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Neonatal Intestinal Obstruction in Acute Renal Failure in Premature Infant: A Case Report

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Abstract

Introduction: Intestinal obstruction is a common cause of abdominal surgery in the neonate. Diagnosis is straightforward using standard radiology, and surgical technique depends on the underlying anatomical lesion. Peritoneal dialysis (PD) is an effective, albeit invasive, therapy for neonatal renal failure. We report a case of neonatal obstruction with severe renal failure treated by PD to highlight our hospital practice and possible remedies in a context of limited resources. **Case Presentation**: This was a female neonate of moderate prematurity admitted on day 4 of life for management of a flat neonatal obstruction. Radiological diagnosis suggested small bowel atresia. Biological tests revealed severe renal failure with creatinine levels of 416 micromoles per liter and blood urea of 27.1 micromoles per liter. Management consisted of preoperative peritoneal dialysis for 48 hours followed by laparotomy. The intraoperative diagnosis was GROSFELD type IIIa digestive atresia. The postoperative course was favourable, transit was resumed on day 5 and the patient returned home on day 12. Progress at 3 months was satisfactory. **Conclusion**: Neonatal intestinal obstruction with renal failure in premature infants is associated with a poor prognosis, even more so if there is a delay in treatment. Peritoneal dialysis seems to be a suitable alternative for this management in our working conditions with limited resources.

Keywords

Neonate, Occlusion, Peritoneal Dialysis, Case Report

1. Introduction

Bowel obstruction is a common cause of neonatal abdominal surgery [1] [2].

Bowel obstruction is easily diagnosed by a combination of ultrasound and standard radiology (thoraco-abdominal X-ray), whether the patient has a flat or distended abdomen. Treatment remains surgical, by laparotomy or laparoscopy, and the surgical procedure depends on the underlying anatomical lesion, which allows the type of intestinal atresia to be classified. In premature neonates, this congenital anomaly may be associated with some degree of organ dysfunction, such as renal failure. As the kidneys of newborn babies are particularly susceptible to developing acute renal failure (ARF), this can occur without kidney damage. The term acute kidney injury (AKI) is often used instead of ARF. In such cases, peritoneal dialysis (PD) is the treatment of choice [3] [4].

We report a case of neonatal intestinal obstruction with severe renal failure treated by peritoneal dialysis in a 35-week-old premature neonate, in order to highlight our clinical practice at the University Hospital of Brazzaville and the possible recourse in our context of limited resources.

2. Case Study

This was a female newborn, the couple's first child, born at 35 weeks amenorrhoea, from a pregnancy carried to term without any significant incident.

The mother was primigravida and primiparous, aged 25 years, from an average socio-economic background. Pregnancy monitoring revealed no maternal pathology; ultrasound scans showed no abnormalities in either the foetus or the amniotic fluid. Prenatal surveillance was inadequate.

The newborn weighed 1900 g at birth. He was admitted to the University Hospital of Brazzaville from a tertiary health centre on day 4 of life for management of flat neonatal intussusception. On admission, the baby was dehydrated, 300g underweight, had never passed meconium, had urinated within 24 hours of birth and had a flat abdomen with no collateral venous circulation. The radiological diagnosis suggested small bowel atresia (**Figure 1**). Biological investigations revealed severe anaemia with haemoglobin of 10.9 g/dl, severe pre-renal renal failure with creatinine of 416 micromoles per litre and azotemia of 27.1 micromoles per litre, associated with fluid and electrolyte disturbances. Ultrasound of the urinary tract was inconclusive, showing no abnormalities of the urinary system.

Peritoneal dialysis was indicated with correction of the ionic disturbances. A rigid hinge 10 suction catheter was inserted under local anaesthetic via a supraumbilical approach (**Figure 2**). Peritoneal dialysis was performed for 48 hours according to the protocol of the Nephrology Department of the University Hospital of Brazzaville. Creatinine fell to 100 micromoles per litre and azotemia to 5.32 micromoles per litre, **Table 1** summarises the newborn's biological work-up.

Surgical management of the bowel obstruction was performed 72 hours after peritoneal dialysis, after correction of the haemodynamic disturbances. It was performed under general anaesthesia with the patient in dorsal recumbency via a median laparotomy. Exploration of the abdominal cavity revealed a spiral intestinal atresia at 60 centimetres from the TREITZ angle. The procedure consisted

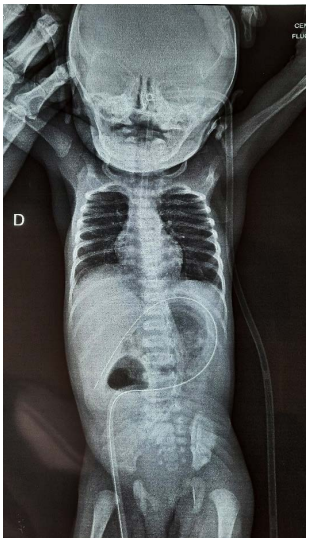


Figure 1. Front thoraco-abdominal radiograph: in favour of small bowel atresia.

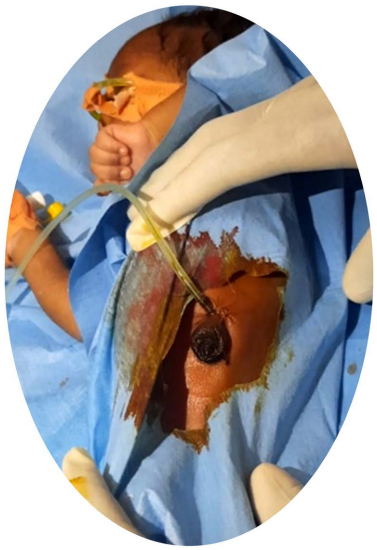
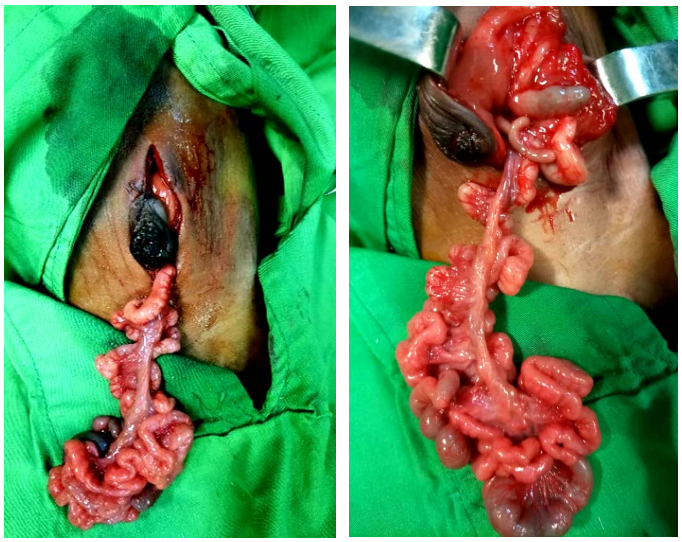


Figure 2. Positioning the peritoneal dialysis catheter.

Table 1. Renal biology.

	Créatinine in micromole/litre	Azotémia in micromole/litre
Before dialysis	416	27.1
After 48 hours of dialysis	100	5.32
72 hours post-dialysis	80	4.12
At the Hospital discharge	41.36	2.5

of an intestinal resection to remove the various areas of atresia and a lateral-terminal groin graft anastomosis without drainage of the abdominal cavity. The intraoperative diagnosis was GROSFELD type IIIb small bowel atresia (**Figure 3**). We did not perform a renal biopsy.



(a) (b)

Figure 3. Intraoperative images of stepped jejunal atresia.

The postoperative course was uncomplicated with resumption of transit on day 5, progressive enteral re-feeding and return home on postoperative day 12. Progress was satisfactory at 9 months. The weight gain was significant, at 9 kg at 9 months, and the monthly biological check-up (creatinemia and azotemia) was normal.

3. Discussion

Prematurity is a risk factor for poor adaptation to life outside the womb. Given that the fetal kidneys do not fulfil their true homeostatic function and that nephrogenesis ceases at around 35 weeks of intrauterine life, a low-birth-weight preterm infant, who starts life with a smaller number of nephrons than a term infant, increases the risk of serious complications in the event of acute kidney injury [4] [5] [6], with a threefold increase in neonatal mortality compared with newborns without abnormal kidney function.

The diagnosis of renal failure is based on biological criteria, including the measurement of blood creatinine (**Table 2**) [5]. However, this varies with muscle mass, which is not very significant in a newborn, even at term. The diagnosis of renal failure in the newborn is therefore often underestimated.

Branagan *et al.* [6] recommend regular monitoring of renal function and fluid and electrolyte balance, selection of the least toxic drugs for the kidneys, and optimisation of nutrient intake in all low birth weight neonates admitted to hospital who are at high risk of developing severe kidney damage that could lead to kidney transplantation before school age.

In our context, no aetiology for this renal failure was found, it was a first baby, and there was no evidence that the mother had taken nephrotoxic drugs (antibiotics, anti-inflammatories, antifungals). We suspected pre-renal renal failure because of the dehydration and weight loss of 300 grams observed on admission. Parenteral nutrition is still not widely used because of the high cost to our

Table 2. Normal blood creatinine levels at term.

Term in weeks of amenorrhoea	Creatinine in milligrams/decilitre	Creatinine in micromole/litre
23 to 26	0.77 - 1.05	(68.1 - 92.8)
27 to 29	0.76 - 1.02	(67.2 - 90.2)
30 to 32	0.70 - 0.80	(61.9 - 70.7)
33 to 45	0.77 - 0.90	(68.1 - 79.6)

patients. The combination of bowel obstruction and renal failure meant that enteral nutrition was not possible.

Early use of peritoneal dialysis is an indication of choice, especially in low birth weight premature infants [3]. Paediatric peritoneal dialysis began in France and Europe in 1960 and 1969 with pioneers such as Michel Broyer [7] [8]. In the Congo, it began in 1989 with Mpio and colleagues, but this programme was stopped in 1994 due to lack of resources, before being reintroduced in 2022 [9]. Peritoneal dialysis is a relatively simple and inexpensive technique and is the treatment of choice for very young children, as it can be performed under local anaesthesia if there are no contraindications to using the peritoneum. However, it requires good technical skills and appropriate equipment. As the Tenckhoff catheter was not available in our context, we used a rigid suction catheter, which gave good results when inserted early in the series reported by Ngandzali *et al.* [9]. Intestinal atresia is not a contraindication to this technique. The use of the peritoneum for dialysis does not in any way alter the surgical procedure and even less the approach. The choice of a supra- and subumbilical midline was purely aesthetic because of the scar where the dialysis catheter would be introduced.

Most anaesthetics have renal tropism and are potentially nephrotoxic. Renal insufficiency, even acute, would therefore be a contraindication to general anaesthesia, which in our case would have been detrimental to our average premature patient with intestinal atresia.

4. Conclusion

Neonatal intestinal obstruction with renal failure due to prematurity is associated with a poor prognosis, even more so if treatment is delayed. This Congolese experience shows that, in a context of limited resources, it is possible to adapt a relatively simple technique such as peritoneal dialysis into an excellent alternative for the management of acute renal failure in newborns.

Authors' Contributions

All the authors contributed to the conduct of this research work; they read and approved the final version of the manuscript.

Informed Parental Consent

We certify that the child's parents have been informed and have given their con-

sent to the publication of this case report.

Conflicts of Interest

The authors declare no conflict of interest.

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