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Sigmoid colon perforation complicating neonatal rectovestibular fistula: A case report

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ABSTRACT

Anorectal malformation (ARM) with rectovestibular fistula may allow small amounts of meconium to pass despite ongoing distal bowel obstruction. We report a three-day-old term female neonate with an imperforate anus, progressive abdominal distension, bilious vomiting, and minimal meconium passage through a rectovestibular fistula. Abdominal radiography showed marked bowel dilatation and pneumoperitoneum. Emergency laparotomy revealed sigmoid colon perforation with diffuse fecal peritonitis. The perforation was repaired, followed by a double-barrel sigmoid colostomy. The infant recovered well and was discharged on postoperative day eight. At three-month follow-up, the wound was completely healed and the colostomy remained healthy and functional. This case illustrates a rare but serious complication of rectovestibular fistula, in which limited meconium passage may coexist with significant bowel obstruction and subsequent perforation. These findings emphasize that thorough perineal inspection, high vigilance for obstruction despite minor meconium passage, and timely surgical intervention are essential to prevent bowel perforation in neonates with anorectal malformations.

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INTRODUCTION

Anorectal malformations (ARMs) encompass a heterogeneous group of congenital abnormalities involving the distal rectum and anus, with variable fistulous communications to the urinary or genital tract and frequent associations with other congenital anomalies (Amerstorfer et al., 2022; Hageman et al., 2024) Because the anatomical presentation of ARM varies considerably, accurate identification of the malformation during the neonatal period is important for determining appropriate diagnostic evaluation and subsequent surgical management (Amerstorfer et al., 2022). Careful inspection of the anus and perineum should therefore be an integral component of routine neonatal examination, particularly for identifying abnormalities in anal position, caliber, or fistulous openings (Amerstorfer et al., 2022). Although uncommon, ARM occurs worldwide and

shows geographical variation in reported birth prevalence (Kancherla et al., 2023). A large multicountry surveillance study involving 9,438 cases among nearly 29 million births estimated a pooled ARM prevalence of 3.26 per 10,000 total births (Kancherla et al., 2023). Population-based data from Southeast Asia remain comparatively limited; however, a nationwide analysis using Thailand's National Health Security Office database reported an ARM prevalence of 2.57 per 10,000 births between 2017 and 2020 (Sirichamratsakul et al., 2023).

Among female patients with ARM, rectovestibular fistula represents an important anatomical phenotype in which the rectum opens into the vestibule anterior to the expected anal position (Hageman et al., 2024). Data from the European ARM-Net registry, which included 2,619 patients from 34 centers, showed that vestibular fistula accounted for 31.8% of ARM phenotypes among female patients (Hageman et al., 2024). Although a rectovestibular fistula permits passage of meconium and may provide some degree of distal bowel decompression, visible meconium through an abnormal perineal opening should not be interpreted as evidence of normal anorectal anatomy or necessarily adequate intestinal emptying (Long et al., 2024). This distinction is clinically relevant because delayed recognition of ARM continues to occur despite routine neonatal assessment (Kruger et al., 2019; Long et al., 2024) In a prospective population-based cohort of 174 infants with ARM in the United Kingdom and Ireland, 39 infants (22%) were diagnosed late, while female sex, a visible perineal opening, and visible meconium on the perineum were associated with an increased likelihood of late diagnosis (Long et al., 2024). These findings emphasize the importance of careful anatomical assessment and continued clinical observation when meconium is passed through an abnormal perineal opening (Amerstorfer et al., 2022; Long et al., 2024).

Recognizing signs of bowel obstruction in a neonate with a rectovestibular fistula carries substantial clinical urgency, because diagnostic delay is consistently linked to a higher risk of intestinal perforation, sepsis, and mortality, particularly when a patent fistula creates a false impression of adequate decompression (Oyania et al., 2024; Piperidis et al., 2025). International reviews emphasize that ARM is a clinical diagnosis that should be actively excluded within the first 24-72 hours of life through a structured perineal examination performed by trained birth attendants, including midwives, rather than inferred from spontaneous meconium passage alone (Murthi et al., 2023; Oyania et al., 2024). Every hour of unrecognized obstruction allows further bowel distension and wall stress to accumulate, so the interval between birth and a confirmatory perineal examination represents a critical window for preventing progression to perforation and peritonitis (Piperidis et al., 2025). However, substantial knowledge gaps persist regarding the clinical trajectory, warning signs, and monitoring protocols for sigmoid colon perforation in neonates with rectovestibular fistulas, particularly in detecting early intestinal wall stress before perforation occurs.

Gastrointestinal perforation is an uncommon but potentially life-threatening complication of ARM, particularly when diagnosis or effective intestinal decompression is delayed (Kruger et al., 2019; Singh et al., 2023). Delayed recognition of ARM may be accompanied by progressive bowel distension and obstructive manifestations, with intestinal perforation documented among affected neonates (Kruger et al., 2019). Although colonic perforation is rarely encountered in ARM, neonatal cases have been documented, indicating that this complication should be considered when abdominal deterioration occurs in an affected infant (King et al., 2016; Singh et al., 2023). More specifically, neonatal sigmoid colon perforation has been reported in association with low ARM, indicating that severe proximal colonic complications may occur even in anatomically lower forms of the malformation (Parelkar et al., 2016; Singh et al., 2023). The pathophysiology of perforation is likely multifactorial, with inadequate distal decompression, progressive bowel distension, and increased intraluminal pressure proposed as contributing mechanisms (Parelkar et al., 2016; Singh et al., 2023). Therefore, the mechanism responsible for perforation in an individual neonate should be interpreted by correlating the clinical course with radiological and

intraoperative findings rather than being attributed to distal obstruction alone (Parelkar et al., 2016; Singh et al., 2023).

Early recognition of an evolving intra-abdominal complication requires integration of serial clinical assessment and appropriate imaging rather than reliance solely on the apparent patency of a distal fistula (Riccabona et al., 2017; Long et al., 2024). Progressive abdominal distension, vomiting or feeding intolerance, and clinical deterioration in a neonate with ARM warrant reassessment for possible intestinal obstruction or perforation (Kruger et al., 2019; Singh et al., 2023). Radiological evaluation complements physical examination by helping define anorectal anatomy, identify associated abnormalities, and provide information relevant to subsequent surgical decision-making (Riccabona et al., 2017). Despite previous reports of sigmoid perforation associated with low ARM, published evidence specifically describing sigmoid colon perforation complicating neonatal rectovestibular fistula remains limited (Parelkar et al., 2016; Singh et al., 2023). This represents a clinically relevant knowledge gap because distal meconium passage through a rectovestibular fistula may coexist with significant proximal bowel pathology and therefore should not be considered sufficient evidence of effective colonic decompression (Long et al., 2024; Singh et al., 2023). The present case describes sigmoid colon perforation complicating neonatal rectovestibular fistula, with particular emphasis on the temporal relationship among clinical deterioration, radiological findings, and intraoperative anatomy. The clinical value of this report lies in highlighting that continued meconium passage through a rectovestibular fistula does not necessarily exclude a serious proximal intestinal complication and that integrated clinical, radiological, and surgical assessment may facilitate timely recognition and appropriate management of this rare presentation (Long et al., 2024; Singh et al., 2023).

RESEARCH METHOD

This study was designed as a retrospective descriptive case report based on a review of the medical records (Chu et al., 2021). Clinical information was retrospectively collected from the patient's medical records, including admission records, laboratory results, radiological reports, operative notes, and postoperative records. including perinatal history, clinical presentation, physical examination findings, laboratory investigations, radiological findings, operative findings, postoperative management, and clinical outcomes. Clinical, radiological, and intraoperative findings were correlated according to their chronological sequence and concordance, with emphasis on the consistency between progressive clinical signs of bowel obstruction, radiological evidence of bowel dilatation and pneumoperitoneum, and operative confirmation of sigmoid colon perforation) The case analysis primarily focused on the clinical progression of bowel obstruction and its correlation with radiological and intraoperative findings.

RESULTS AND DISCUSSIONS

A 3-day-old female neonate, born at term and weighing 3,000 g, was referred to our emergency department because of an absent anal opening that had been recognized since birth. She developed progressive abdominal distension accompanied by recurrent bilious vomiting. Her parents initially reported that she had not passed meconium after delivery. However, further questioning revealed intermittent passage of small amounts of meconium through a tiny opening in the vestibule, located just below the vaginal introitus. The infant was delivered vaginally at term following an uncomplicated pregnancy. The delivery was uneventful, with no reported birth trauma. The mother had no significant illness during pregnancy, and there was no known family history of congenital anomalies, anorectal malformations, or hereditary gastrointestinal disorders.

At presentation, the infant was hemodynamically stable. Her abdomen was markedly distended but remained soft, with no overlying erythema or edema. Careful examination of the perineum confirmed the absence of a normal anal opening. A small opening was identified within

the vestibule, from which only a minimal amount of meconium could be expressed. The location of this opening and the passage of meconium through it were consistent with an anorectal malformation with a rectovestibular fistula.

Laboratory evaluation showed marked leukocytosis (25.98 × 10^3/μL) with neutrophil predominance and an elevated C-reactive protein level of 6.4 mg/L, suggesting an ongoing inflammatory response. Prothrombin time was mildly prolonged, whereas serum electrolyte levels were within normal limits. Plain abdomen foto showed marked gaseous dilatation of multiple bowel loops, consistent with distal intestinal obstruction. Free intraperitoneal air was also evident, indicating pneumoperitoneum and raising strong suspicion of gastrointestinal perforation (Figure 1). In neonates with anorectal malformations, finding pneumoperitoneum indicates severe bowel perforation, signaling an critical need for immediate emergency surgical intervention. In view of the intestinal obstruction and pneumoperitoneum, the infant was initially stabilized with gastric decompression and supportive therapy. Emergency exploratory laparotomy was subsequently performed.

A transverse supraumbilical incision was made, and extensive fecal contamination was encountered upon entering the peritoneal cavity. Exploration revealed a perforation of the sigmoid colon with diffuse fecal peritonitis. The perforation was primarily repaired with a two-layer closure. A double-barrel sigmoid colostomy was then created to divert the fecal stream and protect the repaired bowel segment. After surgery, the infant was transferred to the neonatal intensive care unit for close observation and postoperative care. She was managed with bowel rest, nasogastric decompression, broad-spectrum intravenous antibiotics, intravenous fluids, nutritional support, and regular assessment of colostomy function.

Her postoperative recovery was uneventful. Abdominal distension gradually subsided, and subsequent abdominal radiography demonstrated resolution of the bowel dilatation with no residual or recurrent pneumoperitoneum (Figure 2). Enteral feeding was gradually introduced on postoperative day 4 after bowel function had recovered and was well tolerated.

The infant continued to improve and was discharged on postoperative day 8 in good general condition. At the time of discharge, her abdomen was soft and non-distended, the surgical wound was healing without evidence of infection, and the double-barrel sigmoid colostomy was viable and functioning well (Figure 3). At the 3-month follow-up, the patient remained clinically well. The laparotomy incision had completely healed, and the abdomen remained non-distended. The colostomy was viable and functioning normally, with healthy-appearing mucosa and no clinically apparent stoma-related complications (Figure 4).

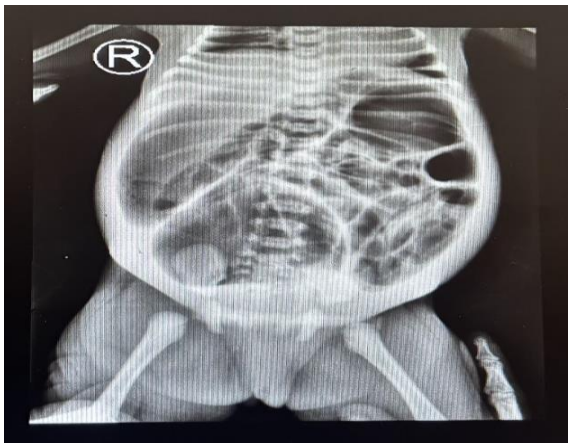

Figure 1. Plain abdominal foto obtained at presentation, showing marked gaseous dilatation of multiple bowel loops, consistent with distal intestinal obstruction. Free intraperitoneal air (pneumoperitoneum) is also present, raising suspicion of gastrointestinal perforation

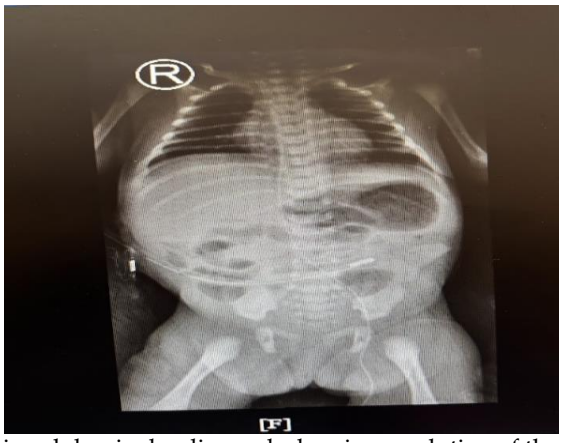

Figure 2. Postoperative supine abdominal radiograph showing resolution of the previously observed bowel dilatation and pneumoperitoneum. An intra-abdominal drainage catheter is visible, with its tip projecting over the left mid-abdomen

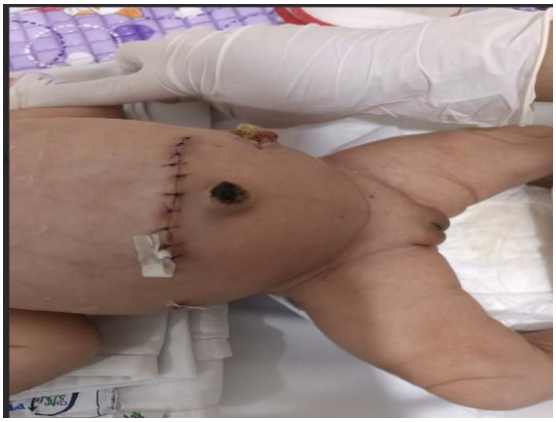

Figure 3. Clinical appearance on postoperative day 8. Abdominal distension had resolved, and the transverse laparotomy incision was healing well without clinical signs of surgical-site infection. The double-barrel sigmoid colostomy was viable and functioning appropriately

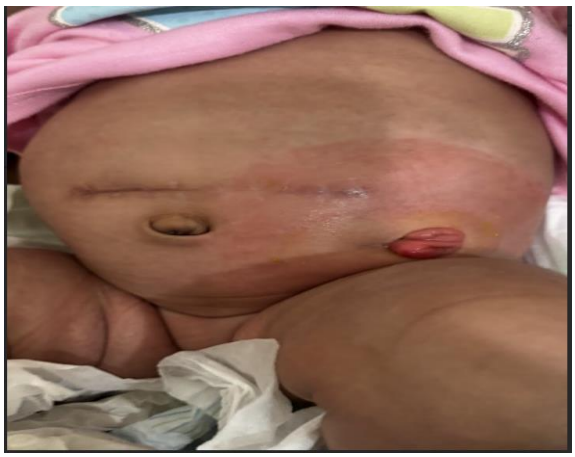

Figure 4. Clinical appearance at the 3-month follow-up showing complete healing of the laparotomy incision and a non-distended abdomen. The double-barrel sigmoid colostomy remained viable, with healthy-appearing mucosa and no clinically apparent stoma-related complications

The findings of the present case support evidence that visible meconium passage through a perineal fistula does not necessarily exclude clinically significant anorectal obstruction. In this neonate, only small amounts of meconium intermittently passed through the rectovestibular fistula despite progressive abdominal distension, bilious vomiting, and marked bowel dilatation, indicating inadequate distal decompression. Visible meconium on the perineum has been associated with delayed diagnosis, and obstructive manifestations are reported more frequently among patients whose ARM is recognized late (Davidson et al., 2024; Long et al., 2024). Rectovestibular fistula is also a common ARM phenotype in female patients and may present with an abnormal opening in the vestibule through which stool or meconium passes (Hageman et al., 2024). In contrast to the complicated presentation in our patient, selected patients with uncomplicated rectovestibular fistula can undergo definitive repair without preliminary fecal diversion with satisfactory outcomes (Abdul Aziz et al., 2017; Amanollahi & Ketabchian, 2016). These contrasting findings suggest that the clinical significance of a rectovestibular fistula depends not only on its anatomical presence but also on its functional adequacy for fecal drainage, the severity of obstruction, the patient's clinical condition, and timing of diagnosis (Xiao et al., 2026). Therefore, the distinctive feature of the present case was the coexistence of limited meconium passage through a rectovestibular fistula with progressive evidence of functionally significant distal obstruction.

The clinical course suggests a plausible pathophysiological progression from inadequate distal drainage to progressive bowel distension and subsequent perforation. A small or functionally inadequate fistulous opening may allow some meconium to pass while remaining insufficient for effective decompression, and persistent abdominal distension or defecation difficulty despite conservative management may necessitate fecal diversion in selected patients (Xiao et al., 2026). In our patient, marked gaseous dilatation of multiple bowel loops on admission radiography provided objective evidence of substantial distal intestinal obstruction. Persistent obstruction may increase intraluminal pressure and bowel-wall stress, providing a plausible mechanism by which an obstructed colon becomes susceptible to perforation; nevertheless, this mechanism cannot be directly proven from the present case. Pneumoperitoneum on admission indicated gastrointestinal perforation, which was subsequently confirmed at laparotomy as sigmoid colon perforation with diffuse fecal peritonitis. Although colonic perforation is rare in ARM, sigmoid perforation has been reported in neonates with low ARM and represents a potentially life-threatening complication requiring prompt surgical treatment (Singh et al., 2023). Delayed ARM diagnosis has also been associated with serious complications, including intestinal perforation, reinforcing the importance of early recognition of distal obstruction (Kruger et al., 2019). Accordingly, the sigmoid perforation in our patient should be interpreted as a severe complication occurring in the setting of unresolved distal obstruction rather than as a proven direct consequence of the rectovestibular fistula itself.

Delayed recognition provides an important clinical context for understanding the progression observed in this case. A substantial proportion of neonates with ARM may still experience delayed diagnosis, particularly when an abnormal perineal opening or visible meconium creates the impression that distal bowel drainage is adequate (Davidson et al., 2024; Long et al., 2024). Delayed presentation has also been reported in settings where early neonatal recognition and access to specialized pediatric surgical care are limited (Bhavsar et al., 2021). Importantly, the available evidence demonstrates an association rather than a direct causal relationship between delayed recognition and perforation; therefore, diagnostic delay should be regarded as a potential contributor that prolongs unresolved obstruction in susceptible neonates rather than as an independent cause of intestinal perforation (Kruger et al., 2019; Davidson et al., 2024). In the present case, intermittent passage of a small amount of meconium may have contributed to initial false reassurance despite the absence of a normal anal opening. This observation emphasizes that the presence of meconium on the perineum should not be interpreted

as evidence of normal anorectal anatomy or adequate intestinal decompression (Davidson et al., 2024; Long et al., 2024).

Several concrete clinical lessons can be drawn from this case to help prevent delayed diagnosis in similar presentations. First, any meconium observed at an abnormal perineal site should prompt a complete anorectal examination rather than being accepted as reassurance of normal bowel patency, since delayed diagnosis is disproportionately common precisely among neonates who pass some meconium through an ectopic opening (Piperidis et al., 2025). Second, progressive abdominal distension, bilious vomiting, or feeding intolerance occurring after birth in an infant with a known or suspected perineal fistula should trigger urgent radiological evaluation for obstruction or perforation rather than a period of watchful waiting (Oyania et al., 2024). Third, structured, checklist-based newborn examination performed by trained birth attendants, together with explicit documentation of the anatomical source of any meconium passage, has been associated with earlier detection of ARM in national screening programs and should be reinforced through ongoing training of midwives and other first-line examiners (Murthi et al., 2023). Applying these lessons systematically may not eliminate delayed diagnosis, but it can shorten the interval between birth and definitive recognition of obstruction, potentially preventing progression to perforation as occurred in the present case (Murthi et al., 2023; Piperidis et al., 2025).

The surgical strategy in this patient was determined primarily by the acute complication rather than by the rectovestibular fistula alone. In uncomplicated rectovestibular fistula, both primary and staged reconstruction have been described, and treatment should be individualized according to anatomy, clinical condition, associated abnormalities, and surgical expertise (Amanollahi & Ketabchian, 2016). In our patient, sigmoid perforation with diffuse fecal peritonitis shifted the immediate therapeutic priority from definitive anorectal reconstruction to source control, repair of the perforation, and fecal diversion. Primary two-layer closure of the sigmoid perforation followed by a double-barrel sigmoid colostomy provided diversion of the fecal stream while allowing definitive anorectal reconstruction to be deferred until clinical recovery. Staged repair with colostomy remains an accepted strategy for selected patients with rectovestibular fistula, particularly when clinical circumstances make immediate definitive reconstruction inappropriate (Xiao et al., 2026). Large registry data further demonstrate that temporary stomas remain part of ARM management, although stoma-related complications require appropriate surveillance (Hageman et al., 2024). The resolution of abdominal distension and pneumoperitoneum, successful initiation of enteral feeding, discharge on postoperative day eight, and a viable functioning colostomy at three months demonstrated a favorable short-term outcome. Nevertheless, longer follow-up remains essential because constipation, soiling, fecal accidents, and the need for bowel management may persist after reconstruction of rectovestibular fistula (Hakalmaz & Topuzlu Tekant, 2023; van der Steeg et al., 2022)

The major clinical and educational implication of this case is that meconium passage should never substitute for direct assessment of anorectal anatomy in a newborn. In female neonates, careful inspection is essential because rectovestibular fistula and other ARM phenotypes may present with abnormal perineal openings through which meconium is visible (Hageman et al., 2024). Visible meconium may paradoxically contribute to delayed diagnosis when it is incorrectly assumed to originate from a normally positioned anus (Davidson et al., 2024; Long et al., 2024). Therefore, physicians, midwives, nurses, and other healthcare professionals responsible for newborn assessment should systematically inspect the perineum, confirm the presence and normal position of the anus, examine the urethral and genital openings, and identify any additional perineal opening. When meconium is observed, its exact anatomical source should be verified rather than assumed. An absent anal opening, meconium emerging through an abnormal opening, progressive abdominal distension, bilious vomiting, or inadequate stool evacuation should raise suspicion of ARM with intestinal obstruction and prompt early pediatric surgical referral. The importance of careful postnatal examination is further reinforced by the continuing difficulty of

reliably detecting ARM prenatally (Huijgen et al., 2025) neonatal examination and training of healthcare professionals performing newborn assessment may therefore facilitate earlier recognition and reduce preventable diagnostic delay (Kruger et al., 2019; Long et al., 2024).

This case is strengthened by the concordance between clinical presentation, direct perineal findings, laboratory evidence of inflammation, radiographic demonstration of bowel obstruction and pneumoperitoneum, and operative confirmation of sigmoid perforation with diffuse fecal peritonitis. Nevertheless, as a single case report, it cannot establish the incidence of perforation or prove a causal relationship between delayed recognition, inadequate fistulous drainage, and sigmoid perforation. The proposed pathophysiological mechanism remains inferential because fistula caliber, intraluminal pressure, local bowel perfusion, and histopathological changes at the perforation site were not objectively assessed. Furthermore, the three-month follow-up is insufficient to determine outcomes after definitive anorectal reconstruction, particularly constipation, continence, urinary function, and long-term quality of life, which remain important components of ARM follow-up (van der Steeg et al., 2022; Hakalmaz & Tekant, 2023). Despite these limitations, the present case demonstrates an important clinical principle: limited passage of meconium does not confirm normal anorectal anatomy and should not be considered sufficient evidence of adequate distal bowel decompression. Systematic perineal examination, confirmation of the actual route of meconium passage, recognition of obstructive warning signs, and timely referral may reduce diagnostic delay and provide an opportunity for intervention before severe complications develop (Kruger et al., 2019; Davidson et al., 2024). Therefore, systematic perineal examination of every newborn should remain an essential component of routine neonatal assessment, particularly at primary and maternity care facilities where the first opportunity to identify ARM commonly occurs.

CONCLUSION

This case demonstrates that fistula patency must not be equated with adequate bowel decompression, as visible meconium can coexist with life-threatening colonic perforation. To improve early detection in primary care settings, four recommendations are proposed: (1) routine, structured perineal inspection before discharge; (2) explicit documentation of the meconium source; (3) low threshold for pediatric surgical referral upon detecting abnormal perineal openings or obstructive symptoms; and (4) continuous training for birth attendants on screening pathways. Future research should focus on prospective multicenter studies to identify specific risk factors for colonic perforation in neonates with anorectal malformations and evaluate standardized management protocols to strengthen current evidence.

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