

Case Series

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Functional Intestinal Obstruction of Prematurity (FIOP): Short term management results: A case series

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KEYWORDS

Functional intestinal obstruction of prematurity, Management, Meconium, Premature newborn

ABSTRACT

Background: Functional Intestinal Obstruction of Prematurity (FIOP) is the delay or failure of meconium evacuation in premature neonates. It is associated with hypomotility in the developing intestine. It mostly presents with signs of intestinal obstruction in very low (VLBW) or extremely low birth weight (ELBW) neonates.

Case Series: We present short-term results regarding the management of 8 premature newborns with FIOP treated with Awolaran O. et al [1] algorithm in a pediatric hospital, two of them required a surgical procedure due to conservative management failure.

Conclusion: Early conservative management is successful in most patients with FIOP, related to symptom resolution. Surgical management should be kept for those with conservative management failure.

INTRODUCTION

FIOP affects premature newborn, particularly those with VLBW (<1500g) and ELBW (<1000g). In these cases meconium evacuation could be physiologically delayed for a 24–48-hour period.

Etiology is multifactorial: immature intestinal hypomotility, increase in meconium viscosity, maternal risk factors that predispose to premature birth and medication use such as magnesium sulfate. FIOP presents during the first 2 weeks of life with: feeding intolerance, progressive abdominal distention and scarce or absent meconium evacuation despite stimulation.

On a physical exam we can find a distended abdomen but no hemodynamic instability nor signs of peritoneal irritation. Clinical suspicion is fundamental in order to diagnose as laboratory exams will not offer any clues. X-ray shows dilated intestinal loops and signs of obstruction caused by meconium plugs. It does not show air-fluid levels or pneumoperitoneum.

Conservative management is done first and it includes: glycerine rectal stimulation, 0.9% saline rectal irrigations, N-acetyl cysteine (NAC) or contrast enema. Change of therapy should take place every 48 hours according to clinical status. Strict monitoring is mandatory. Surgery is reserved for those cases which have

failed to progress with conservative management or when perforation is suspected. [1-3] The goal of this study is to present our short-term results regarding the management of patients with FIOP in a pediatric hospital.

METHODS

A retrospective analysis was performed. Eight patients were diagnosed with FIOP and treated in the ICU of a pediatric hospital during the period from February to October 2021. Patients suspected to have NEC based on their signs and lab values were excluded. Data was gathered manually and analyzed using the SPSS statistics 21.0.0.0 program. The variables used were: gestational age, delivery method, maternal risk factors, gender, birth weight, the requirement of mechanical ventilation, age at symptom onset, and clinical presentation (feeding intolerance, abdominal distention, and meconium evacuation).

Abdominal X-rays showed symmetrical dilatation of intestinal loops, without signs of pneumoperitoneum /pneumatosis intestinalis. Management took place according to the algorithm proposed by Awolaran O. et al. [1] Rectal irrigations were done with a combination of 0.9% Saline (10ml/kg/dose) and 100-150 mg of NAC every 8-12 hours. [1,2] The available NAC vials were 300 mg/ml. 100 mg of NAC was used on pa-

tients with weight lower than 1200gr., if higher 150 mg was used.

Iodinated contrast (320 mg/ml) was used as a diagnostic method and as part of conservative treatment. Esophago-gastrointestinal transit was initially performed, always taking into account the gastric capacity of each patient. A Colon Enema was then done using 1 cc of contrast/2cc of 0.9% saline. Many of these patients were unable to go to the radiology department due to their critical conditions. Bedside ultrasound was used. The goal was to reach the terminal ileum. Enema revealed symmetrical dilated intestinal loops in some patients and microcolon in others. Treatment efficacy was evaluated with feed tolerance and meconium evacuation.

RESULTS

Our database is composed of 8 premature newborns whose gestational age was between 29 and 36 weeks (mean 32). Three (37,5%) patients were delivered vaginally and 5 (62,5%) by C-section. Three (37,5%) patients were male and 5 (62,5%) females. Identified maternal risk factors were: urinary/genital infection in 6 (75%) patients, multiple pregnancy in 2 (25%) patients. No patient was prenatally exposed to magnesium sulfate. Mean weight at birth was 1360g (1000-2450 g). 6 (75%) patients required invasive mechanical ventilation.

Patients' age at symptom onset was between 8-34 days (mean 25 days). Seven (87,5%) patients received enteral feeding and 1 (12,5%) was never fed. Four (50%) patients had gastric output through the OG tube, 1 (12,5%) patient presented with vomiting; Five patients (62,5%) had abdominal distention. Meconium evacuation was minimal or absent during the first 2 weeks of life.

Conservative management was performed in 7 (87,5%) patients. 1 (12,5%) patient with saline rectal irrigations, 6 (75%) with rectal N-acetylcysteine, and 5 (62,5%) patients with contrast therapy (2 underwent esophago-gastrointestinal transit and 3 colon enema).

Two (25%) patients underwent surgery because conservative management failed; Santulli ileostomy was done in 1 and in the other case the inspissated meconium was evacuated.

One (12,5%) patient developed intestinal perforation as a complication of the conservative management and succumbed. Another (12,5%) patient died due to comorbidities (Trisomy 18). Six (75%) patients showed significant improvement, measured by feeding tolerance and spontaneous meconium evacuation. (Table 1).

Table 1. Characteristics of Patients.

Sr. #	Gestational age (weeks)	Weight (g)	Gender	Conservative Management	Surgery	Complications	Outcome
1	36	1420	F	Yes	-	-	Recovered
2	30	1400	F	Yes	-	-	Recovered
3	29	1200	M	Yes	Yes	Conservative management failure	Recovered
4	34	1460	M	Yes	-	-	Recovered
5	29	1000	F	Yes	-	-	Recovered
6	30	1200	F	Yes	Yes	Conservative management failure with Intestinal Perforation evidence	Died
7	34	2448	M	Yes	-	-	Recovered
8	32	1000	F	Yes	-	-	Died (Trisomy 18)

DISCUSSION

Functional Intestinal Obstruction of Prematurity (FIOP) increases morbidity and mortality in preterms with very low or extremely low birth weight. [1,3-5] In our series, 3 patients weighed under 1500 g.

The most common prenatal risk factors for premature birth are preeclampsia/eclampsia or chronic arterial

hypertension (reduced intestinal blood flow) as well as magnesium sulfate administration (reduces smooth muscle activity). [6,7] None of these were seen in our cases; the most prevalent risk factor was maternal urinary/genital infection. No patients had been exposed to prenatal magnesium sulfate.

There is no described association between gender and FIOP [5,8]. We included this variable in our study and

found a higher frequency in females. It was also more frequent in those born by c-section and in those who underwent mechanical ventilation, however, no statistical significance was obtained when correlating gender with patients who received mechanical ventilation and presented with FIOP ($p > 0.05$), statistical significance was also not obtained when correlating gender with patients delivered by c-section who had FIOP ($p > 0.05$).

Intestinal obstruction appears on days 10-14 of life: feeding intolerance (vomit or gastric/bilious output through OG tube) and scarce or absent meconium evacuation despite stimulation. [1,3,4,6-9] On physical examination, we found abdominal distention and dilated intestinal loops, without signs of perforation or hemodynamic instability. The presence of the latter might suggest the presence of Necrotizing Enterocolitis (NEC).

Diagnosis is based on clinical evolution, pre and post-natal risk factors, normal inflammatory laboratory values, and an abdominal x-ray showing symmetrical dilated intestinal loops without air-fluid levels, pneumatosis intestinalis, and pneumoperitoneum. [1,3] US is used only to discard a possible NEC diagnosis or to perform a colon enema to verify that the contrast reaches beyond the ileocecal valve. [10-13]

Management has changed through time; conservative treatment is currently preferred. [1,5] It consists of

rectal stimulation with glycerine, saline rectal irrigations, NAC which can be used by feeding tube, orally or per-rectal, [2] and contrast enema. [1] Surgery is reserved for those who do not progress with conservative management or have a perforation. [1,14,15] In our case series saline irrigations, rectal N-acetylcysteine, and contrast therapy were used, patients returned to normal feeding, had reduced abdominal distention, and showed spontaneous evacuation of meconium. Due to the short follow-up time, we still do not have results regarding total recovery of gastrointestinal function.

CONCLUSION

Improvements on FIOP diagnosis allow a successful conservative approach to be done in a timely manner, avoiding complications. Surgery should be reserved for those who have failed to progress with conservative management or presented complications such as intestinal perforation

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