

## ORIGINAL ARTICLE

# MECONIUM PERITONITIS IN NIGERIAN CHILDREN

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### Abstract

**Background:** Meconium peritonitis is a rare disease with a fatal outcome. In Nigeria and Africa, there are only the occasional case reports on the subject matter.

**Methods:** This is a 10-year retrospective study of all patients with meconium peritonitis treated at the University of Maiduguri Teaching Hospital, Maiduguri, Borno State, the Lagos University Teaching Hospital, Lagos State, Obafemi Awolowo University Teaching Hospitals complex, Ile-Ife, Osun State and the Federal Medical Centre Gombe, Gombe State, Nigeria.

**Results:** There were 10 neonates comprising 6 girls and 4 boys. The median age at presentation was 4 days (range 2-6 days). Six of the mothers of the children with meconium peritonitis had a supervised antenatal care and 4 had antenatal ultrasonography but meconium peritonitis was missed. The most common clinical presentation was abdominal distension at birth in 9 of 10 patients. The abdominal X-rays showed calcification and homogenous opacity in 4 patients and pneumoperitoneum in 2 patients. At laparotomy, all the patients had inflammatory adhesion bands and matted bowel loops. The generalized type was the commonest form observed (7 patients) and giant pseudocyst was noted in 2 patients. The commonest sites of perforation were the ileum in 4 patients and jejunum in 3 patients. In one patient the perforation had sealed at laparotomy. Intestinal obstruction was the commonest cause of meconium peritonitis in 7 of 10 patients. In the remaining 3 patients the cause is unknown. The commonest procedure performed was resection and anastomosis (4 patients). The mortality rate was high (50%).

**Conclusion:** Our data revealed the rarity of meconium peritonitis and intestinal obstruction as the commonest cause. It is recommended that in patients with an unidentifiable cause a rectal biopsy should be done to rule out Hirschsprung's disease. Early diagnosis, proper operative procedure and meticulous post-operative care should improve their survival.

**Key words:** Meconium, peritonitis, antenatal diagnosis, Hirschsprung's disease, outcome

### Résumé

**Contexte:** La péritonite à méconium est une maladie rare d'issue fatale. Au Nigéria et en Afrique, seuls quelques cas cliniques se rapportent au sujet.

**Méthode:** Il s'agit d'une étude rétrospective de 10 ans portant sur tous les patients traités pour péritonite à méconium dans les CHU de Maiduguri, de l'Université de Lagos, de Obafemi Awolowo et du

Centre Médical Federal Gombe.

**Résultats:** Il s'agissait de 10 nouveau-nés dont 6 filles et 4 garçons. L'âge médian était de 4 jours (étendue 2 à 4 jours). Six des mères avaient eues une surveillance prénatale et 4 avaient eues une échographie prénatale mais le diagnostic de péritonite à méconium n'avait pas été posé. La manifestation clinique la plus fréquente était une distension abdominale à la naissance chez 9 des 10 patients. La radiographie sans préparation de l'abdomen montrait une calcification et une opacité homogène chez 4 patients et un pneumopéritoine chez 2 patients. A la laparotomie, tous les patients avaient des adhérences inflammatoires et des anses intestinales emmêlées. La forme généralisée était la forme la plus fréquente (7 patients) et on notait un pseudokyste géant chez 2 patients. Le site de perforation le plus fréquent était l'iléon chez 4 patients et le jéjunum chez 3 patients. Chez un patient la perforation s'était bouchée à la laparotomie. L'obstruction intestinale était la cause la plus fréquente de péritonite à méconium chez 7 des 10 patients. Chez les 3 patients restants, la cause est restée inconnue. La plus fréquente procédure exécutée fût la résection anastomose (4 patients). Le taux de mortalité était élevé (50%)

**Conclusion:** Nos données révèlent la rareté de la péritonite méconiale et l'occlusion intestinale comme la cause la plus fréquente. Il est recommandé chez les patients avec une cause non identifiée, qu'une biopsie rectale soit faite pour identifier une éventuelle maladie de Hirschsprung. Le diagnostic précoce, une prise en charge chirurgicale correcte et des soins post-opératoires méticuleux devraient améliorer leur survie.

**Mots clés:** Péritonite, méconium, diagnostic anténatal, maladie de Hirschsprung's, prognostic

## Introduction

Meconium peritonitis (MP) is a sterile chemical peritonitis resulting from perforation of the bowel in utero. Among neonates the incidence is 1:35 000 live births in the United States of America.<sup>1</sup> In most cases the perforation occurs before an obstruction<sup>2</sup> but obstruction may be absent.<sup>3</sup> Other rare causes of MP include perforation of Meckel's diverticulum, rectal perforation, perforated intestinal duplication, fetus-in-fetu and perforations caused by parvovirus B19 infection.<sup>4-7</sup> Early diagnosis and prompt surgical intervention is critical to survival in these patients. The mortality rate becomes very high when they were operated on after the first 24 hours of life.<sup>4,8</sup>

In Nigeria<sup>9,10</sup> and Africa<sup>7,11</sup> there is paucity of literature on MP as all were case reports. This is a multicenter study on all cases of MP presenting to us with highlights of the peculiar presentation and outcome of treatment. This is also an addition to the World literature on this rare problem.

## Materials and Methods

A retrospective study of all patients with MP treated at the University of Maiduguri Teaching Hospital (UMTH), Maiduguri, Borno State, Lagos University Teaching Hospital, Lagos State (LUTH), Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, Osun State and the Federal Medical Centre Gombe (FMCG), Gombe State, Nigeria between January, 1998 and December, 2007. Data retrieved from the case files included the age at presentation, sex, place of birth, antenatal care, clinical presentation and investigations findings.

Others included operative findings, operative procedures carried out, post-operative complications and outcome of treatment and follow up. The results are presented as simple percentages.

## Results

Details of the results are summarized in Table 1. There were 10 neonates comprising 6 girls and 4 boys. The median age at presentation was 4 days (range 2-6 days). Six of the mothers of the children had supervised antenatal care with 4 having had an antenatal ultrasound examination but MP was missed in all these cases. Delivery was unsupervised at home for six of the mothers and in 4 of the mothers the delivery was in the hospital.

The commonest clinical presentation was abdominal distention at birth in 9 of the 10 neonates (Figure 1). Others were failure to pass meconium in 5 patients, vomiting in 3, and fever in 2 patients and jaundice in one. Radiographic evidence of intraperitoneal calcification and homogenous opacity was present in 4 patients (Figure 2) and in 2 patients there was air under the diaphragm.

At laparotomy, the findings were the generalized type in 7 patients, giant cysts in 2 and fibro adhesive in one patient. The commonest site of perforation was the terminal ileum (4 patients), others were the jejunum in 3 patients, cecum and splenic flexure of the colon in 1 patient each. In one of the patients the perforation had sealed at the time of surgery. The commonest causes of MP were intestinal atresia in 3 patients and Hirschsprung's disease (HD) in 3 patients. One of the neonates had a high anorectal malformation (ARM). The remaining 3 patients

had no identifiable cause.

The procedures performed were resection and anastomosis in 5 patients and in one of these patients with resection and anastomosis there was an anastomotic dehiscence and an ileostomy was done. Simple closure and colostomy formation was carried out for 3 patients. Simple closure, cyst

excision and drainage only were the procedures for one patient. Five of the 10 patients died in the immediate post-operative period. The patient on ileostomy defaulted after 2 visits on discharge. Only 4 of the 5 survivors were available for follow up for duration of 2 to 48 months.

**Table 1.** Patients characteristics, etiology, operative findings, procedures and outcome of treatment

S/No.	Hospital	Age (Days)	Sex	Etiology	Site of perforation	Operative findings	Procedures performed	Outcome
1	A	4	M	Ileal atresia	Jejunum	Meconium in peritoneal cavity, calcification	Resection and anastomosis	Died 5 d postoperative
2	A	6	F	Jejunal atresia	Jejunum	Atresia, huge cyst, adhesions	Drainage, cyst excision, resection and anastomosis	Died 4d postoperative
3	A	2	M	Unknown	Ileum	Meconium in peritoneal cavity, calcification, adhesions	Drainage, resection and anastomosis, dehiscence then resection and ileostomy	Discharged with ileostomy lost to follow up
4	A	4	F	HD	Jejunum	Meconium in peritoneal cavity	Closure, colostomy	Alive and well
5	A	4	F	Unknown	Ileum	Meconium in peritoneal cavity	Resection and anastomosis	Died
6	A	4	M	HD	Splenic flexure	Meconium in peritoneal cavity, calcification	Closure, colostomy	Alive
7	B	2	F	Unknown	Ileum	huge cyst, calcification, adhesions	Closure, drainage, cyst excision	Alive and well
8	B	2	F	High ARM	Sealed	Dense adhesions, calcification scrotal swelling, undescended testis, ambiguous genitalia	Colostomy	Died 3d postoperative
9	C	6	M	HD	Cecum	Meconium in peritoneal cavity and pus	Closure, colostomy	Alive and well
10	D	3	M	Ileal atresia	Ileum	Meconium in peritoneal cavity, dense adhesions	Closure, resection and anastomosis	Died 3d postoperative

A: University of Maiduguri Teaching Hospital; B: Lagos University Teaching Hospital; C: Obafemi Awolowo University Teaching Hospital; D: Federal Medical Centre, Gombe; HD: Hirschsprung's disease; ARM: Anorectal malformation

**Figure 1.** A preoperative newborn with cystic meconium peritonitis



**Figure 2.** Plain abdominal x-rays showing homogenous opacity with areas of calcification



## Discussion

Meconium peritonitis is a sterile chemical peritonitis resulting from antenatal passage of meconium from the fetal gut into the peritoneal cavity. It is rare with an incidence of 1:35 000 live births in the United States of America.<sup>1</sup> In Nigeria<sup>9,10</sup> and Africa<sup>7,11</sup> there had been only the occasional case reports on the subject of MP. In our series as in others intestinal obstruction is mostly responsible for MP<sup>4,8</sup> and ileal atresia or meconium ileus is the major contributor to the intestinal obstruction. Intestinal atresia and Hirschsprung's disease were responsible for MP in more than half of our cases, intestinal atresia was also the commonest cause of MP in a large series

from South Korea.<sup>12</sup> In the remaining patients, the etiology was unknown as no pathology was found. This is not unusual as absence of definite pathology has been documented by earlier reports.<sup>4,13</sup> All these patients with no demonstrable pathology in our series were subjected to a rectal biopsy to rule out HD. Among Caucasians, meconium ileus is the commonest cause of MP and is present in 40% of postnatal cases.<sup>1</sup> None of our patients as in the series of Nam and colleagues<sup>12</sup> had features suggestive of meconium ileus even though no screening tests were carried out for cystic fibrosis as this is extremely rare in our practice.

The clinical presentation is that of intestinal obstruction rather than peritonitis.<sup>4</sup> However, rarely it may present as scrotal mass with calcification<sup>10</sup> as seen in one of our patients. Other rare forms include passage of meconium through the vagina without an associated anorectal malformation or through the umbilicus.<sup>10,14</sup>

Antenatal sonographic diagnosis after the 24th week of gestation is now possible.<sup>15,16</sup> In fact in a particular case some authors actually observed the leakage of meconium in the fetus during an ultrasound examination.<sup>16</sup> Prenatal diagnosis will facilitate perinatal management by allowing for surgery as soon as possible after birth following resuscitation,<sup>17,18</sup> thus avoiding the bacterial colonization that occurs after birth. This has led to reduction of operative mortality to about 2.4 to 23 per cent,<sup>4,12,16-18</sup> when compared with the high rates in the early 1950s.<sup>4</sup> Only half of our patients had a supervised antenatal care with an ultrasound examination. Meconium peritonitis was however, missed in all these cases. The implication is that the presentation to hospital is delayed with advanced disease and this is associated with the poorer outcome observed in our series. It will be expected that the rarity of meconium ileus will confer a better outcome as is the experience of people where this is also rare.<sup>12</sup>

A two staged approach with an initial enterostomy and subsequent reversal is generally advocated and has contributed to the reduction of the operative mortality.<sup>4,17</sup> However, in our setting where facilities for neonatal intensive care and total parenteral nutrition are lacking and most patients come from poor backgrounds, multiple surgical operations within a short time span can be quite challenging.

We have highlighted the peculiar features of this disease in some parts of Nigeria. In cases where there are no obvious causes for MP, a rectal biopsy is recommended to rule out HD. We hope that this report will facilitate early diagnosis of MP by sensitizing physicians to consider it as a differential diagnosis in any child with abdominal distension at birth. With proper operative procedure and

meticulous post-operative care their survival should improve.

## References

1. Foster MA, Nyberg D, Mahony B, et al. Meconium peritonitis: Prenatal sonographic findings and their clinical significance. *Radiology*. 1987;165:661-665.
2. Birth AG, Coran AE, Gross RE. Neonatal peritonitis. *Surgery*. 1961;61:305-313.
3. Smith B, Clathworthy HW. Meconium peritonitis: Prognostic significance. *Pediatrics*. 1961;27:967-970.
4. Boix-Ochoa J, Lloret J. Meconium peritonitis. In: Puri P (ed). *Newborn Surgery*: London, Arnold publishers, 2nd Edition. 2003; 471-477.
5. Piolat C, N'die J, Andrini P, et al. Perforated tubular duplication of the transverse colon: a rare cause of meconium peritonitis with prenatal diagnosis. *Pediatr Surg Int*. 2005;21:110-112.
6. Khadaroo RG, Evans MG, Honore LH, et al. Fetus-in-fetu presenting as cystic meconium peritonitis: diagnosis, pathology, and surgical management. *J Pediatr Surg*. 2000;35:721-723.
7. Velaphi S, Reubenson G, Nakwa F. Meconium peritonitis and parvovirus B19 infection associated with hydrops fetalis. *Ann Trop Paediatr*. 2006;26:371-375.
8. Tibboel D, Gaillard JLJ, Molenaar JC. The importance of mesenteric vascular insufficiency in meconium peritonitis. *Hum Pathol*. 1986;17:411-416.
9. Kolawole TM, Bankole MA, Olurin EO, Familusi JB. Meconium peritonitis presenting as giant cysts in neonates. *Br J Radiol*. 1973;46:964-967.
10. Odita JC, Omene JA. Neonatal ascites in Benin, Nigeria. *Afr J Med Med Sci*. 1980;9:7-13.
11. Muguti GI, Nijland A. Meconium peritonitis with intestinal obstruction. *Cent Afr J Med*. 1987;33:225-227.
12. Nam SH, Kim SC, Kim DY, et al. Experience with meconium peritonitis. *J Pediatr Surg*. 2007;42:1822-1825.
13. Agarwal N, Kriplani A, Bhatla N, Deorari AK. Idiopathic origin of meconium peritonitis. *Indian J Pediatr*. 2000;67:845-846.
14. Featherstone NC, Fathi K, MacIver D, Mathur A, Kulkarni M. Meconium per vagina: a rare presentation of meconium peritonitis. *J Pediatr Surg*. 2008;43:e5-e7.
15. McGahan J, Hanson F. Meconium peritonitis with accompanying pseudocyst: Prenatal sonographic diagnosis. *Radiology*. 1983;148:103-105.
16. Chalubinski K, Deutringer J, Bernescheck G. Meconium peritonitis: extrusion of meconium and differential sonographic appearances in relation to the stage of disease. *Prenat Diagn*. 1992;12:631-636.
17. Eckoldt F, Heling KS, Woderich R, Kraft S, Bollman R, Mau H. Meconium peritonitis and pseudo-cyst formation: prenatal diagnosis and post-natal course. *Prenat Diagn*. 2003;23:904-908.
18. Dirkes K, Crombleholme TM, Craigo SD, et al. The natural history of meconium peritonitis diagnosed in utero. *J Pediatr Surg*. 1995;30:979-982.