Innovative and cost-effective management of large omphalocele

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Abstract

Background/Purpose: The aim of this study was to develop a method of management of large omphalocele, with easily available inexpensive materials. The efficacy of using the plastic of urine collection bag and paper stapler, in creating the “silo” for the management of 3 newborns with such defects, were assessed.

Methods: All operations were done within 36 hours of birth. A silo was created with the plastic of a sterile urine collection bag, which was stapled with a paper stapler at its free margin. The omphalocele was gradually reduced every 24 to 48 hours, using the stapler, until the contents were reduced, when the abdominal wall was repaired.

Results: The mean time taken to close the abdominal defect was 34 days. All patients could be breast-fed from 48 hours after the first stage is done. Rooming in was done by day 7. None of the babies required assisted ventilation.

Conclusion: This method is simple and cost-effective, using minimally expensive, easily available materials.

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There is little consensus about the optimal treatment of large unruptured omphaloceles. [1]. Direct closure of large (giant) omphalocele always bears the risk of caval compression and respiratory distress, thus requiring ventilatory assistance [2]. Thus came the concept of gradual or staged reduction after creation of a “silo” with an inert and impervious material [3]. In a developing country, silastic sheets are not easily available and are very expensive. We thought of an innovative and cost-effective way of creating the silo with plastic material cut out from a sterile urine collection bag and the staged reduction was done with a paper stapler.
1. Methods

Three neonates were treated during the period of June to December 2004. All of them were delivered normally (vaginal) and the silo was created within 48 hours of birth (Fig. 1). Preoperative x-ray chest was performed to rule out diaphragmatic hernia. Incision was made 2 mm away from the junction of the skin with amniotic membrane. Margins of the rectus abdominis muscles were delineated and the dimension of the defect recorded. Plastic from the urine collection bag (Fig. 2) was cut accordingly, slightly in excess (to be trimmed later). One free margin of the cut sheet was anchored to the freed medial margins of the rectus abdominis muscle with interrupted 3-0 horizontal mattress sutures, thereby creating a base for the silo. Free margins of the sheets were then stapled with a paper stapler (Fig. 2) to create the silo. Stapling was done starting at the cranial and caudal free margins (in relation to the body) of the sheets and lastly on the superior margin to complete the silo. The stapler and the staples were presterilized in a formalin chamber. This silo did not require any further stabilization. The silo was covered with antiseptic dressing and a well-padded bandage was applied. All babies were monitored for the next 48 hours with a pulseoximeter. Breast-feeding was allowed from the third day. Subsequent reductions were achieved every 24 to 48 hours depending on the tightness of the abdomen felt after the first stage and the resistance felt while squeezing the contents down (Fig. 3). Stapling was done under a pulseoximeter guidance, without any sedation or anesthesia. Rooming in was done by the seventh day from creation of the silo. When the contents were totally reduced, abdominal wall reconstruction was done (Fig. 4).

2. Results

Three newborns with an average birth weight of 2.35 kg were treated. None of the babies had any dysmorphic features. The horizontal gap between the rectus abdominis muscle was 8.16 cm (average), and longitudinally the defect was 9.1 cm (average).

The mean time taken to complete the procedure was 34 days—this was dependent on the gap between the 2 recti muscles, which was observed to occur more in smaller babies with low birth weight (Table 1). None of the patients required ventilatory support. Breast-feeding was allowed from the third postoperative day. In 1 patient, few of the anchoring stitches to the rectus abdominis muscle gave way at a time

<table>
<thead>
<tr>
<th>Sl. no.</th>
<th>Body weight (kg)</th>
<th>Gap in the rectii (cm)</th>
<th>Time taken for closure (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Horizontal</td>
<td>Vertical</td>
</tr>
<tr>
<td>1</td>
<td>1.80</td>
<td>10.00</td>
<td>11.00</td>
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<tr>
<td>2</td>
<td>2.50</td>
<td>8.00</td>
<td>8.50</td>
</tr>
<tr>
<td>3</td>
<td>2.75</td>
<td>6.50</td>
<td>8.00</td>
</tr>
<tr>
<td>Average</td>
<td>2.35</td>
<td>8.16</td>
<td>9.16</td>
</tr>
</tbody>
</table>

![Fig. 2](image1) Urine collection bag used for this method and the paper stapler.

![Fig. 3](image2) Staged reduction in process.

![Fig. 4](image3) Final closure.
when the reduction of contents was nearly complete—perhaps as a result of the vector force, opposing on each side. This required restitching under general anesthesia.

### 3. Discussion

Staged closure of gastroschisis and omphalocele using the silo technique has been reported by several authors [4-7]. Dacron-reinforced silastic sheet is the preferred material to create such silos, which is very expensive and not easily available in a developing country. The use of plastic material from a urine drainage bag in the staged closure of gastroschisis was reported by Anand et al [8]. This material is made out of polyvinyl chloride with additives to add color and alter hardness. This material did not cause any immediate or late tissue reaction and appeared quite inert in nature. Use of paper stapler made the construction of silo very easy and substantially less time-consuming. It was easy to place and easy to remove if required and seemed to be more secure. The polyvinyl chloride material was sturdy enough to stabilize the omphalocele and there was no need for it to be suspended from the cot or incubator, thus making breast-feeding very easy, so much so that the babies were roomed in from the seventh postoperative day. None of the 3 neonates required any assisted ventilation.

This method is cost-effective as shown in Table 2, and the materials used are easily available. It is not always simple to popularize a new procedure [9]; still, we believe that this simple method can be adapted not only in the developing world but also in developed countries.

**Table 2** Comparative costs of management

<table>
<thead>
<tr>
<th>Standard method</th>
<th>Proposed method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silastic sheet, INR 5000 ($108.70)</td>
<td>Urine collection bag, INR 40 ($0.86)</td>
</tr>
<tr>
<td>Atraumatic silk, INR 40 ($0.86) each</td>
<td>Paper stapler, INR 30 ($0.65)</td>
</tr>
<tr>
<td>(×5 or 6 depending on number of stages)</td>
<td>Staples (1000), INR 10 ($0.21)</td>
</tr>
<tr>
<td>Total, INR 5240 ($114)</td>
<td>Total, INR 80 ($ 1.73)</td>
</tr>
</tbody>
</table>

INR indicates Indian national rupee.

References