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Two Years Shy of 100: Symptomatic Meckel's Diverticulum Causing Small Bowel Obstruction in a 98-Year-Old Patient

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Background	Meckel's diverticulum (MD) is the most prevalent congenital malformation of the gastrointestinal tract. While often asymptomatic, it can lead to significant complications at any age, although symptomatic presentations in advanced elderly populations are exceedingly rare. This report details an exceptional case of symptomatic MD in a 98-year-old female, necessitating Meckel's diverticulectomy for management of an acute small bowel obstruction.
Summary	Meckel's diverticulum arises from the incomplete obliteration of the omphalomesenteric (vitelline) duct during embryonic development. It is classically associated with the "Rule of 2s": occurring in approximately 2% of the population, typically symptomatic by age 2, affecting males twice as often as females, and usually located within 2 feet proximal to the ileocecal valve. Complications of MD include diverticulitis, small bowel obstruction (SBO) from various mechanisms (e.g., volvulus, intussusception, internal hernia), and gastrointestinal bleeding, often from ectopic gastric or pancreatic mucosa. While late-onset symptomatic MD in adults has been documented, such presentations predominantly occur in individuals under 40 years of age. Prior to this report, the oldest documented patient undergoing surgery for symptomatic MD was 91 years old (as of 2005). Our patient, a 98-year-old female, presented with an acute SBO attributable to her Meckel's diverticulum. She underwent an exploratory laparotomy, during which a Meckel's diverticulectomy was performed, thus representing, to our knowledge, the oldest individual reported to date to undergo surgical intervention for this condition.
Conclusion	Just two years shy of 100, this patient represents, to the best of our knowledge, the oldest individual on record to undergo a Meckel's diverticulectomy for symptomatic disease. This exceptionally rare case underscores the importance of maintaining MD in the differential diagnosis of small bowel obstruction even in the very elderly. Furthermore, it reinforces the principle that surgical intervention for complicated Meckel's diverticulum should be guided by the patient's clinical presentation and physiological status rather than by chronological age alone, advocating for diligent and individualized management in elderly patients.
Key Words	Meckel's diverticulum; small bowel obstruction; congenital gastrointestinal malformations; late-onset complication; volvulus

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Case Description

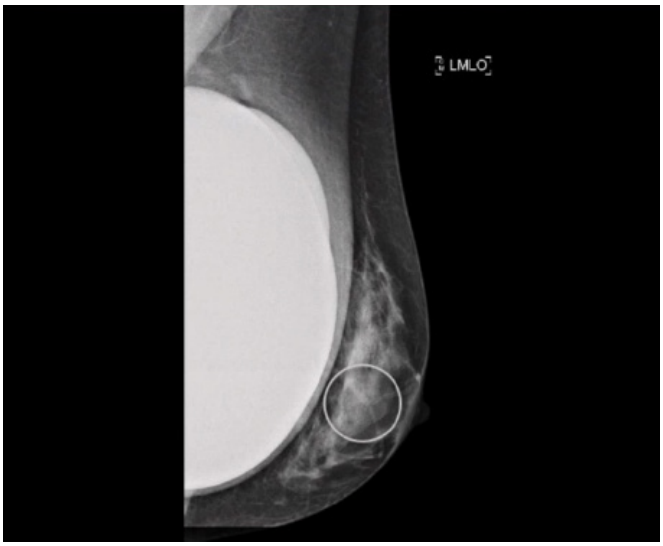
A 98-year-old female with a remote surgical history of an appendectomy and cholecystectomy, both performed via a midline laparotomy in her twenties, presented to the emergency department with a one-day history of bilateral lower abdominal pain, nausea, and multiple episodes of emesis. On physical examination, she was afebrile and hemodynamically stable. Her abdomen was mildly distended yet soft and non-tender, with a well-healed midline laparotomy scar. Laboratory investigations revealed a white blood cell (WBC) count of 13.38 x 10^9/L.

A computed tomography (CT) scan of the abdomen and pelvis demonstrated multiple dilated loops of small bowel with air-fluid levels and a small amount of free fluid, consistent with a small bowel obstruction (SBO). However, no definite transition point was identified. Given the high suspicion for SBO, a nasogastric (NG) tube was placed for bowel decompression. The primary differential diagnoses for the SBO included adhesions from her previous abdominal surgeries and, considering her advanced age, an underlying neoplasm.

Initially, the patient expressed a preference to avoid surgical intervention due to concerns related to her advanced age. Consequently, a trial of non-operative management was initiated, comprising NG tube decompression and nil per os (NPO) status, with a plan to reconsider surgery if there was no improvement within 72 hours. By admission day two, the NG tube continued to drain significant dark green bilious output, and the patient reported only limited bowel movements without passage of flatus in the preceding 24 hours. A Gastrografin challenge performed on the same day showed minimal contrast progression beyond the gastric fundus, with persistent dilation of small bowel loops. With ongoing evidence of unresolved obstruction by the morning of admission day three, and after further discussion, the patient consented to an exploratory laparotomy later that day.

Intraoperatively, a significant amount of straw-colored free fluid was found within the peritoneal cavity, along with scant blood-tinged fluid in the pelvis. Approximately two feet proximal to the ileocecal junction, a Meckel's diverticulum (MD) was identified on the antimesenteric border of the ileum (Figure 1). The mechanical obstruction was caused by an adhesive band originating from the gastrocolic omentum, which had encircled the Meckel's diverticulum, leading to a secondary mesenteric volvulus of the involved bowel segment.

Figure 1. Intraoperative Identification of Meckel's Diverticulum. Published with Permission.



Given the patient's advanced age, overall frailty, and the absence of gross inflammation or ischemia of the diverticulum itself or adjacent bowel, a decision was made to perform a diverticulectomy rather than a segmental bowel resection. The broad-based morphology of the diverticulum was deemed amenable to complete excision using a stapling device without compromising the luminal diameter of the distal ileum. The omental adhesive band was incised, and the Meckel's diverticulum was detached from the omentum. An endoscopic 45 mm linear cutting stapler was then used to completely transect the diverticulum at its base. The remainder of the small bowel, though markedly dilated proximally, was confirmed to be viable.

The patient recovered well postoperatively, with return of bowel function allowing for tolerance of a general diet. She was discharged home on postoperative day five. The surgical pathology report subsequently confirmed the diagnosis of Meckel's diverticulum, describing a true diverticulum exhibiting focal mucosal ulceration and associated active inflammation. Heterotopic mucosa, which is often implicated in symptomatic Meckel's diverticula, was not identified in the specimen.

Discussion

The "Rule of 2s" traditionally estimates the prevalence of Meckel's diverticulum at approximately 2% in the general population; however, ascertaining the precise incidence is challenging due to a significant proportion of cases remaining asymptomatic and undetected throughout an individ-

ual's lifespan. A systematic review of literature from 2000 to 2017 indicated an MD prevalence ranging between 0.3% and 2.9%, with symptomatic manifestations occurring in 4% to 9% of these individuals.[1] Among symptomatic adult patients, small bowel obstruction is a common presentation (35.6%), followed by hemorrhage (27.3%) and diverticulitis (29.4%).[1] Although complicated MD is more frequently reported in young males, the current case of symptomatic MD causing SBO in an elderly female underscores the necessity of including MD in the differential diagnosis for SBO across all age groups and sexes.[1,2]

Preoperative diagnosis of MD in symptomatic adult patients remains difficult. While imaging modalities such as ultrasound, CT or CT angiography, and Technetium-99m pertechnetate scintigraphy are utilized, their sensitivity for specifically identifying MD in adults is often limited, particularly in the emergent setting of an SBO.[1,3] The primary value of imaging, especially contrast-enhanced CT, lies in confirming the presence of SBO, assessing for complications like ischemia or perforation, and guiding the decision for surgical management, rather than definitively diagnosing MD as the etiology.[4] This was exemplified in our patient, whose preoperative CT scan confirmed SBO but did not visualize the Meckel's diverticulum.

Surgical intervention for symptomatic MD typically involves either a simple diverticulectomy or a segmental small bowel resection with anastomosis.[5] Segmental resection is generally preferred when there is evidence of inflammation or ischemia at the base of the diverticulum, a palpable mass within the diverticulum, a very short and broad-based diverticulum (height-to-diameter ratio less than two, increasing the likelihood of ectopic tissue at the base), or significant inflammation extending to the adjacent ileum, to ensure complete removal of any ectopic mucosa (often gastric or pancreatic) that can be a source of complications.[5-7] However, a recent study comparing outcomes in adult patients undergoing diverticulectomy versus segmental bowel resection for MD found no significant difference in postoperative complications, suggesting that patient-specific factors and intraoperative findings are crucial in guiding the choice of operative approach.[8] In our patient, considering her advanced age, overall frailty, and the favorable anatomy of the diverticulum without overt signs of deep inflammation or ischemia at its base, a stapled diverticulectomy was deemed the most appropriate and least morbid intervention.

Conclusion

This report of a Meckel's diverticulum causing significant small bowel obstruction in a 98-year-old patient serves as a crucial reminder of this condition's potential to manifest with severe complications across the entire age spectrum, challenging the common perception of MD as primarily a pediatric pathology. To our knowledge, this patient represents the oldest individual reported to date to undergo a Meckel's diverticulectomy for symptomatic disease. The decision to proceed with diverticulectomy rather than segmental resection was carefully considered, predicated on the patient's overall physiological status, the intraoperative findings of a non-inflamed diverticular base, and the expediency of this approach to resolve the obstruction with minimal surgical trauma. While factors such as diverticular size, extensive inflammation, or associated luminal narrowing of the ileum can necessitate segmental resection, these were not prominent features in this instance.

Lessons Learned

While mnemonics like the "Rule of 2s" offer useful generalizations for MD, clinicians must remain vigilant for atypical presentations, as exemplified by this exceptional case. Recognizing this variability prompts the inclusion of MD in the differential diagnosis of small bowel obstruction even in very elderly patients, advocating for adaptable and individualized surgical strategies to provide effective care for this congenital anomaly in the aging population.

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