

General Aspects on Post Partum Care of Laparoschisis in Newborns

—A Pediatric Surgeon's View Point

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Abstract

In this communication, a short overview about congenital abdominal wall defects—laparoschisis is given. Focusing on all day clinical practice, possible surgical therapies and best postpartal care for these critically ill newborn babies are presented for the obstetrician in charge from a neonatal surgeon's viewpoint.

Keywords

Congenital Abdominal Wall Defects, Laparoschisis, Postpartal Care

1. Introduction

Congenital abdominal wall defects in newborns in general are called “laparoschisis” or either “gastroschisis” and “exomphalos” when using their synonymes. If the abdominal wall defect is located on the right side of the umbilical cord and there is no sac or its remnants around the herniated viscera, the defect is sub-classified further as “gastroschisis” (**Figure 1**). In the second type, called “omphalocele”, always a sac or at least some of its remnants are covering the herniated viscera (**Figure 2**). The abdominal wall defect is usually big(ger) and the viscera are herniating through the umbilical ring in any case. Besides bowel, herniated liver is found more likely in an omphalocele than in a gastroschisis patient.

Laparoschisis has an incidence of 1:2000 live births. The sex distribution is male:female = 1.5:1 in omphaloces, 1:1 in gastroschises, respectively.

“Laparoschisis” is considered as a failure in the embryonic development sequence when the physiological umbilical cord herniation of the viscera fails to return back into the abdominal cavity before the 11th week of gestational age.



Figure 1. Newborn with typical gastroschisis. The abdominal wall defect is located on the right side of the umbilical cord.



Figure 2. Newborn with typical omphalocele. The abdominal wall defect is opening into the umbilical cord.

The result is that all herniated viscera are kept either inside the umbilical cord (sac) or its remnants (=omphalocele), respectively within the abdominal wall defect and the amniotic membranes (=gastroschisis).

The latter is usually prone to secondary changes to the intestine caused by the amniotic fluid like (secondary) atresias or short bowel syndrome. Both are often associated with malrotation, mesenterium dorsale commune and Meckel's diverticulum. In up to 40% of patients, omphalocele is associated with congenital heart malformations and trisomy 13, 18 or 21. Overall complications are infection/sepsis, hemorrhage, ileus/bowel obstruction, failure to close the abdominal wall, abdominal compartment syndrome or abdominal wall hernia.

Making prenatal diagnosis by ultrasound scan is possible around the 16th week of gestational age. Otherwise the diagnosis is made by clinical examination right after delivery. Differential diagnoses to be considered are (simple) umbilical hernia, supraumbilical or epigastric hernia and hernia into the chord (see references for details).

2. Management

2.1. Peripartal Management

Peripartal management of these prenatally diagnosed babies is still a matter of debate. Many authors say that a spontaneous vaginal delivery for routine omphaloceles at term is possible. But, that on the other hand, it is advisable to plan Caesarian section for intrauterine ruptured omphaloceles or for a gastroschisis 4 - 6 weeks preterm. Doing this Caesarian section around 36 weeks of gestational age is preferred by the majority of authors, because afterwards the malratio between the further growth of the intestine and the small size of the abdominal cavity increases constantly and makes the situation even worse. There is a general consensus that such babies should be delivered in a Level I—Perinatal Center and that the mode and time of delivery should be chosen in regard to obstetrical rather than newborn issues (see references for details).

2.2. Postpartal Management

Immediately after birth the omphalocele content or the herniated viscera are covered with moist, non-adhesive gauze and the entire lower part of the newborn is packed completely in a plastic bag to avoid further loss of heat and fluids (**Figure 3**).

The newborn baby is brought into a (right side) lateral position, where the herniated bowel is heavily supported. A proper nasogastric and rectal tube is inserted and neonatal intensive care management and therapy continued. After his/her initial stabilization either single or multi-step surgical therapy is planned tailored to the specific condition and individual size of the abdominal wall defect of the baby.

All possible air and fluid is evacuated by suctioning repeatedly via the nasogastric tube. The bowel is irrigated repeatedly via the rectal tube, too, to flush out as much meconium as possible. If the bowel perfusion is compromised, the defect in the abdominal wall is stretched bimanually or opened up by a deep cut even bedside as an emergency procedure (**Figure 4**) [1] [2] [3].



Figure 3. Newborn with laparoschisis packed into a plastic bag immediately after birth to prevent further loss of heat and fluids.

3. Pediatric Surgical Management

When choosing the “Bianchi manoeuvre” for reduction of the herniated bowel, the abdominal wall is gently and continuously stretched and the bowel gently and continuously decompressed until the entire herniated bowel can be reduced back into the abdominal cavity completely (**Figure 5**).

When using the so called “silo” or “Schuster’s technique” a prefabricated spring loaded silo or a “self-fabricated sterile plastic bag” is sutured with its base into the abdominal wall defect while the tip is twisted and hooked up over the herniated bowel like a tent. Step by step the tip is twisted down to reduce the bowel gently back into the abdominal cavity (**Figure 6**). This is the most classical technique used in pediatric surgical practice so far.

In selected cases the amniotic sac or the residual remnants of the omphalocele sac are tanned and later used to cover the defect in the abdominal wall. If the obstetrician leaves the umbilical cord long enough, it can be sutured together in a “snail shell” fashion before it will be stitched in for definite replacement of the defect in the fascia level (“Koltai-technique”) (**Figure 7**).



Figure 4. Bimanual stretching of the abdominal wall defect to ensure better perfusion of the herniated bowel loops.



Figure 5. Bianchi manoeuvre. Gentle bimanual reduction of the herniated viscera back into the abdominal cavity.



Figure 6. “Silo” or “Schuster’s technique”. By twisting the bag, the herniated viscera is reduced step by step back into the abdominal cavity.



Figure 7. “Koltai-technique”. Umbilical cord parts are used for replacement of the fascia defect in the abdominal wall.

A pericard, a dura patch or alloplastic materials like Goretex® (**Figure 8**) or the VAC® system (**Figure 9**) are also used by some pediatric surgeons for reconstruction of the abdominal wall.

In some cases primary closure of the abdominal wall defect by muscle or fascia flaps (=autologous tissue) according to plastic surgical principles is feasible. The newborn skin in general is usually elastic and stretchable enough to be closed primarily in almost all cases.

When finally a tension free and well perfused closure of the defect could be achieved, an uneventful wound healing and a well thriving baby will be the case, regardless if the baby has had single or even multiple step surgery (see references for details).

4. Special Case Presentation

In a short appendix we would like to report on a case where we have treated a gastroschisis with the Nanova™ system (KCI—Acelity Group) for the first time.



Figure 8. Alloplastic material like Goretex® *in situ*.



Figure 9. VAC® system in place for abdominal closure.

The baby was born in the 35 (+6) weeks of gestational age after early rupture of membranes by Cesarean section with a huge gastroschisis and two bowel atresias. After initial stabilization the atresias have been cleared by an artificial anus and the abdominal wall defect has been temporarily covered first by a Goretex® patch and later by a silo. The silo has been twisted down step by step and the bowel could be re-anastomosed in due course (approx 2 weeks). After the herniated bowel reached the actual level of the abdominal cavity (**Figure 10**) and after informed consent of the parents was taken we decided to use the Nanova™ system for further closure (**Figure 9**).

Briefly, the Nanova™ system (KCI USA, Inc, San Antonio, TX, USA) consists out of a sterile, absorbable Nanova™ dressing for single use, a piece of sterile GranuFoam™ dressing wound filler and a non-sterile single use therapy unit for one patient only. The pre-pumped therapy unit provides the advantageous negative pressure around the wound margins.

The rest of the silo plastic bag was kept in place to cover and protect the surface of the viscera. On top of it the tailored foam (Granufoam™ wound filler) was placed and the dressing closed by the Nanova™ wound cover. V. A. C.® GEL stripes were glued between the skin margins of the abdominal wall and the wound cover (Nanova™ wound cover) that act as a power transmission for con-

tinuous lengthening and stretching of the abdominal wall by the negative pressure of the therapy system (=dynamic secondary suture) (Figure 9, Figure 11).

Six days after the initial application of the Nanova™ therapy system it could be removed and the abdominal wall defect closed definitely by primary suture. The baby's recovery to date (4th month of life) was uneventful (Figure 12).



Figure 10. Starting with the Nanova™ system.



Figure 11. Application of the Nanova™ system.



Figure 12. Baby in the arm of her mother.

First Conclusions Out of This Case Report

It is just a primary case report (!), but it seems that the defect closure by the Nanova™ therapy system might have the following advantages:

- defect closure seems to be faster than with the “silo-Schuster’s technique”,
- dressing changes are less frequent and less labour intensive, therefore
- saving valuable resources in comparison to other techniques seems to be possible.

Last but not least, the biggest advantage is that the newborn babies did not need the bulky rack anymore, which means that they can lie flat on their abdomen earlier and that they can be cuddled in the arms of their parents earlier and easily (Figure 12).

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