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ORIGINAL ARTICLE

Meckel's Diverticulum in Children - Presentation & Management: 5 Year Experience At a Tertiary Care Hospital

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Abstract

Background: *Meckel's diverticulum (MD) is the most common congenital anomaly of the gastrointestinal (GI) tract. Early identification and appropriate surgical management are critical to prevent complications and improve outcomes.*

Objective: *The aim of this study was to assess the presentation and management of Meckel's Diverticulum in children.*

Methods: *This retrospective study was conducted in the Division of Paediatric Surgery, Bangladesh Shishu Hospital & Institute, Dhaka from February 2019 to January 2023. Total 35 children admitted within this period due to Meckel's Diverticulum were included in this study.*

Results: *The participants' mean age was 30.1 months (SD± 34.9 months) ranged between 0.5 to 156 months. There was male predominance (82.9%) among the study patients. Painless rectal bleeding was the most common symptom (34.28%), followed by inflammation/diverticulitis (25.71%), intussusception (lead point) (14.29%), incidental in 14.29%, and intestinal obstruction/acute abdomen (5.71%). No Surgical intervention was undertaken in 34.3% of cases, while laparotomy with wedge resection was done in 28.5% of cases. A laparotomy along with appendectomy was done in 17.1% of cases, laparotomy with resection and anastomosis was required 8.6% of the patients, and laparotomy with manual release of intussusception was done in 11.4% of the cases. The mean diverticulum distance from the ileocecal valve was 16.3 ± 2.1 cm. Postoperative complications included wound infections (14.29%) and adhesive obstruction (5.71%), with no mortality.*

Conclusion: *This study highlights the effective management of Meckel's Diverticulum in children, with favorable postoperative outcomes, low complication rates, and the importance of early diagnosis and appropriate surgical intervention in resource-limited settings.*

Key words: *Meckel's diverticulum, children, presentation and management.*

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Introduction

Meckel's diverticulum is one of the most common congenital diverticulum on the ileum which results from incomplete atrophy of the vitelline duct in the embryo.[1,2] Management of symptomatic MD typically involves surgical resection, with Meckel's diverticulectomy being the treatment of choice in patients with gastrointestinal bleeding, obstruction, or inflammation. Studies have shown that postoperative complications, such as wound infections or adhesive intestinal obstruction, are relatively low in well-managed cases, with mortality rates being minimal.[3] However, in resource-limited settings, surgical expertise and access to minimally invasive techniques such as laparoscopy may not be widely available, leading to higher risks of postoperative complications or delayed recovery.[4] While laparoscopic resection is increasingly favored due to its shorter recovery times and fewer postoperative complications, open surgery is still more commonly performed in low-resource settings due to its wider availability and simpler requirements for surgical infrastructure.[5] The management of asymptomatic MD remains controversial. No surgical intervention is often considered in these cases, particularly when MD is discovered incidentally during abdominal surgeries. Some studies suggest that asymptomatic MDs, especially those found in older patients, can be left in situ without the need for surgical intervention, given the relatively low risk of future complications.[6] However, in paediatric populations, where the risk of complications such as bleeding or obstruction is higher, many surgeons advocate for resection of incidental MDs, especially if ectopic gastric or pancreatic tissue is present, as these are associated with an increased risk of future complications.[7] The decision to resect or leave an incidental MD largely depends on factors such as patient age, the presence of ectopic tissue, and the surgeon's assessment of the risk of future morbidity.[8] In Bangladesh, where healthcare infrastructure can be limited, the availability of advanced diagnostic imaging, skilled paediatric surgeons, and surgical facilities poses significant challenges for the early diagnosis and effective management of MD in children. Most rural and sub-district hospitals lack the necessary infrastructure for laparoscopic surgery or even advanced imaging techniques such as Meckel's scans or CT scans.[4] As a result, many children presenting with symptoms of MD may experience delays in diagnosis and treatment, leading to more severe complications by the time they receive care. In some cases, children may present with advanced complications such as perforation or peritonitis, which can significantly increase morbidity and mortality rates.[9] The lack of early diagnostic tools in these regions underscores the need for improved healthcare infrastructure, better-trained medical personnel, and more widespread availability of advanced surgical techniques. The importance of studying MD in pediatric populations in Bangladesh is underscored by the unique challenges posed by the country's healthcare system. With limited access to pediatric emergency care and a shortage of trained paediatric surgeons, children with symptomatic MD are often at a higher risk of experiencing severe complications before receiving appropriate care.[10] Conducting research on the presentation, diagnosis, and management of MD in Bangladeshi children can provide valuable insights into how regional healthcare systems can be improved to better address the needs of pediatric patients with congenital anomalies. Moreover, gathering regional epidemiological data on MD in children is essential to understanding the true burden of the disease in South Asia, where such data are often scarce compared to Western countries.[11] This study aims to contribute to the growing body of literature on MD in pediatric populations by focusing on the specific challenges faced in diagnosing and managing the condition in Bangladesh. The aim of this study was to assess the presentation and management of Meckel's Diverticulum in children.

Materials and Methods

This retrospective study was conducted in the Division of Paediatric Surgery, Bangladesh Shishu Hospital & Institute, Dhaka from February 2019 to January 2023. Children aged between 0.5 months to 156 months admitted with Meckel's Diverticulum were included in this study. Patients with co-morbid medical and surgical conditions were excluded from this study. Ethical approval for the study was obtained from the hospital's institutional review board. The collected data were analyzed using SPSS (statistical package for social science) version 23

statistical software. Value of p<0.05 was considered significant.

Results

Total thirty five patients were included in this study. The mean age of the participants was 30.1 months, with a standard deviation of 34.9 months, ranging from 0.5 to 156 months (13years). In terms of clinical features, 34.28% (n=12) of the children presented with painless rectal bleeding, which was the most common symptom. Other notable clinical presentations included inflammation or diverticulitis in 25.71% (n=9), intussusception (lead point) in 14.29%, incidental detection during appendicitis 11.42% (n=4) during intussusception release 2.28% (n=1), along with both intestinal obstruction (Meckel's band) and acute abdomen in 5.71% (n=2) of the cases, respectively (Table I). Figure 2 shows the gender distribution of the study subjects. The majority of the participants were male, accounting for 82.9% (n=29), while females represented 17.1% (n=6).

Table II demonstrates the surgical approach among the study subjects. No surgical intervention was undertaken the most of the cases with 34.3% (n=12).

Laparotomy with wedge resection was done in 28.5% (n=10) of cases. A laparotomy along with appendectomy was carried out in 17.1% (n=6) of cases, while laparotomy with resection and anastomosis was required 8.6% (n=3) of the patients. Additionally, laparotomy with manual release of intussusception was done in 11.4% (n=4) of the cases.

Table III shows the operational findings of the study subjects. The mean distance of the Meckel's diverticulum from the ileocecal valve was 16.3 ± 2.1 cm. The mean length of the diverticulum was 1.5 ± 0.3 cm, with the same mean value observed for its diameter (1.5 ± 0.3 cm). The length-to-diameter ratio of the diverticulum was calculated to be 2.08 ± 0.25 cm. Additionally ectopic tissue was found in 15% (n=3) of the cases.

The postoperative outcomes for the study subjects shown in table IV reveals that 14.29% (n=5) experienced wound infections following surgery, while 5.71% (n=2) developed adhesive intestinal obstruction. Notably, there were no reported cases of mortality among the patients.

Fig.-1 *Meckel's Diverticulums and complications*

Table I
Clinical feature of the study subjects (N=35)

Clinical feature	Number	Percentage
Without complications		
Painless rectal bleeding	12	34.29
Inflammation/Diverticulitis	9	25.71
With complications		
Intestinal obstruction	2	5.71
Acute abdomen	2	5.71
Intussusception(lead point)	5	14.29
Incidental		
During appendectomy	4	11.43
During Intussusception release	1	2.86

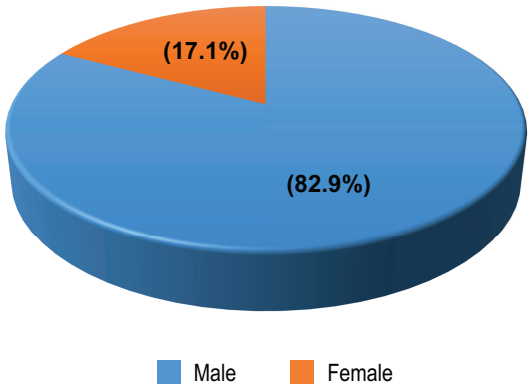

Fig.-2 *Gender distribution of the study subjects (N=35)*

Table II
Surgical approach of the study subjects (N=35)

Surgical approach	Number	Percentage
Without complications		
No surgical intervention required	12	34.3
Laparotomy with wedge resection	10	28.6
With complications		
Laparotomy with appendectomy	6	17.1
Laparotomy manual release	4	11.4
Laparotomy with resection anastomosis	3	8.6

Table III
Operational findings of the study subjects (N=35)

Operational findings	
Distance to ileocecal valve (Mean ± SD, cm)	16.3 ± 2.1
Diverticular length (Mean ± SD, cm)	1.5 ± 0.3
Diverticular diameter (Mean ± SD, cm)	1.5 ± 0.3
Length-to-diameter ratio (Mean ± SD, cm)	2.08 ± 0.25
Ectopic tissue (n, %)	3 (15)

Table IV
Postoperative outcome of the study subjects (N=35)

	Number	Percentage
Postoperative complications		
Wound infection	5	14.29
Adhesive intestinal obstruction	2	5.71
Mortality	0	0

Discussion

This retrospective study was conducted in the Division of Paediatric Surgery, Bangladesh Shishu Hospital & Institute, Dhaka from February 2019 to January 2023. Total 35 children admitted within this period due to Meckel's Diverticulum were included in this study. The aim of this study was to assess the presentation and management of Meckel's Diverticulum in children.

In this study, the mean age of the study subjects was 30.1 months, with a standard deviation of 34.9 months, and the age range spanning from 0.5 to 156 months. This aligns with research that shows younger children have the highest incidence of symptomatic MD.[12]

In this study, the majority of the patients were male (82.9%), this finding is consistent with well-documented male predominance of MD in the literature. Previous studies have frequently reported similar gender distributions, with male-to-female ratios ranging from 2:1 to 2.6:1 in symptomatic cases.[3,8] This male predominance is thought to be linked to higher rates of symptomatic presentations among males, although the exact cause remains uncertain.[13]

Given that bleeding is more common in younger pediatric patients, the high prevalence of gastrointestinal bleeding (48.57%) in this study, especially in younger children, further confirms earlier research findings.[14] The results of earlier research are mainly supported by the clinical manifestations seen in this study.

Painless rectal bleeding was the most common symptom, reported in nearly half of the cases (48.57%), followed by inflammation/diverticulitis (25.71%) and intussusception (14.29%). The predominance of gastrointestinal bleeding in our cohort is in line with the findings of several studies, where rectal bleeding is often cited as the primary symptom of MD in children.[12,15] Notably, the incidence of inflammation and intussusception in our cohort mirrors findings from similar studies, where these complications are commonly associated with MD in pediatric patients.[3]

The incidental (14.29%) in this study no intervention was done. It is debatable how to treat Meckel's diverticulum, which is discovered following surgery for other abdominal pathologies. Another contentious

topic is the preventive removal of silent Meckel's diverticulum.[6,13,16-19] In their study/review, Soltero and Bill[16], and Zani et al[6] came to the conclusion that it is not justified to remove Meckel's diverticulum that has been accidentally discovered. For the preventative resection of an incidentally discovered Meckel's diverticulum, certain standards are recommended. Most crucially, for the benefit of their cases, the operating surgeon or surgeons must justify whether or not to remove Meckel's diverticulum that was discovered by accident.[6,16]

In addition, our study revealed that 5.71% of patients presented with intestinal obstruction, a relatively low proportion compared to the 30% reported by Ruscher et al[20], but still indicative of the risk MD posing life-threatening complication.

Surgical management remains the mainstay of treatment for symptomatic MD, with various approaches depending on the clinical presentation and available resources. In cases where surgery was indicated, a range of techniques were employed, including laparotomy with appendectomy (17.1%), laparotomy manual release which was done by warm compression (11.4%), laparotomy with resection anastomosis (8.6%). The diversity of surgical approaches observed in our study is in accordance with the findings of other studies, such as Papparella et al[21], who reported a similar range of surgical interventions for MD. The study findings align with study by Ruscher et al[20], which reported that open surgery remains the most common approach in many parts of the world, particularly in resource-limited settings

Postoperative outcomes in our cohort were generally favorable, with a low complication rate. Wound infections were observed in 14.29% of cases and 5.71% of patients developed adhesive intestinal obstruction. Notably, there were no cases of postoperative mortality in this study. These results are consistent with those reported by St-Vil et al[18], who found a similarly low rate of bowel obstracton and no mortality in their cohort of pediatric patients undergoing laparoscopic Meckel's diverticulectomy. Furthermore, Ghritlaharey et al[22] reported smilar postoperative complications, such as septicemia, which aligns with our findings.

In terms of anatomical findings, our study reported a mean distance of the diverticulum from the ileocecal valve of 16.3 ± 2.1 cm, with a mean length and diameter of 1.5 ± 0.3 cm, and the presence of ectopic tissue in 15% of cases. These findings are consistent with the literature, where similar measurements and anatomical characteristics have been reported. For example, Hansen and Søreide[23] reported an average distance of 7 to 200 cm from the ileocecal valve, with ectopic gastric tissue present in a significant proportion of cases. Additionally, Wu et al[24] highlighted the association between the location of the diverticulum and the presence of ectopic tissue, which supports our findings. The findings of this study provide valuable insights into the clinical presentation, management, and outcomes of Meckel's Diverticulum in pediatric patients in Bangladesh.

In this study, the sample size was small and no control group was selected for comparison. The study population was selected from a single center in Dhaka city, as a result may not represent a wider range of population. This study was conducted for a short period of time.

Conclusion

This study highlights that gastrointestinal bleeding to be the most common symptom, with conservative management and laparotomy being the predominant treatment approaches for pediatric patients with Meckel's Diverticulum. Postoperative outcomes were generally favorable, with low complication rates and no mortality. These findings underscore the need for improved access to diagnostic and surgical resources in low-income regions to optimize the care of children with Meckel's Diverticulum.

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