

A modified umbilical incision for laparotomy in newborns and small infants

Abstract

Purpose: A modified upper abdominal incision through the umbilicus has previously been described by one of the authors (Salakos) for performing pyloromyotomy in hypertrophic pyloric stenosis. The advantages were easier access to the peritoneal cavity, and better cosmetic results compared with epigastric transverse or midline incisions.

Methods: Using the same umbilical incision, a wider incision in the aponeurotic fascia following the skin incision lines has been added, thus allowing better access to the abdominal contents, and enabling an easier exteriorization of the bowel.

Results: This surgical approach was used in 23 babies- mean gestational age 34 ± 5.28 weeks and mean birth body weight 1980 ± 1048 g. The mean age at the time of surgery was 12 ± 30 days. Indications for surgery included: necrotizing enterocolitis or its complications ($n=9$), small bowel perforation ($n=3$), malrotation ($n=3$), meconial ileum ($n=2$), intestinal dysmotility due to prematurity ($n=2$), intestinal atresia ($n=2$), gastric perforation ($n=1$), and omphalomesenteric duct remnants causing obstruction ($n=1$). Six patients were left with an ileostomy. Wound infection occurred in 3 cases and there was no dehiscence.

Conclusions: We have extended the use of a modified open umbilical access to manage a broader range of surgical conditions in neonates and infants achieving good exposure and cosmetic appearance.

Keywords: Laparotomy; Umbilical incision; Neonatal surgery; Enterectomy; Necrotizing enterocolitis

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Abbreviations: MIS, minimally invasive surgery; NICU, neonatal intensive care unit

Introduction

A modified upper umbilical incision has been used as a routine by the authors for more than 15 years, mainly for performing pyloromyotomies since its description by Besson R et al.¹ This incision provides a better access to the pyloric mass when the linea alba is incised cranially as much extension as the skin incision allows it. Based in the principles of minimally invasive surgery (MIS) and after adding some technical modifications we have adopted this access, so that its application can be extended to treat many other surgical conditions in small infants since 2009.

Material and methods

From April 2009 to August 2012 out of 23 infants who were admitted to the Neonatal Intensive Care Unit (NICU) and the Pediatric Department of the IASO Hospital underwent to laparotomies with modified upper abdominal incision through the umbilicus. Thirteen babies were male and the mean gestational age was 34 ± 5.28 weeks. Mean birth body weight was 1980 ± 1048 g. The mean age at the time of the operation was 12 ± 30 days. The most common surgical condition treated was NEC in 9 cases (Table 1). Six patients remained with an ileostomy. Wound infection occurred in 3 cases and there was no dehiscence.

This approach uses an incision made in the upper umbilical skin crease approximately two thirds of the circumference of the umbilicus, with a second incision at the midline joining the first one at the top. The three parts of the incision are approximately the same in length (Figure 1). The skin and the subcutaneous tissue are released in a cephalad

direction above the umbilical ring as far as necessary to allow a good exposition of the linea alba. The abdomen is entered by dividing the linea alba longitudinally in the midline, with ligation of the obliterated umbilical vein and the opening of the peritoneum. Following the skin incision lines, the aponeurotic sheaths are lengthened laterally too in order to allow wider access to peritoneal cavity and to permit easy delivery of the intestinal contents (Figure 2). The skin closure of the incision is Y-V plasty (Figure 3).

Discussion

Although the transverse incisions for laparotomies is advocated in neonates and infants, we have found that a less invasive wound in the right place can be more convenient, within the current principles of minimally invasive surgery.²

In this particular age group the abdominal cavity has some anatomical particularities that favour our surgical approach: the compliance of the abdominal wall, and protruding globular abdomen where the paravertebral spaces and the little pelvic cavity are not deep compartments. The abdominal contents, in particular, the intestinal loops, are more exposable. In essence, the laparotomy through the umbilical incision is similar to the extracorporeal step of a laparoscopic procedure when a segmental intestinal resection has to be done, i.e., Meckel's diverticulectomy. With this access we are using the umbilical approach as a primary technique without laparoscopic assistance. In this series of patients, we used cranial and lateral fascial incisions for performing the laparotomies but it can be extended caudally for dealing with pelvic pathology, for example, ovarian cysts.

There are many reports about the versatility of the umbilical incision in infants, including the classical "omega" incision described by Tan & Bianchi for pyloromyotomies and later used by Soutter

& Askew in the surgical treatment of intussusception, malrotation, intestinal atresia and stenosis.²⁻⁴ Among the variants of Tan & Bianchi's incision for pyloromyotomies, there is a full circumumbilical incision which creates a round shape window that can be slid cranially to the right upper quadrant where the abdomen will be entered after blunt dissection of subcutaneous space.⁵

Sauer et al. believe that an umbilical incision is preferable to laparoscopy in long segment cases of Hirschsprung's disease. In this situation, a staged procedure will be necessary and probably a diverting stoma is required which can be settled at the umbilical site.⁶ Sometimes to place an ileostomy in cases of NEC through the umbilical incision is a faster procedure in infants in poor general condition who need an stoma for some weeks. Banieghbal & Beale reported correction of jejuna atresia in 16 neonates using the umbilical incision with excellent results when compared with a group with classical incision, without increasing operative time in experienced hands. They highlighted the parents' satisfaction with the appearance of the scar.⁷ Using a trans-umbilical laparotomy, Chiang et al excised a large duodenal duplication cyst in a newborn with antenatal diagnosis.⁸ As well the umbilical access can be a good alternative to laparoscopy for management of neonatal ovarian cyst.⁹ In neonates undergoing surgery for malrotation, duodenal atresia/web, Suri et al. found that the circumumbilical incision was equivalent to the transverse abdominal approach, in terms of operative time, surgical complications, postoperative analgesia requirements, length of the hospital stay and time to reach full feeds.¹⁰ Many of our patients had procedures that involved NEC complications like intestinal perforations and stenoses. We found the incision very suitable if compared the classic transverse one. Even if an ileostomy is needed, it is possible to place at the umbilical site.¹¹

Table 1 Frequency of the surgical conditions

Surgical conditions	Cases (n = 23)
NEC disease complications and sequels	9
Small bowel perforation	3
Malrotation	3
Meconial ileum	2
Intestinal dysmotility due prematurity	2
Intestinal atresia	2
Gastric perforation	1
Omphalomesenteric duct remnants causing obstruction	1



Figure 1 The incision.



Figure 2 Anastomosis in the right colon after resection of a stenotic segment.

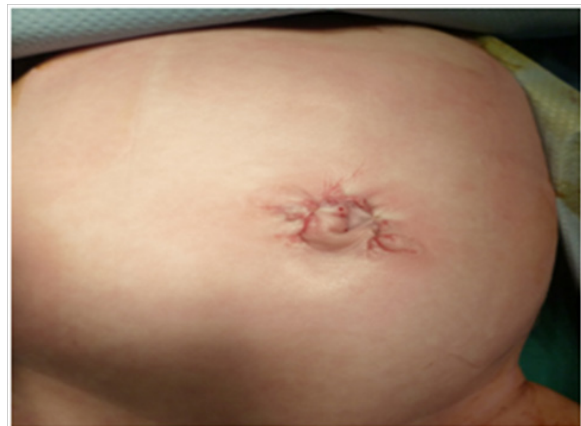


Figure 3 Incision after the skin closure.

Conclusion

In conclusion, we have extended the range of surgical conditions in neonates and infants that can be managed through an open umbilical approach. This technique is versatile, provides good surgical exposure, and produces a good cosmetic result.

Acknowledgments

None.

Conflicts of interest

The authors declare there is no conflict of interests.

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