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Original Research

A Comprehensive Case Study of a Three-Year-Old Child with Prolonged Diarrhea, Subacute Intestinal Obstruction, and Isolation of Pantoea dispersa

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Abstract

Background: Persistent diarrhea and subacute intestinal obstruction (SAIO) are individually challenging pediatric presentations, but their coexistence can obscure timely diagnosis and management. Opportunistic infections in such cases may exacerbate clinical deterioration. Pantoea dispersa, a rare Gram-negative bacillus from the Enterobacteriaceae family, is seldom implicated in pediatric bloodstream infections but can be pathogenic in immunocompromised or malnourished hosts.

Methods: We present a case study of a three-year-old girl admitted with prolonged diarrhea, abdominal distension, and severe anemia. Initial investigations revealed SAIO on imaging and significant anemia (Hb 3.8 g/dL). Serial inflammatory markers and blood counts were monitored. Blood cultures were taken and empiric antibiotics initiated. A multidisciplinary team guided the treatment strategy encompassing antimicrobial therapy, bowel rest, and supportive care.

Results: Blood culture isolated Pantoea dispersa on day four, with susceptibility to multiple antibiotic classes. The child responded well to intravenous ceftriaxone and supportive measures, including red blood cell transfusion and bowel decompression. Clinical improvement was reflected by normalization of leukocyte counts, reduction in C-reactive protein, resolution of abdominal distension, and tolerance of oral feeds. The child was discharged in stable condition after seven days of hospitalization.

Conclusion: This case highlights the importance of comprehensive diagnostic evaluation in persistent pediatric gastrointestinal complaints. It also draws attention to Pantoea dispersa as an emerging pathogen in vulnerable pediatric populations, particularly in the context of compromised mucosal barriers and severe anemia. Prompt recognition, culture-guided antibiotic therapy, and correction of comorbidities contributed to a favorable outcome. Clinicians should maintain a high index of suspicion for unusual pathogens in complex cases involving GI disturbances.

Keywords: Pediatric diarrhea, subacute intestinal obstruction, Pantoea dispersa, bloodstream infection, severe anemia, opportunistic pathogens, case report

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Introduction

Pediatric gastrointestinal (GI) disorders encompass a wide variety of acute and chronic conditions, many of which can rapidly evolve into life-threatening scenarios if not identified and treated in a timely manner. Children under five years of age are particularly vulnerable to dehydration and nutritional imbalances brought about by diarrheal diseases, underscoring the critical need for early diagnosis and appropriate management. Persistent diarrhea spanning more than seven days may point toward various etiologies, including but not limited to infective, inflammatory, and metabolic causes, each necessitating a distinct therapeutic approach (1).

Subacute intestinal obstruction (SAIO) in children introduces an additional layer of complexity to an already delicate clinical picture. SAIO can stem from an array of causes such as adhesions, volvulus, intussusception, infections, or congenital malformations (2). The clinical presentation may include progressive abdominal distension, altered bowel patterns, and sometimes partial relief with

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conservative measures, only to re-emerge and worsen over days. Unlike acute and complete obstruction, subacute forms can initially present with fewer overt "red flags," which may delay definitive diagnosis. Delay in identifying the underlying cause can lead to complications including perforation, peritonitis, and sepsis (3).

Sepsis remains one of the major concerns when a child presents with both gastrointestinal disturbance and signs suggestive of systemic infection. In particular, a pathogen that is not commonly associated with severe disease can complicate the clinical scenario if it proliferates in an immunocompromised or nutritionally vulnerable pediatric patient. Bacterial translocation from the intestinal lumen to the bloodstream, whether due to mucosal breaches or compromised immune defenses, is a recognized phenomenon (4). Such translocations can seed systemic infection, heighten the inflammatory response, and magnify morbidity.

Pantoea dispersa, a Gram-negative bacillus belonging to the Enterobacteriaceae family, has garnered attention in recent decades as an opportunistic pathogen with the potential to cause infections in hospital and community settings (5). Formerly classified within the genus *Enterobacter* or closely related genera, *Pantoea dispersa* was reclassified upon deeper taxonomic analysis. Historically, *Pantoea* species were primarily associated with plants and environmental sources, but several case reports indicate the ability of these bacteria to trigger severe infections in humans ranging from bloodstream infections to meningitis, especially in neonates and immunocompromised individuals (6).

There is a growing awareness that many environmental or plant-associated bacteria possess virulence factors that can manifest in humans under conducive conditions. The risk of such infections may be heightened by breaches in mucosal integrity, indwelling intravenous catheters, underlying immunodeficiencies, or prolonged hospitalization (7). Nonetheless, the overall incidence of *Pantoea dispersa* in pediatric clinical settings remains relatively low, rendering each reported case a valuable learning opportunity. Understanding how and why this organism becomes pathogenic, and the optimal therapies to contain its proliferation, is crucial for improving patient outcomes.

In regions where children may have intermittent access to comprehensive healthcare or where malnutrition and anemia are prevalent, the emergence of an unusual pathogen requires heightened vigilance (8). Severe anemia, as seen in this case, can exacerbate the risk of infection, hamper tissue oxygenation, and undermine host defenses, thereby creating a favorable environment for opportunistic bacteria. Early detection of severe anemia and aggressive correction are indispensable not only for preventing end-organ dysfunction but also for improving the child's immunological resilience (9).

Furthermore, antibiotic stewardship plays a pivotal role in managing pediatric infections, especially when dealing with organisms whose sensitivity patterns may not be completely predictable. The selection of broad-spectrum antibiotics followed by de-escalation, once culture and sensitivity data become available, helps reduce the emergence of drug resistance (10). Clinicians must remain guided by local antibiograms, protocols, and recognized national and international guidelines to fine-tune antimicrobial therapy.

This case study examines an atypical presentation of persistent diarrhea and subacute intestinal obstruction in a three-year-old child who tested positive for *Pantoea dispersa* in the bloodstream. The child's clinical trajectory was complicated by severe anemia, making the scenario even more challenging. The simultaneous presence of GI pathology and a rare pathogen underscores the importance of meticulous clinical examination, comprehensive investigations, evidence-based treatment, and timely interventions (11). Particularly in resource-limited settings, recognition and management of unusual pathogens require a high index of suspicion, specialized laboratory capacities, and interdepartmental collaboration.

In presenting this case, the goal is to integrate the historical, clinical, laboratory, and radiological data to formulate a thorough perspective on diagnostic, therapeutic, and preventive aspects (12). By dissecting the chain of events in detail, this case study aims to contribute to the academic and clinical understanding of pediatric SAIO, the implications of persistent diarrhea, and the potential severity of infections caused by *Pantoea* dispersa.

Case Presentation

A three-year-old female child was brought to the pediatric emergency department of our institute on the evening of April 15, 2023 (CR No. 23/11102). Her primary complaints included prolonged loose stools for ten days and progressive, generalized abdominal distension for three days. Initially, she experienced ten to twelve episodes per day of watery, yellowish diarrhea, unaccompanied by blood or mucus. Although the diarrhea substantially improved over the 24 hours preceding admission, the abdominal distension had become a significant concern.

The parents reported food refusal and a notable weight loss of around two kilograms over the ten-day period. Despite having no history of vomiting or jaundice, the child's clinical condition prompted suspicion of a possible intestinal obstruction or a complicated infectious process. Previously, they had sought care at a government hospital where they were prescribed symptomatic management for the diarrhea: lactobacillus supplements, ondansetron, WHO Oral Rehydration Solution (ORS), zinc supplementation, and metronidazole. Although these interventions alleviated the loose stools, the abdominal distension subsequently worsened.

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Further inquiry revealed no family history of gastrointestinal disorders or known genetic conditions. Of note, the child was born preterm at 7 months via an institutional vaginal delivery. She developed neonatal hyperbilirubinemia on the seventh day of life, requiring a brief neonatal intensive care unit (NICU) stay and phototherapy. Since then, her immunizations have been up to date, and her developmental milestones matched age expectations.

On physical examination, the child weighed 14 kilograms and appeared fair in general condition, but exhibited peripheral warmth with a prolonged capillary refill time exceeding three seconds. She did not exhibit jaundice, but pallor was evident. There was no generalized anasarca. The abdomen was distended and mildly tender on palpation; however, the lungs were clear on auscultation, and her cardiovascular exam revealed normal heart sounds (S1, S2) with no murmurs. Vital signs were stable overall, although the prolonged capillary refill time raised concerns about possible compromised perfusion or ongoing subclinical hypovolemia. Neurologically, the child was alert and responsive.

A nasogastric tube was inserted to decompress any possible obstructive process. Immediate imaging, including ultrasonography (USG) of the whole abdomen, indicated grossly dilated bowel loops, with the right flank region demonstrating a maximum caliber of approximately 3.5 cm. An erect chest X-ray was advised to further delineate air-fluid levels or free air under the diaphragm, and it confirmed significant dilation of the transverse and descending colon, aligning with a likely subacute intestinal obstruction (SAIO).

Laboratory investigations at admission showed a hemoglobin level of 3.8 g/dL (indicating severe anemia), a total leukocyte count (TLC) of 11,420/mm³, platelets of 3.76 × 10^5/mm³, and a quantitative C-reactive protein (qCRP) of 0.5 mg/dL. Subsequent blood investigations on day three, day five, and day six of admission exhibited a rising leukocyte count (52,000/mm³ on day three, 32,000/mm³ on day five, and 17,000/mm³ on day six) and fluctuating platelet counts (1.61 × 10^5/mm³, 0.75 × 10^5/mm³, and 1.74 × 10^5/mm³, respectively). Meanwhile, qCRP peaked at 158.8 mg/dL and then trended downward to 84.6 mg/dL.

On day four, a blood culture reported the isolation of *Pantoea dispersa* after 19 hours of incubation. Identification and sensitivity testing on the Vitek 2 (bioMérieux, USA) system revealed susceptibility to a broad panel of antibiotics: ampicillin, amoxicillin-clavulanate, piperacillin-tazobactam-sulbactam, ceftazidime, cefepime, cefotaxime, amikacin, gentamicin, ciprofloxacin, and trimethoprim-sulfamethoxazole. These results confirmed the presence of a Gram-negative pathogen that was both unusual and, fortunately, broadly sensitive to key antimicrobials.

Given the clinical scenario of SAIO, severe anemia, and a newly diagnosed septic process, the child was initially managed with intravenous fluids (5% dextrose plus potassium chloride) to correct dehydration and electrolyte imbalances, and intravenous ceftriaxone 750 mg every 12 hours as empiric coverage for Gram-negative organisms. Oral intake was withheld to rest the bowel, and nasogastric decompression was continued. With the stabilization of GI symptoms, a cautious reintroduction of oral feeds was undertaken, and the child tolerated these adequately.

On day four of hospitalization, a single unit (150 mL) of packed red blood cells was transfused to address the severe anemia. Over the course of the next week, her clinical parameters improved, with subsidence of fever, alleviation of abdominal distension, and normalization of inflammatory markers. After seven days of intravenous antibiotic therapy and supportive measures, the child was discharged in stable condition, with a clear plan for outpatient follow-up.

Investigations

Complete Blood Count (CBC)

- **Day 1 (Admission):** Hb – 3.8 g/dL, TLC – 11,420/mm³, Platelets – 3.76 × 10^5/mm³
- **Subsequent Days:**

Day 3: TLC – 52,000/mm³, Platelets – 1.61 × 10^5/mm³

Day 5: TLC – 32,000/mm³, Platelets – 0.75 × 10^5/mm³

Day 6: TLC – 17,000/mm³, Platelets – 1.74 × 10^5/mm³

2. C-Reactive Protein (qCRP)

- **Day 1:** 0.5 mg/dL
- **Day 3:** 158.8 mg/dL
- **Day 5:** 84.6 mg/dL

2.Blood Culture (Day 4 of admission):

- Organism: *Pantoea dispersa*
- Antibiotic Susceptibility: Ampicillin, Amoxicillin-clavulanate, Piperacillin-tazobactam-sulbactam, Ceftazidime, Cefepime, Cefotaxime, Amikacin, Gentamicin, Ciprofloxacin, Trimethoprim-sulfamethoxazole

2. **Ultrasonography (Whole Abdomen):**

Grossly dilated bowel loops, particularly in the right flank (max caliber ~3.5 cm).

3. Chest X-Ray (Erect):

Dilated transverse and descending colon consistent with subacute intestinal obstruction.

3. **Electrolytes and Renal Function Tests:**

Initially within acceptable limits but closely monitored given risk of dehydration and potential electrolyte shifts.

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4. **Additional Stool Examination:**
Parents reported watery stools without blood/mucus. No pathogens identified on stool routine examination.

Differential Diagnosis
1.Infective Enterocolitis with secondary subacute obstruction:
While *Pantoea dispersa* is not a typical enteric pathogen, its isolation in the blood culture raises the possibility of translocation due to an intestinal barrier breach.

2.Partial or Subacute Intestinal Obstruction due to Intussusception or Adhesions:
No clear evidence on imaging of a classic intussusception lead point. No past surgical history that would suggest adhesions, though a partial malrotation or another anatomical variant could be considered.

1. Inflammatory Bowel Disease (Rare in this age group):
Chronic inflammatory changes can result in partial obstruction and systemic signs. However, the acute presentation and absence of previous similar episodes make this less likely.

Toxic Megacolon:
Usually associated with fulminant colitis or specific infections (e.g., Clostridioides difficile) and inflammatory conditions. The imaging findings and clinical context did not strongly support this.

Other Rare Infectious Etiologies:
Given the unusual organism isolated, other opportunistic pathogens were also considered, but the child showed clinical improvement once antibiotic therapy was initiated.

Treatment and Hospital Course
1.Supportive Care:
Intravenous fluids were started (5% dextrose with potassium supplementation) to correct possible dehydration and maintain electrolyte balance.

1. Antimicrobial Therapy:
Empiric coverage with IV ceftriaxone (750 mg every 12 hours)., Further antibiotic escalation or adjustment was not required due to an excellent initial response and the eventual culture results showing broad susceptibility.

2.Bowel Rest and Decompression:
Oral intake was withheld initially, and nasogastric decompression aided in relieving the SAIO symptoms.

3.Nutritional Rehabilitation:
Once GI symptoms improved, a stepwise reintroduction of oral feeds was undertaken. The child tolerated semisolid and fluid diets without recurrence of distension or diarrhea.

4.Blood Transfusion:
One unit of packed red blood cells (150 mL) was administered on day four to correct severe anemia (Hb: 3.8 g/dL).

5.Monitoring:
Serial CBC and CRP measurements guided clinical decisions. Improvement in leukocytosis and CRP signaled effective infection control, supporting the decision to continue the chosen antibiotic regimen.

6.Discharge and Follow-Up:
After seven days of hospitalization, with subsiding abdominal distension, improved hematological parameters, and normalizing inflammatory markers, the child was discharged. Parents were instructed to attend follow-up visits to assess weight gain, hemoglobin levels, and any signs of recurrent GI symptoms.

Discussion
Subacute intestinal obstruction (SAIO) in pediatric patients can pose a labyrinthine diagnostic challenge owing to the myriad of possible etiologies, ranging from congenital malformations to atypical infections. Diarrheal illness of extended duration, further complicated by GI obstruction, warrants a thorough exploration of both common and rare pathogens, alongside a high index of suspicion for partial volvulus, adhesions, or intussusception (1). The current case casts light on an uncommon interplay between a prolonged diarrheal state, the emergence of SAIO, and subsequent detection of *Pantoea dispersa* bacteremia in a three-year-old child.

Clinical Convergence of Diarrhea and SAIO
Persistent diarrhea in pediatric patients can lead to significant losses of fluids, electrolytes, and essential nutrients, which in turn might compromise the structural and immunological integrity of the intestinal mucosa (2). When the mucosal barrier is weakened, opportunistic organisms—whether they reside in the bowel or are ingested from the external environment—stand a greater chance of invading the bloodstream. Although episodes of watery diarrhea and abdominal distension can initially be attributed to routine childhood gastroenteritis, the prolonged nature of these symptoms (ten days in this case) and gradual development of distension highlight the need for advanced imaging and serial laboratory evaluations (3).
Ultrasonography and plain radiographs remain frontline diagnostic tools for discerning the extent of bowel dilation, presence of air-fluid levels, or potential lead points. These investigations can lend support to the clinical suspicion of a subacute rather than an acute obstruction. Early detection is

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imperative to facilitate prompt and minimally invasive interventions, as delays in diagnosing intestinal obstruction can lead to further complications like bowel ischemia or perforation (4).

Severe Anemia: Impact on Pediatric Outcomes

The strikingly low hemoglobin level (3.8 g/dL) in this patient underscores the magnified risk of morbidity when pediatric patients present with multi-systemic compromise. Severe anemia reduces oxygen-carrying capacity and can impose additional strain on hemodynamics, especially if dehydration or infection concurrently exists. Children with severe anemia are more prone to infections, as inadequate oxygen delivery affects cellular immunity, and reduced hemoglobin can dampen the capacity to mount effective immune responses (5). In low-resource regions or among populations where undernutrition is endemic, the synergy between anemia, diarrhea, and infection can be devastating, making active surveillance and prompt correction of anemia a cornerstone of pediatric care (6).

Pantoea dispersa as an Emerging Pathogen

Historically overlooked in clinical settings, *Pantoea* species are increasingly recognized as emerging pathogens in humans. They are Gram-negative bacilli closely related to *Enterobacter* and commonly found in plants, soil, and water. While *Pantoea agglomerans* is perhaps the best-known species implicated in human infections (e.g., septic arthritis following thorn pricks, contaminated IV fluids), *Pantoea dispersa* has also been isolated in diverse clinical situations ranging from bloodstream infections to neonatal sepsis (7). In the pediatric population, the immunological immaturity or co-existing states of malnutrition, anemia, or preterm birth complications can predispose to *Pantoea* infections.

Though not a conventional gastrointestinal pathogen, *Pantoea dispersa* can become pathogenic if it translocates from the gut lumen into the circulatory system. This translocation might occur in the presence of compromised mucosal barriers, whether from prolonged diarrhea, local inflammation, or invasive GI procedures (8). In this case, the progression from diarrhea to subacute obstruction could have elicited an abnormal local environment, favoring bacterial overgrowth or direct entry of bacteria into the bloodstream.

Antibiotic Susceptibility and Management

A critical aspect of this case was the organism's demonstrated susceptibility to multiple antibiotics, including cephalosporins, penicillins combined with beta-lactamase inhibitors, aminoglycosides, fluoroquinolones, and trimethoprim-sulfamethoxazole. Sensitivity to a broad panel of agents often simplifies the immediate choice of therapy. Nevertheless, clinicians must interpret such results within the broader framework of antibiotic stewardship. Overuse or inappropriate use of broad-spectrum antibiotics carries risks, such as the development of resistance in both the patient and the community at large (9).

The child's favorable response to ceftriaxone, which was chosen empirically, suggests that immediate and appropriately dosed empirical coverage remains a mainstay in severely ill pediatric patients while culture results are pending. Subsequent decisions on de-escalation to narrower-spectrum antibiotics, or continuation of the same agent until completion of a recommended duration, are grounded in culture data, clinical response, and local guidelines (10).

Balancing GI Management and Infectious Complications

The decision to withhold oral feeding initially is often employed in suspected cases of subacute obstruction to minimize bowel distension, reduce ongoing fluid losses, and allow the bowel to rest (11). This measure, coupled with intravenous fluid resuscitation and nasogastric decompression, can often stabilize children sufficiently until imaging clarifies the cause and severity of obstruction. In this scenario, the child's improvement enabled the cautious reintroduction of oral feeds, which she tolerated without aggravation of abdominal symptoms, pointing toward either resolution of the obstructive process or an inflammation-based partial obstruction that responded to conservative treatment.

Central to the child's recovery was also the timely transfusion of packed red blood cells, which addressed severe anemia. Correction of anemia not only enhances oxygen delivery to tissues but also supports the function of immunological cells pivotal for combating infection (12). Over time, the child's leukocyte count and inflammatory markers improved, hinting at an effective resolution of the septic insult.

Ethical Considerations and Pledge to Patient Safety

It is our collective responsibility to safeguard pediatric patients in every aspect of their care and management. In complicated cases such as this, a coordinated team effort—pediatrics, pediatric surgery, radiology, and microbiology—maximizes diagnostic accuracy and ensures timely intervention. The timely identification of unusual organisms underscores the importance of robust laboratory systems equipped with advanced diagnostic tools like Vitek 2.

Patient confidentiality is vigilantly respected, with all clinical data anonymized except for the minimal demographic details necessary for clarity. We pledge, as healthcare professionals, to sustain meticulous diagnostic protocols, to practice prudent antibiotic stewardship, and to uphold the highest standards of pediatric care and compassion (13). Ensuring that no step in the evaluation or management process compromises the child's welfare or privacy is central to quality healthcare provision (14).

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Future Directions and Areas of Research

The case of *Pantoea dispersa* bacteremia in a toddler with SAIO invites further exploration. Large-scale studies or registries documenting *Pantoea* species infections in pediatric populations may unravel risk factors that predispose children to these infections. Additionally, research into the molecular mechanisms by which *Pantoea* species cross the intestinal barrier could yield valuable insights into prophylactic strategies (15). Immunization against common GI pathogens, improved nutritional interventions to prevent severe anemia, and enhanced sanitation measures may collectively mitigate the risk of unusual bacterial translocations in vulnerable children (16).

On a broader scale, this case reiterates the necessity for multi-disciplinary collaboration. The synergy between acute management, laboratory vigilance, and supportive care contributed decisively to the child's recovery. Regional and international guidelines encourage clinicians to adopt a systematic approach when dealing with pediatric SAIO, emphasizing early imaging, timely operative or conservative management, and empiric antibiotic therapy tailored to local resistance patterns (17).

Conclusion

The presentation of a three-year-old child with persistent diarrhea, progressive abdominal distension, severe anemia, and eventual bacteremia due to *Pantoea dispersa* demonstrates the complexities inherent in pediatric GI disorders. The subacute nature of the intestinal obstruction required careful evaluation and swift management to avoid more severe complications. That the child improved with a relatively conservative management approach—IV fluids, nasogastric decompression, and empiric antibiotic therapy—also illustrates the importance of timely intervention and robust supportive care measures.

This case underscores multiple lessons: the significance of suspecting atypical pathogens, the importance of methodical investigation in cases of prolonged diarrhea, and the need for meticulous correction of comorbidities such as severe anemia. Ultimately, an integrated, multi-departmental approach facilitates prompt identification of the underlying cause, tailored therapeutic regimens, and expedient recovery of pediatric patients. Such case studies deepen our collective understanding and shape our clinical practice to ensure the best possible outcomes for children with complex GI and infectious challenges.

This extended case report provides a detailed illustration of the intricate dynamics that can unfold when a child presents with multifactorial GI pathology and an opportunistic bloodstream infection. From the prolonged diarrheal state progressing to subacute intestinal obstruction, and further complicated by the unexpected isolation of *Pantoea dispersa*, the case accentuates the importance of a thorough diagnostic workup, early imaging, strategic antibiotic use, and vigilant supportive care.

Severe anemia, noted in this patient, emerged as a significant comorbidity, impacting both the child's resilience to infection and overall clinical trajectory. The successful clinical resolution underscores the synergy of appropriate intravenous antibiotics, bowel decompression, and correction of anemia. In resource-limited settings, recognition of unusual pathogens demands both a keen clinical eye and robust laboratory capacities.

Future research directions may focus on large-scale data collection for unusual organisms like *Pantoea dispersa*, improved understanding of mucosal barrier breakdown in persistent diarrhea, and standardized protocols for early recognition of subacute obstructions. Each of these will collectively contribute to earlier interventions and better pediatric outcomes.

Pledge of Care: We, as part of the multidisciplinary team, reiterate our unwavering commitment to pediatric patient safety, privacy, and evidence-based medical practice. The lessons gleaned from this case further strengthen our resolve to remain vigilant against uncommon pathogens, to correct treatable comorbidities such as severe anemia, and to collaborate across specialties in pursuit of comprehensive, child-centered care.

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