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Meckel's Diverticulum-Induced Intussusception Coinciding with Diabetes Mellitus in a Young Adult Male

Reza Aditya Digambiro1*, Edy Parwanto2, Dyah Ayu Woro Setyaningrum3, Florinda Ilona4, Indah Widya Lestari5, Julian chendrasari 6

[1,2,3,4,5,6]Faculty of Medicine, Trisakti University, Jakarta, Indonesia

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ABSTRACT

Introduction: Intussusception in adults, especially when caused by Meckel's Diverticulum, is a rare occurrence, often presenting with nonspecific symptoms such as abdominal pain and nausea, making it challenging to diagnose. When concurrent with conditions like diabetes mellitus, the situation need particular care. ***Case Illustration****:* A 27-year-old male with a medical history of diabetes presented with severe right abdominal pain, nausea, and a reduced appetite. Initial symptomatic treatment did not alleviate the condition. Subsequent CT scans revealed an ileo-ileal intussusception triggered by Meckel's Diverticulum and partial high obstruction ileus, leading to surgical intervention. ***Discussion:*** Ileo-ileal resection (end to end anastomosis) and adhesiolysis surgery were successfully performed, followed by vigilant postoperative monitoring for complications, effective pain management, maintenance of drain patency, and careful glucose level monitoring. The patient's significant postoperative improvement underscores the importance of early diagnosis and timely surgical intervention in managing Meckel's Diverticulum-induced intussusception in adults. ***Conclusion:*** The clinical course also highlighted the importance of tailoring postoperative care considering the patient's comorbidities, in this case, diabetes mellitus. This case served as a reminder for clinicians to consider Meckel's Diverticulum as a potential cause of intussusception in adults presenting with abdominal pain.

1. Introduction

Intussusception, particularly when triggered by Meckel's Diverticulum, is a rare yet potentially life-threatening condition in adults. Meckel's Diverticulum, a congenital condition, can act as the lead point, initiating the intussusception into another segment.[1,2] Intussusception is often recognized as a pediatric condition, and in adults, it is usually secondary to a pathologic condition that serves as a lead point.[3] Early detection and intervention are paramount to prevent severe complications like bowel necrosis, perforation, or sepsis.

Meckel's diverticulum is a common congenital anomaly, wherein, since it is caused by the failure of obliteration of the omphalomesenteric duct, it mostly is asymptomatic but causes gastrointestinal bleeding and abdominal pains due to the secretions of acid from ectopic gastric mucosa.[4] Based on Sagar, Kumar, and Shah's review, Meckel's diverticulum has complications of ulceration, hemorrhage, intussusception, and intestinal obstruction; the rare complications are vesicodiverticular fistulae and tumors.[4,5]Despite its seriousness, adult intussusception often manifests through nonspecific symptoms such as abdominal pain, nausea, vomiting, and weight loss, leading to a delay in diagnosis and management.[6] The presence of concurrent conditions, like diabetes mellitus in this case, can further complicate the clinical picture.

A plain abdominal X-ray is not performed due to its low sensitivity, whereas CT scans and abdominal ultrasounds are preferred for their better anatomical detail, more accurate detection of complications, and higher safety, especially in children and pregnant women. For the diagnosis,

*Corresponding author
E-mail addresses: drdigambiro@trisakti.ac.id

imaging studies like ultrasound, computed tomography (CT), or magnetic resonance imaging (MRI) can reinforce clinical suspicion. CT scan is considered the most sensitive and specific modality for diagnosing intussusception.[7] The CT scan indeed showed signs of ileo-ileal intussusception and partial high ileus obstruction, prompting the decision to perform emergency surgery.[8–10] However, Meckel's Diverticulum as the cause of intussusception could only be confirmed through histopathological findings after the intestinal resection was performed.

The management of intussusception in adults usually involves surgery, preferring resection over reduction due to the potential risk of underlying malignancy.[11,12] When comorbidities are present, such as diabetes, the decision to perform surgery must carefully consider the patient's overall health status and the type and location of the invagination.[13]The determination that the patient has Type 2 Diabetes Mellitus, despite being under 30, is based on his well-controlled condition using oral medications, the absence of typical autoimmune markers of Type 1 Diabetes, and clinical characteristics such as lifestyle and glycemic control, which align more with Type 2 Diabetes.[13–15]

This report presents a case of a 27-year-old male with a medical history of diabetes who developed ileo-ileal intussusception due to Meckel's Diverticulum, emphasizing the importance of early detection, intervention, and postoperative care tailored to the patient's comorbidities. This is an area that requires further research, for Meckel's diverticulum is typically accidentally found when imaging other diabetes complications. Diabetes, further, may also affect the treatment and outcome after the surgery of the gastrointestinal tract; and, yet sometimes, symptoms for diabetes might overlap or imitate those for Meckel's diverticulum, leading to quite a diagnostic challenge.[16–18]

2. Case Illustration

A 27-year-old male, initially presented to the emergency department of Pasar Minggu General Hospital , complaining of right abdominal pain, which he described as intermittent and crampy in nature. The pain had been worsening over the past week. Alongside this primary symptom, he reported episodes of nausea, vomiting, and loss of appetite, further accompanied by an unintentional weight loss of approximately 5kg over the past month. He denied any change in bowel habits, blood in stool, or any family history of gastrointestinal disorders.The patient had a significant past medical history, including an appendectomy conducted five years prior, well-controlled type 2 diabetes mellitus, and hypertension managed with oral medications. He was a non-smoker, consumed alcohol occasionally, and denied any illicit drug use.

Physical examination revealed a mildly distended abdomen with localized tenderness in the right lower quadrant. There was no palpable mass, and bowel sounds were slightly increased. The rest of the physical examination was unremarkable, including cardiorespiratory and neurological systems. Given the patient’s persistent abdominal pain and history of appendectomy, acute appendicitis was initially eliminated. However, the absence of a fever, leukocytosis, and the location of the tenderness raised questions about the diagnosis. Therefore, a decision was made to conduct further investigations to rule out other differential diagnoses like Crohn’s disease, diverticulitis, and tumors.[3]

Initial laboratory tests showed a normal complete blood count, liver function tests, and kidney function tests. However, the patient's glycated hemoglobin (HbA1c) was slightly elevated, indicating suboptimal control of his diabetes. A plain abdominal X-ray did not reveal any significant findings such as free air under the diaphragm or air-fluid levels.

Table 1.
Subject Characteristics

Lab Test Parameters	Results	Normal Range
Hemoglobin	13 g/dL	13.5 - 17.5 g/dL (male), 12 - 15.5 g/dL (female)
Liver Function Tests: ALT	25 U/L	7 - 55 U/L
Liver Function Tests: AST	28 U/L	8 - 48 U/L
Kidney Function Tests: Creatinine	0.9 mg/dL	0.6 - 1.2 mg/dL (male), 0.5 - 1.1 mg/dL (female)
Glycated Hemoglobin (HbA1c)	7.2%	< 5.7%

The key diagnostic breakthrough came with the abdominal CT scan, which revealed a characteristic "target sign," suggestive of ileo-ileal invagination. It further revealed signs of partial high obstruction ileus. Following the CT findings, a decision was made to proceed with emergency surgery given the severity of His symptoms and the risk of bowel necrosis associated with untreated intussusception.[19,20]

Figure 1.
"Target sign" or "donut sign," characterized by concentric rings of alternating echogenicity, representing the telescoped segments of the intestine, as classic appearance of intussusception.

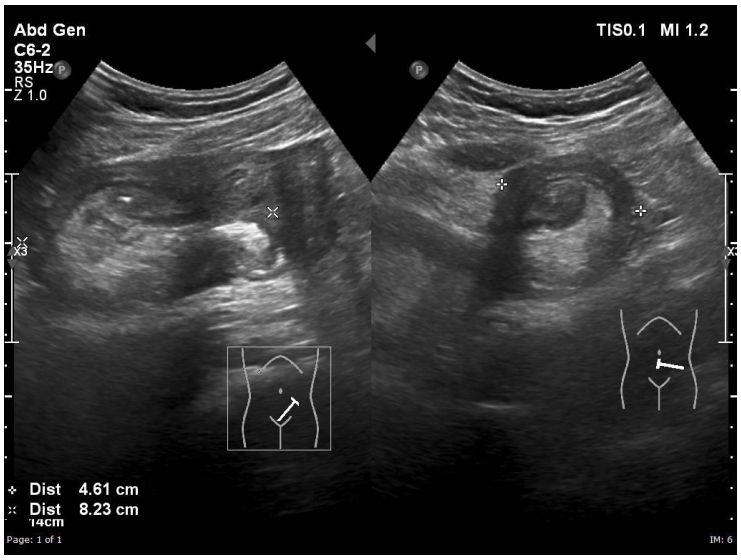


Figure 2.
The classic "target sign" or "bowel-within-bowel appearance"

Figure 3.
"Sausage-shaped" mass, indicative of the telescoped bowel segments

Intraoperatively, a segment of the ileum was found to be invaginated into the adjacent segment, consistent with ileo-ileal intussusception. No obvious lead point could be identified. This segment of the bowel was edematous and hyperemic but viable, so an enterectomy was performed with primary end-to-end anastomosis.

Figure 4.
A segment of the ileum invaginating into the adjacent segment

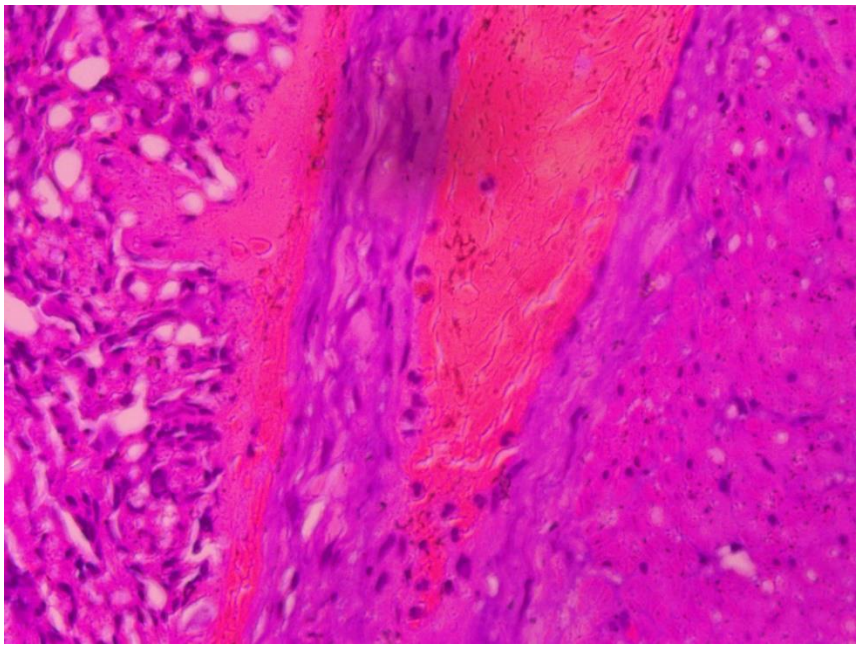
Postoperatively, the patient's recovery was uneventful. He was started on a liquid diet on the second postoperative day, gradually progressed to a regular diet, and was discharged home on the fifth postoperative day. Histopathology of the resected bowel segment was consistent with benign invagination without any signs of malignancy.

The patient's histopathology report details the findings from the examination of the resected intestinal specimen. On a macroscopic level, the specimen was recorded to be 15 cm in length and 3 cm in diameter. The serosa presented a smooth and glistening appearance. Notably, the mucosal surface was patchy, showcasing areas of both necrosis and hemorrhage. Further examination revealed an intraluminal polypoidal mass, approximately 3x2 cm in size. This mass had a firm consistency and displayed an irregular surface.

Microscopic Findings: The histopathological examination revealed the presence of transmural inflammation within the sections of the intestinal tissue. Distinct features such as

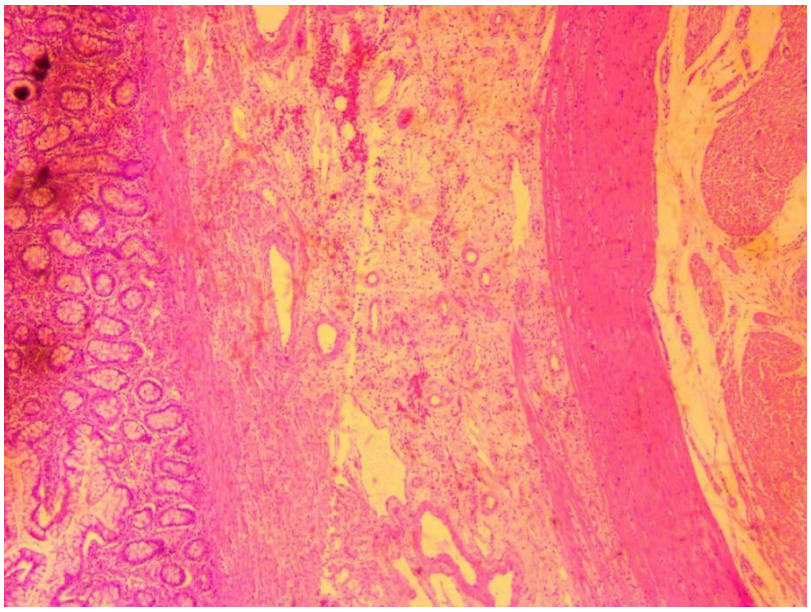
necrosis, hemorrhage, and edema were also observed. Uniquely, the presence of Meckel's diverticulum was identified, serving as the lead point of the intussusception.

Figure 5a.
Inflammations, hemorrhage, and edema of the intestinal tissue (HE 40X)



More specifically, the Meckel's diverticulum presented with heterotopic gastric tissue within the diverticular structure, a feature characteristic of this congenital anomaly. Alongside this, all three layers of the intestinal wall were distinctively evident in the diverticulum, further confirming the diagnosis.

Figure 5b.
Distinctive presence of all three layers of the intestinal wall, which support the diagnosis of Meckel's Diverticulum (HE 40X).



Within the diverticular tissue, glandular formations lined by dysplastic epithelium, similar to an adenomatous polyp, were noted. The dysplastic cells exhibited a high nuclear to cytoplasmic

ratio, hyperchromatic nuclei, and few of mitotic figures. Importantly, there was no indication of invasion beyond the muscularis propria, emphasizing the benign nature of the diverticulum.

The remaining examined intestinal tissue did not exhibit any significant pathological alterations. These findings underscore the role of Meckel's diverticulum as the lead point of the ileo-ileal intussusception in this case, and provide further insights into the microscopic characteristics of Meckel's diverticulum in the context of adult intussusception.

The patient's case emphasizes the importance of maintaining a high index of suspicion for intussusception in adults presenting with nonspecific abdominal symptoms, especially when traditional diagnoses do not align with clinical presentation. The use of CT scans in such cases can significantly assist in the accurate and timely diagnosis, potentially avoiding the serious complications of untreated intussusception.

3. Discussion

Adult intussusception is a rare but significant cause of abdominal pain, accounting for only 5% of all cases of intussusception and 1-5% of intestinal obstruction.[8] While pediatric patients often have idiopathic origins, adult intussusception is typically attributable to a clear cause, commonly a malignant or benign tumor.[12] In our case, Meckel's diverticulum, a congenital abnormality, served as the lead point for intussusception.

Meckel's diverticulum, present in 2% of the population, is the most common congenital defect of the gastrointestinal tract.[20] However, its presentation as a lead point for intussusception in adults is unusual, making this case noteworthy. The histological confirmation of gastric tissue in the Meckel's diverticulum is also of interest, as it occurs in approximately 50% of cases.[6]

Furthermore, our patient also had a concurrent diagnosis of Type 2 Diabetes Mellitus (T2D). Although there is no direct relationship established in the literature between T2D and intussusception, T2D has been associated with various gastrointestinal complications.[18] Additional research would be necessary to investigate any potential link between T2D and intussusception.

Management of adult intussusception is often complex due to the high likelihood of pathological lead points, as seen in our case. Surgery is the treatment of choice, with laparoscopic intervention becoming increasingly accepted due to its lesser post-operative complications and shorter hospital stays.[17,19]

The case also underscores the importance of optimizing glycemic control in diabetic patients before and after surgical intervention, as hyperglycemia can exacerbate postoperative complications.[16,17,19]

This case highlights the diagnostic and management complexities of adult intussusception, particularly when rare lead points like Meckel's diverticulum are involved and comorbidities such as diabetes are present. It emphasizes the need for clinicians to maintain a high index of suspicion for atypical presentations of common conditions.

While intussusception is typically associated with pediatric populations, it should not be disregarded as a differential in adults presenting with acute or chronic intermittent abdominal pain, obstruction, or GI bleeding.[1] The use of radiological methods, such as CT scanning, can be instrumental in confirming a diagnosis, given the condition's rarity and often elusive presentation in adults.[3,20]

Management of adult intussusception typically necessitates surgical intervention due to the high likelihood of pathological lead points, such as Meckel's diverticulum. The laparoscopic approach used in our case offers a viable option with fewer post-operative complications and shorter hospital stays.[3]

The concomitant presence of T2D in our patient highlights the need for careful perioperative management, with an emphasis on achieving optimal glycemic control before and after surgery to prevent adverse postoperative outcomes.[3,14]

4. Conclusion

This case underscores the importance of comprehensive diagnostic approaches, effective management strategies, and the need for further research to get a better understanding about the complex interactions of adult intussusception caused by Meckel's diverticulum and concurrent T2D. Patient with both Meckel's diverticulum and T2D may perceive this condition as highly complex and stressful, affecting the overall confidence in the treatment process. This patient required benefit from enhanced support and clear communication from healthcare providers.
Informed Consent: Written informed consent was obtained from the patient for publication of this case report and any accompanying images.
Data Availability: All data generated or analyzed during this study are included in this article.

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