preparation of the baby, general anesthesia was administered and the baby was partly prepared and draped. A midline incision was carried out above and below the defect to suitably enlarge it. The abdominal cavity was very small with virtually no space to reinsert the bowel. The abdominal wall was manually stretched, and after trimming it to an appropriate size, a urobag was stitched to the fascial margins of the defect using Vicryl 3/0 suture which finally enclosed the bowel

loops inside (**Figure 1**). No post-operative (post-op) ventilation was required and the baby was returned to the NICU. The urobag was hanged overhead the warmer to facilitate gradual bowel reduction. Manual reduction started on day 3 by applying a gauze tape from the top. Daily reductions were done and finally on the 8th post-operative day, complete reduction was achieved (**Figure 2**). In the meantime, total parenteral nutrition TPN was provided to maintain the baby's nutrition. A couple of bowel movements took place during this period. On the 9th post-operative day, the baby was returned to the operation theater for formal closure of the abdomen, which was achieved with much difficulty (**Figure 3**).

The baby breathed spontaneously after reversal from anaesthesia and maintained 100% oxygen saturation, so no post-operative ventilation was required. The baby was returned to the NICU and kept on TPN. The baby's bowel started functioning



Figure 1. Immediately after application of silo-made out of urobag (Day 1)



Figure 2. Bowel loops were almost completely reduced into the peritoneal cavity (Day 7)



Figure 3. Sequence of staged reduction using silo

five days after fascial closure. Oral feeds started on post-op day 7 and the baby was able to tolerate full oral feeds by post-op day 11. Sutures were removed on the 15th day and the baby was discharged in satisfactory conditions with a weight of 2 kg. Total duration of stay was 24 days. The child has been under monthly follow-up with us, has gained weight gradually and is feeding well with no apparent problems.

Case 2

A preterm female neonate born at 29 weeks, weighing 1.6 kg via normal vaginal delivery at home, was brought to us on the same day in a poor condition with eviscerated intestines wrapped in cotton clothes. The baby cried immediately after birth but the exact information about her vitals was unavailable. The child was examined and an IV access was established, by which, normal saline bolus was given along with 10% dextrose. Upon examination, the bowel loops were eviscerated through a 3-cm defect to the right of the umbilicus, matted together and meconium-stained. Oxygen saturation was 100% with a heart rate of 145 beats per min. No other congenital anomalies were found upon clinical examination. Final surgical management was done on similar lines by stitching a urobag after enlarging the defect around the fascia. The baby was returned to the NICU and ventilation was not required. Reduction of contents started on day 3 and final reduction was achieved by day 9. Fascial closure was achieved on post-op day 11. The baby started oral feeds on day 16 (five days after fascial closure) and was discharged on day 25. The child had a few episodes of diarrhea, needing one

hospitalization admission for dehydration treatment, and was managed conservatively. She is also under monthly follow-ups and is doing well. We have not noticed any significant regurgitation during her follow-ups so far.

Case 3

A 2 kg male neonate with gastroschisis, born preterm at 33 weeks via normal vaginal delivery at a peripheral center, was referred to us with the details of the conditions at birth unavailable. The baby had cried immediately after his birth, according to attendants. The baby was on IV fluids and antibiotics when he reached us. The baby's bowels were wrapped in a polythene bag after delivery, and he was referred to us on day 3 of his life. The baby was grossly septicemic and was dehydrated on arrival. Oxygen saturation was 84% with a heart rate of 160 beats per min. On day 5, after resuscitation and primary management, the baby was taken to the operation theater and a urobag was stitched to the fascial defect under general anesthesia. An almost complete reduction of the bowel was achieved after 10 days of treatment and a fascial closure was done. Abdominal capacity was less than expected and closure was done with some tension. The child was put in a ventilator on synchronized intermittent mandatory ventilation (SIMV) mode in the NICU but developed progressive abdominal distension and septicemia, finally succumbing to it seven days later.

Materials and methods

Standard operative techniques and routine sterile urobags were used as silos, and the final fascial closures were done via interrupted Vicryl 3/0 sutures.

Ethics statement

Written permission and informed consent were taken from the parents of all three neonates treated by this method.

Results

We treated three preterm babies with gastroschisis at a level 3 NICU, who were referred to us from peripheral centers. Since the babies were small and primary closures were not possible, we used urobags as silos to enclose the intestines in it. Successful reduction was achieved in all three babies within 7–9 days, and we were able to close the abdomen in all three cases. We lost one baby due to sepsis but were able to save the other two. They are still under our follow-up observation. We have not noticed any significant feeding problems except a few episodes

of diarrhea for which one baby needed to be admitted to the hospital due to dehydration. They are under our follow-up observation for four months and are doing well.

Discussion

Gastroschisis is a congenital abdominal wall defect typically located to the right of the umbilicus with herniation of the midgut. It was first described by Calder in 1733^[3]. It is mostly an isolated anomaly and surgical management for repositioning of the bowel into the abdomen is either primary closure if the abdominal capacity allows it, or more commonly a staged surgery such as what we did in our three cases. The anomalies associated are malrotation of the midgut and atresia of the bowel in about 10% of these cases, but none of our patients had atresia of the intestines^[4]. The incidence of gastroschisis is about 1:4,000 in live births and the incidence is increasing. The main cause of morbidity and mortality is the damage to the intestines as a result of prolonged exposure to amniotic fluid, resulting in the thickening and matting together of the bowel, leading to poor peristalsis and intestinal mucosal dysfunction. Faulty management after delivery at peripheral centers is one of the important reasons for poor outcome. A majority of the neonates referred to us had their intestines wrapped in gauze or cotton wools. This caused soaking of the peritoneal fluids and exudates, leading to bacterial contamination. A better method that can be applied is that the intestines are enclosed in a sterile urobag immediately after birth and the outer surface of the urobag is applied with sterile gauze. This will prevent bacterial contamination as well as fluid loss from the intestines. Therefore, post-op results will subsequently improve^[5].

The use of bedside spring-loaded silos, parenteral nutrition and improved NICU care and ventilation has led to the survival of nearly 90% of affected neonates over the last two decades. We had a survival rate of 66% in our short case series. The management of gastroschisis is controversial, with options ranging from operative fascial closure at birth to staged closure using bedside spring-loaded silo applications, to construction of silos in the operation theater and gradual staged reduction^[6]. Primary fascial closure is not possible in a majority of the cases due to small abdominal cavities and edematous bowels. The best option is to use a spring-loaded silo and its application in the NICU itself, but spring-loaded silo is expensive and is not available in developing countries. Custom silos have been fashioned from a wide variety of materials such as

silicone, gortex, blood collection bags and urobags, which are sutured to the fascial defect and used for progressive reduction of the bowel before final fascial closure^[7]. The degree of the visceroabdominal disproportion and the condition of the herniated viscera play important roles in making surgical decisions. We used sterile urobags to enclose the herniated bowel loops. The urobag has proven to be a very cheap and effective alternative to the expensive silos made from silicone. The disadvantage of the urobag is that it needs to be sutured to the fascia under general anesthesia as compared to spring-loaded silos which can be applied at bedside. However, we believe that it is an acceptable alternative in developing countries like ours where cost is a major constraint for treatment. Gastroschisis is a very challenging surgical emergency requiring immediate intervention in neonates. In India, the condition is mostly accompanied by preterm and low birth weight (LBW) babies; and due to small abdominal cavities, primary closure is not possible in a majority of the cases. We had a similar problem and thus needed a staged reduction. The post-op ileus was prolonged as mentioned in literature and we used TPN to tide it over. Average duration of hospital stay was around 25 days for these neonates. Survival rates after surgery according to worldwide data are 87–100%^[8]. We had a survival rate of 66% through our very small case series which comprised of only three cases. Poor healing of the abdominal wound may result in a ventral hernia which requires secondary surgical repair^[4]. Fortunately, two of our surviving babies have so far not developed any ventral hernia in the four months of their follow-up observation. A staged repair approach is commonly preferred^[9]. Less than 10% of the babies can be managed by primary closure. The management of gastroschisis in a peripheral hospital is challenging; nevertheless, the outcome is no different in tertiary care centers globally^[10]. More cases need to be studied in order to know the effectiveness of this method as compared to spring-loaded silos since initial results are encouraging.

Conclusion

The use of urobag for staged reduction of the intestines in gastroschisis in preterm neonates can be an effective treatment method for this serious condition. It is not only cheaper but easily adaptable and can be used even in smaller centers in the developing world where cost is the limiting factor. We obtained encouraging results in our small series of cases and hoped that this would encourage

fellow pediatric surgeons to try this technique in order to enrich our knowledge with regards to the effectiveness of this method.

Author contributions

All three cases were managed at a single tertiary care center by a single pediatric surgeon (author R Gupta). The co-author A Singh helped in literature search and preparation of the manuscript along with assisting the surgeon during operations.

Conflict of interest

The authors declared no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

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