

Simplified Preformed Silo Bag Crafted from Standard Equipment in African Hospitals

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Abstract

Silo bags are synthetic, flexible silicone bags used to cover and protect the bowel of neonates born with gastroschisis. They are transparent, which enables clinicians to visualise bowel colour and allows for gentle reduction until closure. Silo bags are expensive, and different sizes are needed depending on the gastroschisis size. Currently, tertiary hospitals in low-income countries experience great difficulty in purchasing these bags. Therefore, in this article, we present a method for creating a preformed silo bag by utilising readily available disposable equipment in secondary or tertiary hospitals. The disposable equipment required includes a 200- or 500-ml saline or blood bag, 16- or 18-Fr silicone/latex Foley catheter, Opsite® and 2-0 silk suture. The saline bag is cut and opened transversely. The Foley catheter is cut corresponding to the diameter of the saline bag opening, and both ends of the catheter piece are connected to each other to create a 'circle', which is used as the base for the opening. The edge of the saline bag is turned inside out around the catheter and then securely closed with a continuous suture, which fixes the folded part of the bag to the catheter. These silo bags are cheap and easily and quickly prepared at any centre in Africa and very similar to manufactured silo bags, which are comparatively costly and difficult to procure in limited-resource environments.

Keywords: Gastroschisis, limited resources, medical equipment, silo bag

INTRODUCTION

Gastroschisis is a common congenital defect of the anterior abdominal wall and has a prevalence of 2–4.9 per 10,000 live births, with a rising incidence globally.^[1] It is characterised by the herniation of abdominal contents via a defect to the right of the umbilical cord, without a covering membrane.

One of the challenges in the closure of a gastroschisis defect is the mismatch between the available space in the abdominal cavity and volume of the herniated bowel.

Delay in the coverage of the exposed bowel results in rapid fluid loss and hypothermia risk as well as constriction and/or twisting of the mesentery at the site of the defect, which can result in bowel hypoperfusion, ischemia and bowel injury.^[2,3]

The ideal treatment is bowel reduction within the abdominal cavity as soon as possible and closure of the defect. Often, a silo bag is used to protect the bowel and allow for the gradual

return of the bowel within the abdomen, as intestinal wall oedema gradually subsides.

For many decades, to attain this goal, a silo bag (similar to a Bogota bag) was sutured to the abdominal sheath, under local or general anaesthesia.^[4,5] Recently, a number of commercially preformed silo bags have become available, and these can be slipped under the abdominal fascial defect in the delivery room or intensive care unit without sedation.^[6]

A preformed silo bag is a synthetic, flexible silicone bag with a semi-rigid ring at its base [Figure 1]. It is transparent and allows the clinician to visualise the colour of the bowel. It is soft and allows for manual reduction until closure is achieved.^[6] The preformed silo bag is a disposable product

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Received: 13-05-2020 Revised: 03-08-2020 Accepted: 20-08-2020 Available Online: 18-02-2021

Access this article online

Quick Response Code:



Website:
www.afripaedurg.org

DOI:
10.4103/ajps.AJPS_62_20

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How to cite this article: Elhosny A, Banieghbal B. Simplified preformed silo bag crafted from standard equipment in African hospitals. Afr J Paediatr Surg 2021;18:123-6.

and can cost approximately US \$300–450 per unit. Multiple sizes are necessary to ensure an appropriate fit depending on the gastroschisis defect size and herniated bowel volume. Many hospitals in low-income countries have difficulty in purchasing large consignments of these bags. Thus, they use the Alexis Wound Protector and Retractor XS device as cheaper alternatives (US \$25 each) to the preformed silo bag.^[7]

In some sub-Saharan African countries, with limited medical resources, other types of low-cost silo bags have been reported, such as silo bags fashioned from a sterile urine bag with a rubber ring from an automobile oil filter after disinfection, or a urine bag supplemented with a female condom ring that requires a clothing iron, scissors and sewing machine. This device is soft and prone to frequently slipping off with abdominal fluid leakage. In addition, clinical infectious disease professionals do not approve of the sterilisation technique used for these types of devices in South Africa.^[8,9]

PROCEDURE

We would like to present a method for creating a preformed silo bag by utilising readily available sterile disposable equipment in secondary and tertiary hospitals.

The equipment required includes a 200- or 500-ml saline or blood bag, 16- or 18-Fr silicone or latex Foley catheter, Opsite® and 2-0 silk suture [Figure 2]. The size of the bag can be customised according to the defect size and herniated bowel volume.

The steps of the technique are as follows:

- The saline bag is cut at its base and fully opened transversely
- The Foley catheter is cut according to the diameter of the saline bag base; both ends of the catheter piece are attached to each other by a sterile adhesive by Opsite® to create a ‘circle’ [Figure 3a and b]
- This piece of catheter is used as a semi-rigid base for the opening of the bag
- The saline bag is inserted inside the catheter ‘circle’, and the edge of the saline bag is turned inside out around the catheter and folded carefully to hide the sharp edges of the saline bag [Figure 4a-c]
- A continuous silk suture is then used to securely close the fold of bag around the catheter ‘circle’ [Figure 5a and b].

The bag is made under aseptic conditions and used immediately or is subjected to gas sterilisation (ethylene oxide) for later use.

The total cost is approximately US \$10 for each ‘silo’ bag. The cost may be lower according to the source of the disposable equipment.

We used self-produced preformed silo bags in four neonatal cases with gastroschisis due to the unavailability of manufactured silo bags. In these cases, the bag was easy to

insert, and the ring was solid, which held the edges of the abdominal wall with minimal abdominal fluid leakage. The bags did not pop out or expand the defect because the ring



Figure 1: A preformed silo bag

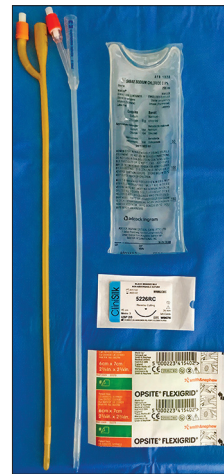


Figure 2: Sterile disposable medical equipment

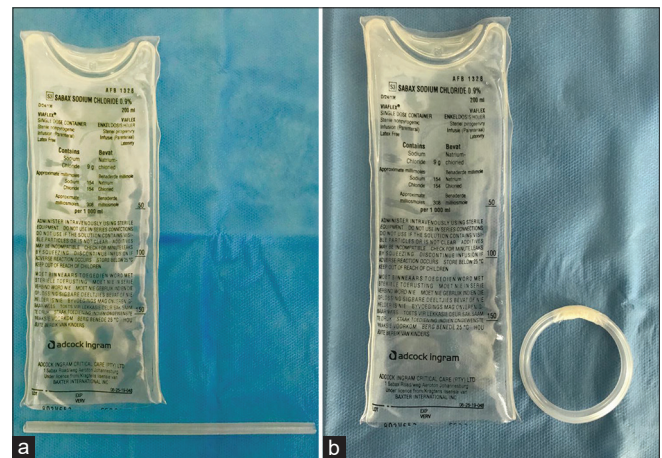


Figure 3: (a and b) Creating the circular base of the preformed silo bag using a silicone Foley catheter

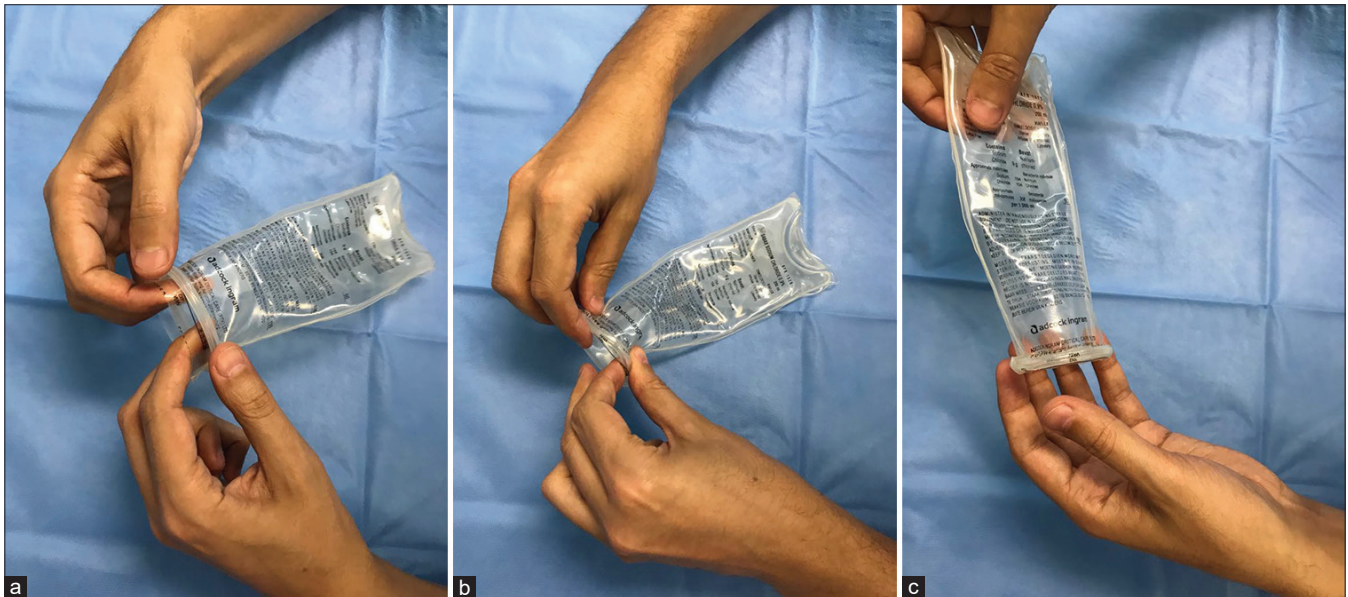


Figure 4: (a) Insertion of the saline bag inside the circular base (created by the catheter). (b and c) Folding the bag inside out around the catheter while hiding its sharp edge

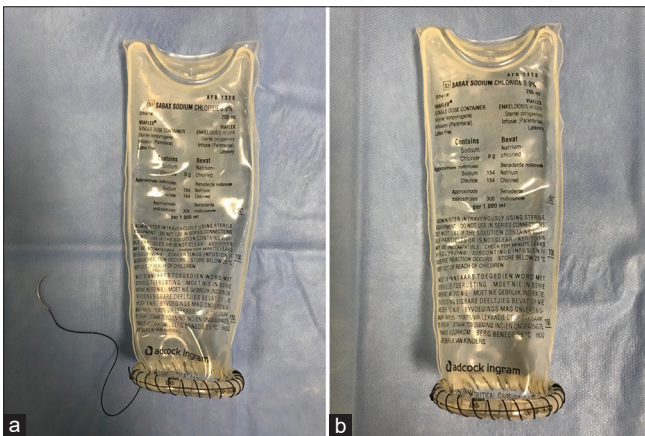


Figure 5: (a and b) Sewing of the folded bag around the circular catheter base using a continuous silk suture



Figure 6: (a) Preformed silo bag '200 ml saline bag' and adhesive dressing applied (if available), after insertion in a neonate with gastrostomy (b) 2-month follow-up, post-gastrostomy closure

tensile strength was higher than that of the other preformed devices. The bags were safely removed without liver laceration or bowel injury. In our limited number of cases, using preformed silo bags yielded successful outcomes [Figure 6a and b].

CONCLUSION

Preformed silo bags are economically affordable and simple to produce at any centre in Africa, and they are comparable to manufactured silo bags, which are comparatively costly and difficult to procure in limited-resource environments.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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