Surgical management of Necrotizing Enterocolitis in an Incredibly Low Birth Weight infant and review of the Literature

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Abstract

Survival of preterm infants have dramatically improved over the last decades. Nonetheless, infants born preterm remain vulnerable to many complications, including necrotizing enterocolitis (NEC).

The severity of the disease and the mortality rate are directly correlated with decreasing gestational age and birth weight. Despite surgical treatment mortality rate remains very high in extremely premature infants, especially in newborns at the lowest limit of viability.

Survival of infants of birth weight (BW) below 750 g has been increasingly reported in recent years, however the overall mortality in extremely low "BW" infants (ELBW) requiring surgery for NEC has not decreased over the past years.

We describe our experience with a male preterm infant who survived after an ileostomy procedure for Bell stage II NEC, with improving neuromotor skills at 2 years follow up.

Our experience suggest that surgery has not a negative impact on survival and ileostomy could prevent further damage of the bowel in NEC.

We hypothesize that indication to surgery at an earlier stage may prevent further progression of the disease without a significantly negative impact on survival. Further studies are needed to confirm the appropriateness of this approach in ELBW infants. Clin Ter 2017; 168(5):e297-299. doi: 10.7417/CT.2017.2024

Key words: Necrotizing Enterocolitis, preterm infants, ileostomy, Bell stage

Introduction

Although the mortality rate of preterm infants and the gestational age-specific mortality rate have dramatically improved over the last decades, infants born preterm remain vulnerable to many complications, including respiratory distress syndrome, bowel injuries, a compromised immune system, cardiovascular disorders, rethionopathy and neurological damage.

These patients are usually included in three birth weight (BW) groups: low BW (LBW) between 2500 g and 1500 g, very low BW (VLBW) between 1500 g and 1000 g, extremely low BW (ELBW) below 1000 g. Some Authors (1) included patients of BW below 750 g in a further group of incredibly low BW (ILBW).

With progress in the treatment of preterm condition, cases of survival with ILBW are reported in the Literature, but newborns at the lowest limit of viability have the highest mortality rates and the highest rates of all complications.

Necrotising enterocolitis (NEC) is the most frequent gastrointestinal complication affecting premature infants, in which the severity of the disease and the mortality rate are directly correlated with decreasing gestational age (GA) and BW. Surgical management of this condition could become particularly crucial in extremely premature infants.

In this case report we describe the treatment and outcome of a male preterm infant with ILBW who survived after an ileostomy procedure for NEC.

Case report

A premature and small for GA (26 weeks and 4 days) male baby, with a BW of 450 g (-3.06 SDS) and reverse end-diastolic flow (REDF) in umbilical artery, was admitted at our third-level Neonatal Intensive Care Unit (NICU). Complications of prematurity were hyaline membrane disease, patent ductus arteriosus requiring pharmacological therapy, NEC, stage 1 retinopathy of prematurity, bronchopulmonary dysplasia. He was kept nihil per os (NPO) at birth due to the REDF pattern, and on second day of life developed abdominal distention, biliary gastric residuals, thrombocytopenia and metabolic acidosis. Serial plain X-rays of the abdomen showed increasing abdominal distention, biliary gastric residuals, thrombocytopenia and metabolic acidosis. Serial plain X-rays of the abdomen showed increasing abdominal distention and, on day 9, evidence of cystic pneumatosis in the small bowel without evidence of perforation (Bell stage II) (2). He underwent surgical laparotomy with ileostomy without resection of the affected tract of the bowel (Fig 1). Weight at the time of surgery was 395 g.

Immediate postoperative outcome was uneventful. Subsequent course was complicated by ileostomy prolapse (50

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days after surgery). Stoma closure was performed 100 days postoperatively, as the baby reached the weight of 2000 g, with no complications.

At two years’ corrected age, follow up examination showed growth impairment, with body weight z-score -2.54 SDS; Bayley test was suboptimal for age. At the moment, the child is being followed by local physiotherapist and logopedist and is improving his neuromotor skills.

Discussion

Survival of ILBW infants has been increasingly reported, in some cases without severe long-term neurodevelopmental impairment. Nonetheless, mortality of these infants remains high and first year survival of 15.5% has been reported for infants with a birth weight less than 500g (3).

Management of these infants may be particularly challenging, especially when severe complications such as NEC occur. Data on the treatment options and outcome of ILBW as a separate group are not available in the literature due to the scarcity of cases and they are discussed in the larger ELBW or VLBW groups.

Surgical treatment, consisting in laparotomy and resection of the gangrenous bowel and/or ileostomy, is usually indicated in Bell stage III NEC. Peritoneal drainage has been advocated as a less invasive procedure in unstable VLBW patients (4), but laparotomy has recently revealed the treatment of choice (5).

Gangrene and perforation are known to be associated with 30% and 64% postoperative mortality rate respectively (6), and the outcome of affected infants is influenced by the length of necrotic bowel (7). Other patient characteristics correlated with an increased likelihood of death are lower gestational age, lower birth weight, use of vasopressors (8).

The overall postoperative mortality observed in a study cohort of ELBW infants with NEC or IP was 49%, supporting the catastrophic nature of this illness and the fragility of these neonates. Despite many advances in neonatal, anesthetic and surgical care of these infants, the overall mortality rate for those requiring surgery has not decreased over the past years (8).

Some Authors (9) found that in VLBW the total number of comorbidities, rather than the treatment choice, affects outcome suggesting that selection of therapeutic options requires evaluating all factors that may impact survival rather than applying a single treatment strategy for all patients.

Although standard indication to surgery is Bell stage III, in our case combined neonatological and surgical consultation led to the choice of minimal laparotomy with exploration of the bowel and decompressive loop ileostomy while in the Bell stage II, in the attempt to prevent further progression to stage III, which is known to be associated with very high mortality rate despite surgery. A single case is not demonstrative, nevertheless few considerations can be formulated.

The most important determinants of mortality are pan-necrosis and longer length of necrotic bowel (7, 10).

Some Authors (11) investigated the importance of the trend of metabolic derangement to define more timely surgical intervention, demonstrating that waiting for intestinal perforation may be too late. Indeed, mortality of these patients is linked to advanced disease, lower GA and lower BW and it is scarcely influenced by surgery (7, 9).

Early primary laparotomy is safe and effective for the management of surgical NEC in ELBW infants (7). The value of enterostomy in preventing further damage of the bowel in NEC is confirmed by its widespread use and by the literature (12, 13), suggesting its possible application in selected cases. It could be therefore hypothesized that indication to surgery at an earlier stage, in selected ILBW patients, may prevent further progression of the disease without a significantly negative impact on survival.

However, further investigation is needed to better ascer-
tain the value of fecal diversion in preventing development of intestinal necrosis, in order to identify its possible indications in a more precocious stage than currently acknowledged.

In order to identify increased risk of progression in patients who would benefit of preventive ileostomy, while in the Bell stage II, promising new approaches that define the trajectory of physiologic derangement will give us the opportunity of constant careful clinical surveillance and a better assessment and timing of operative intervention (11, 14).

In conclusion, we report a case of an ILBWI with successful early ileostomy for Bell stage II NEC. Further studies are needed to confirm the appropriateness of this approach in ILBW infants.

References

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