Gastroschisis: deferred closure with releasing incisions. A case report

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ABSTRACT

Primary defect closure is the surgical treatment of choice in gastroschisis. When this is not feasible, a silo is required to progressively reduce the organs and perform a deferred closure of the wall.

We present the case of a newborn with gastroschisis that required the use of a silo. Once the silo had been created, the distance between borders did not allow the defect to be closed, so decision was made to conduct releasing aponeurotic incisions for mobilization purposes.

Progression was uneventful, and enteral nutrition was initiated at 24 days of life. Total enteral total nutrition was achieved at 40 days of life. He received parenteral nutrition for 36 days. He was discharged at 59 days of life.

Abdominal wall treatment through releasing incisions allows prostheses to be avoided and represents an alternative for these patients.

KEY WORDS: Gastroschisis; Silo; Releasing.

GASTROSQUISIS: CIERRE DIFERIDO CON INCISIONES DE DESCARGA. REPORTE DE CASO

RESUMEN

El tratamiento quirúrgico de referencia en la gastrosquisis es el cierre primario del defecto. En los casos en que esto no es posible es necesario confeccionar un silo para reducir progresivamente las vísceras y realizar así el cierre diferido de la pared.

Presentamos el caso de un recién nacido con gastrosquisis, que luego de confeccionar un silo, la distancia entre los bordes no permitía cerrar el defecto, por lo que se decidió realizar incisiones de descargas aponeuróticas para movilizar los mismos.

El paciente evolucionó sin complicaciones, iniciando alimentación enteral a los 24 días de vida, alcanzando el aporte enteral total a los 40 días de vida. Recibió nutrición parenteral durante 36 días. Fue dado de alta a los 59 días.

El tratamiento de la pared abdominal mediante incisiones de descarga permite evitar el uso de prótesis y agrega otra alternativa para el tratamiento de estos pacientes.

PALABRAS CLAVE: Gastrosquisis; Silo; Descarga.

INTRODUCTION

Gastroschisis – a congenital defect of the anterior abdominal wall – can be managed using various strategies in order to make patient recovery as little morbid as possible. These strategies are determined by the characteristics of the eviscerated content and the volume of the abdominal cavity. They include primary closure and deferred closure through a silo, as first described by Schuster[1] in 1967, to allow for a complete reduction of the eviscerated organs. Separation of the abdominal wall components[3] and progressive reduction using the Alexis® retractor[4] have also been described. In some cases, these strategies do not suffice to close the defect and other methods are required. Various materials, both absorbable and permanent, have been described to cover the defect. These include reinforced silicone prostheses, polypropylene meshes (Marlex®, Prolene®), polyglycolic acid (Vicryl®), polytetrafluoroethylene-PTFE (DualMesh®), dural or dermal acellular human allografts (Alloderm®), amnion grafts, and decellularized submucosal pork collagen meshes (Surgisis®)[2-6].

In addition, releasing incisions on the aponeurotic and muscular planes are frequently used – mostly in adults – in the reconstruction surgery of large abdominal wall lesions[7].

We present the case of a newborn with gastroschisis that required the use of a silo. Once the silo had been created, the distance between borders did not allow the defect to be closed, so decision was made to conduct releasing aponeurotic incisions for mobilization purposes.

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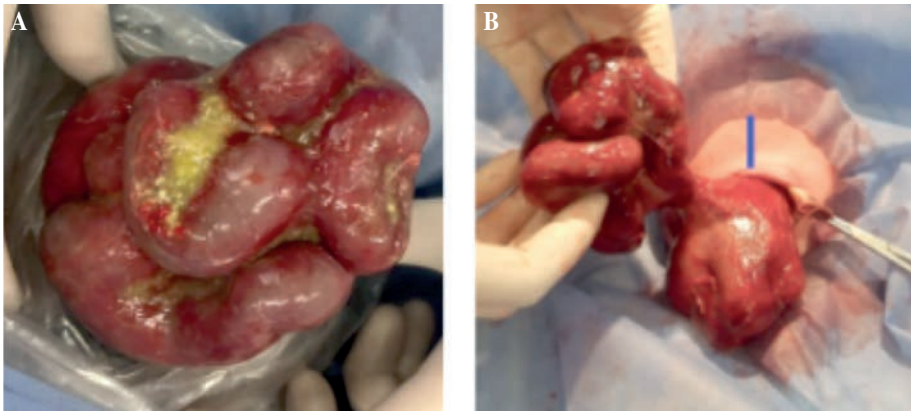

Figure 1. A) Small bowel evisceration, with profuse intestinal wall edema. B) The blue line shows the defect's extension site.

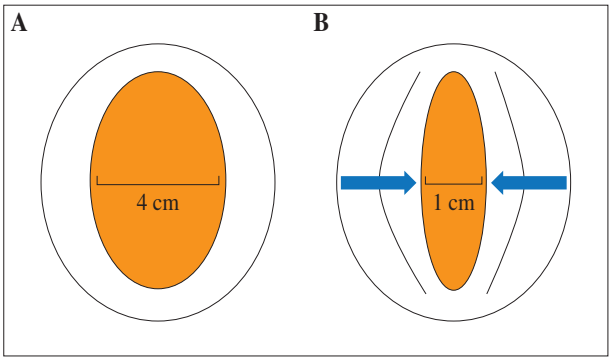

Figure 2. The releasing incision on the anterior sheath of the rectus muscles allowed them to be freed and the defect borders to be approximated.

CASE PRESENTATION

34-week pre-term, 2,260 g newborn prenatally diagnosed with gastroschisis referred to our hospital from another institution.

At admission, stomach and small bowel evisceration – with remarkable edema ("peel") – was observed. Evisceration occurred through a small umbilical defect considering the size of the content (Fig. 1A), which prevented it from being reintroduced into the cavity. Therefore, decision was made to create a silo according to Abello-Britto-Svetliza's technique[8,9]. The patient was under mechanical ventilation, analgesia, and muscle relaxation.

The silo was left in place for 12 days. In this period, dressings and progressive reductions were carried out every 48-72 hours, without replacing the silo. Small bowel loop edema significantly decreased. In the second reduction (72 hours), the defect was slightly extended caudally, which allowed a minor part of the content to be reintroduced (Fig. 1B).

After 5 reductions, with the defect laid open, abdominal wall closure according to our protocol was decided upon. However, it was impossible to approximate the borders for suture purposes. Separation between borders while exerting maximum tension was 4 cm (Fig. 2A). At this time, we considered replacing the abdominal wall with a polytetrafluoroethylene mesh (PTFE-DualMesh®).

Finally, decision was made to perform a wall relaxation maneuver by dissecting the plane between the subcutaneous cellular tissue and the aponeurosis of the anterior abdominal wall muscles until the posterior axillary line had been reached on both sides. A longitudinal releasing incision was then carried out on the anterior sheath of the rectus muscles while surpassing the size of the defect both caudally and distally. The longitudinal incision was conducted in the middle of the muscle (at the same distance from both borders), parallel to the muscle fibers. This allowed the medial borders to be moved, and the distance between borders decreased to 1 cm (Fig. 2B, Fig. 3A, and Fig. 3B). The closure was completed using U-shaped, 2/0 separate polyglactin stitches (Vicryl®), while reinforcing the suture with an extradermal 4/0 overlock one, made of the same material (Figure 3C). Bladder pressure at closure was 16 cm H_2O.

Progression is satisfactory. The suture has not been damaged, and no complications have been recorded (Fig. 4A). Enteral nutrition was initiated at 24 days of life. Total enteral total nutrition was achieved at 40 days of life. The patient was discharged at 59 days of life. He received parenteral nutrition for 36 days. In the postoperative control at 6 months of age, no signs of incisional hernia were noted, with an acceptable cosmetic result (Fig. 4B).

DISCUSSION

In gastroschisis patients with a disproportion between eviscerated abdominal content and abdominal cavity capacity (content-container ratio), definitive wall closure represents a challenge for the surgeon[2]. Forced wall closure may cause compartment syndrome as a result of abdominal hypertension, which may compromise renal flow and small bowel vitality. Eviscerated small bowel wall edema

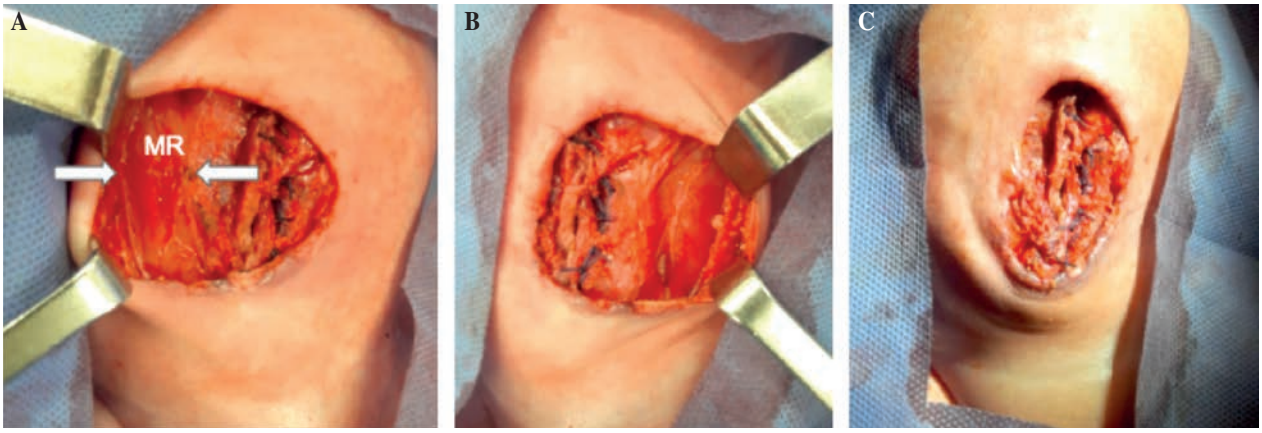

Figure 3. A) and B) The white arrows point at the incision borders on the anterior sheath of the rectus muscle, once traction had been exerted on the defect borders medially. Separation between the anterior sheath borders allows abdominal rectus muscles (MR) to be seen. C) Midline suture.

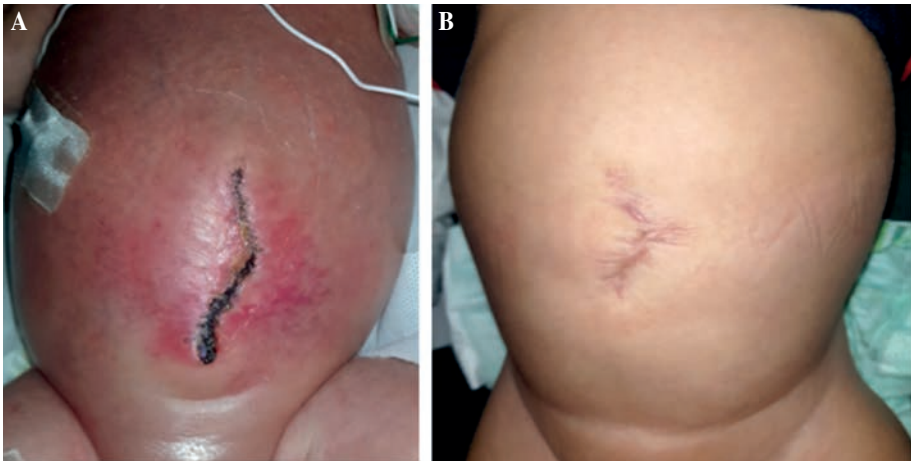

Figure 4. A) Surgical wound appearance on postoperative day 6. B) Cosmetic appearance at control at postoperative month 6.

aggravates this. Bladder pressure as an indirect marker of intra-abdominal pressure helps the surgeon determine how far they can try closure. Bladder pressure levels below 20 cmH_2O have been associated with a lower risk of complications as a result of intra-abdominal hypertension, which leads to successful wall closure. Therefore, the strategies implemented should be aimed at preventing and/or avoiding abdominal compartment syndrome[2].

Our patient had a small defect. Progressive content reduction by means of the silo allowed for an adequate container, which in turn extended the size of the defect.

In this case, the defect closure strategy was an unusual, unprecedented event in patients of this age and weight. Levy[3] reported two cases of abdominal wall closure in gastroschisis patients using the component separation technique described by Ramírez[10], but one of them required a porcine acellular dermal mesh. In our case, the component separation technique was not used – only a releasing incision was performed on the anterior sheath of each rectus muscle.

Even though intestinal wall edema was so severe that the presence of atresia could not be identified or ruled out, the wall closure process was carried on. Indeed, when facing suspicion or confirmation of an atretic intestinal segment, the abdomen is carefully closed and a watchful waiting approach is adopted, since an inflammatory environment is not ideal for resection and anastomosis. Intestinal transit will then determine the next step to be made. If exploration is required, we rather leave it for a time of greater clinical stability (about 30 days) as this has demonstrated to reduce intestinal wall inflammation[11].

Although the use of releasing incisions to lower abdominal wall tension was an unplanned decision made at the time of surgery, it was based on adult surgery principles in the treatment of abdominal wall incisional hernia[7].

Abdominal wall treatment through releasing incisions allows prostheses to be avoided, thus reducing morbidity. Therefore, it represents an alternative for these patients[4,5].

Regardless of the closure technique used, the result should be optimal for the patient. This means all closure

techniques should conform to certain requirements, from safely reducing organs to providing acceptable cosmetic results. In addition, they should be complemented with parenteral nutrition until enteral feeding is resumed[2].

We believe the surgical management of congenital abdominal wall defects requires a deep understanding of the various options available in order to provide the patient with the best possible solution. This allows the issue to be approached with as little risk and morbidity as possible, which translates into better results.

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