

Pantoea agglomerans septicemia in a preterm neonate: A case report

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ABSTRACT

Neonatal sepsis remains a significant cause of morbidity and mortality, particularly in preterm infants. We present a case of late-onset sepsis caused by atypical pathogen *Pantoea agglomerans* in a 27-day-old preterm male neonate, following traditional head shaving and application of an herbal poultice. Blood culture using an automated system flagged positive within 24 h, and identification with VITEK 2 confirmed *P. agglomerans*. The isolate demonstrated broad susceptibility to beta-lactams and carbapenems, intermediate susceptibility to aminoglycosides, and resistance to ciprofloxacin. Empiric therapy was modified based on susceptibility results, resulting in clinical recovery. This case emphasizes the significance of detailed exposure history and recognition of unusual pathogens with rapid microbial diagnostics in neonatal sepsis. Awareness and consideration of traditional cultural practices as potential infection sources may facilitate earlier diagnosis and targeted therapy, improving outcomes in high-risk neonates.

Key words: Automated diagnostics, Neonatal infection, Neonatal sepsis, *Pantoea agglomerans*, Rare pathogen

Neonatal sepsis is a leading cause of morbidity and mortality worldwide, with particularly elevated risks for preterm and low-birth-weight infants.[1] South Asia continues to bear the highest burden of neonatal sepsis, with India reporting substantially higher incidence compared to global averages, with 153 sepsis-related deaths per 100,000 neonates in 2021.[2] Within this high-prevalence setting, atypical pathogens may be overlooked due to limitations in diagnostic capacity.

Pantoea agglomerans is a Gram-negative, facultative anaerobic bacillus, motile by peritrichous flagella, and belongs to the Enterobacterales. It is an environmental commensal found in soil and water and is primarily recognized as a plant pathogen.[3] Its recent emergence as an opportunistic pathogen in humans, particularly in immunocompromised hosts, has been documented in sepsis, catheter-related bloodstream infections, and meningitis.[4] It is also known to cause wound infections following penetrating injuries, often with plant material.[3] Due to its rarity in common clinical practice, recognition may be delayed.

This case describes a rare case of *P. agglomerans* causing neonatal sepsis, associated with exposure to plant material. Although numerous reports have documented *Pantoea* infections in neonates, these are

most commonly hospital-acquired, often linked to contaminated parenteral nutrition, intravenous fluids, or nosocomial outbreaks. In contrast, this case highlights a rare instance in which environmental exposure to plant material appears as the likely source of infection.

CASE REPORT


A 27-day-old male neonate presented with a 3-day history of fever, poor feeding, and decreased responsiveness. There was no history of seizures, respiratory distress, or diarrhea. Notably, 5 days before presentation, the infant underwent traditional head shaving, followed by application of an herbal poultice. The neonate was born pre-term, at 34 weeks through normal vaginal delivery to a 38-year-old G3P3L3 mother (blood group B, Rh-negative), who received anti-D immunoglobulin. The infant (B, Rh-positive) weighed 2.2 kg at birth, cried immediately after birth, and had no congenital anomalies. He was exclusively breastfed.

On admission, temperature of 99°F, SpO₂ of 94% on room air, and blood glucose level of 47 mg/dL were noted. Clinical examination revealed wasting, pallor, and a depressed anterior fontanelle, with preserved reflexes.

Further laboratory investigations indicated leukopenia, with a total leukocyte count of 2,100/mm³ and an elevated C-reactive protein (CRP) level of 32 mg/dL, serum sodium: 147 mEq/L, serum potassium: 5.8 mEq/L,

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serum creatinine: 0.4 mg/dL, and blood urea nitrogen: 127 mg/dL.

A provisional diagnosis of late-onset sepsis with failure to thrive was established. Blood and cerebrospinal fluid (CSF) were collected for further evaluation. Empiric therapy with intravenous meropenem (70 mg/kg q8h) and amikacin (25 mg IV q24h) was initiated. Supportive care included intravenous fluids and oxygen of 2 L/min through nasal prongs. Breastfeeding was encouraged and supplemented with formula feeds.

Blood and CSF samples were collected for microbiological evaluation. The blood sample was processed using the Bact/ALERT automated blood culture system (bioMérieux, France) and was flagged positive after 24 h of incubation at 37°C. The sample was subsequently subcultured onto blood agar and MacConkey agar. On blood agar, a significant growth of non-hemolytic, smooth, convex colonies was noted (Fig. 1a); MacConkey agar showed non-lactose fermenting, small, convex colonies (Fig. 1b). Gram stain from these colonies revealed non-sporing, non-encapsulated, Gram-negative bacilli, with an average thickness of 0.5 µm and average length of 2 µm (Fig. 2). The CSF sample showed no significant findings on microscopy and yielded no growth on culture, with pathological examination yielding normal findings.

Further identification of the isolated colonies was performed using the VITEK 2 system (bioMérieux, France) with ID card (REF 21341) and AST Card (REF 414531). *P. agglomerans* was identified as the causative agent with 98% probability. The antimicrobial

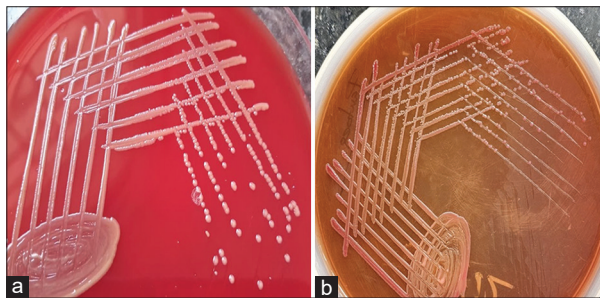


Figure 1: (a) Blood agar showing non-hemolytic, smooth, convex, yellow colonies of *Pantoea agglomerans*; (b) MacConkey agar showing small, convex, non-lactose-fermenting colonies of the isolate

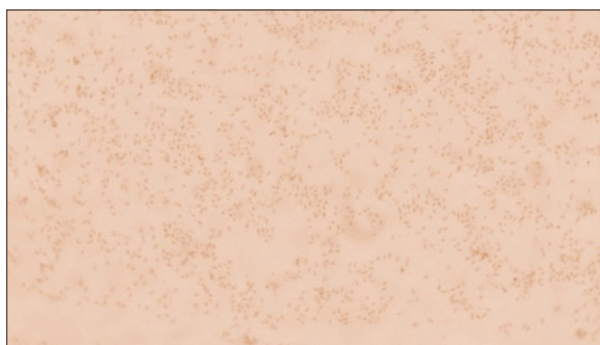


Figure 2: Gram-negative bacilli of *Pantoea agglomerans* observed on Gram stain under ×1000 magnification (oil immersion), measuring approximately 0.5 µm in width and 1–3 µm in length

susceptibility profile of the isolated *P. agglomerans* strain showed susceptibility to amoxicillin-clavulanic acid (MIC <1), piperacillin-tazobactam (MIC <2), cefuroxime (MIC <1), ceftriaxone (MIC <1), cefoperazone-sulbactam (MIC <4), cefepime (MIC <2), ertapenem (MIC <0.5), imipenem (MIC <1), meropenem (MIC <1), intermediate susceptibility to amikacin (MIC 6), gentamicin (MIC 6), and resistance to ciprofloxacin (MIC >2). Following the antimicrobial susceptibility results (Table 1), therapy was de-escalated to ceftriaxone, and amikacin was discontinued.

The infant showed marked clinical improvement, with resolution of fever and normalization of feeding. Laboratory parameters improved, with the total leukocyte count rising to 5,200/mm³ and CRP decreasing to 7 mg/dL. Weight increased from 3.0 kg at admission to 3.2 kg post-treatment. The patient was subsequently discharged from our care in stable condition.

DISCUSSION

P. agglomerans is primarily an environmental commensal and agricultural plant pathogen, frequently isolated from plants, soil, and water.[3] Human infections are uncommon, but increasingly recognized and documented.[4,5] Reported clinical manifestations of *P. agglomerans* include bacteremia, wound infections, and osteomyelitis.[6-8] The organism typically affects immunocompromised individuals, including pre-term and low birth weight neonates and patients with chronic kidney disease.[9,10] However, rare cases of infection in immunologically competent patients have also been documented, as reported by Shankari *et al.* in Gondia, Maharashtra.[11]

Neonatal infections are rare and are typically described in association with nosocomial outbreaks or contaminated parenteral nutrition. Only a limited number of sporadic cases of neonatal septicemia due to *P. agglomerans* have been reported in the literature.[7]

The application of an herbal poultice following head shaving represents a potential portal of entry for

Table 1: The antimicrobial susceptibility results of the patient

Antibiotic	Minimum inhibitory concentration (MIC) (µg/mL)	Inference
Amoxicillin-clavulanic acid	<1	Sensitive
Piperacillin-tazobactam	<2	Sensitive
Cefuroxime	<1	Sensitive
Ceftriaxone	<1	Sensitive
Cefoperazone-sulbactam	<4	Sensitive
Cefepime	<2	Sensitive
Ertapenem	<0.5	Sensitive
Imipenem	<1	Sensitive
Meropenem	<1	Sensitive
Amikacin	6	Intermediate
Gentamicin	6	Intermediate
Ciprofloxacin	>2	Resistant

this plant-associated organism. This emphasizes the importance of obtaining a detailed history, including cultural practices and environmental factors that might otherwise be overlooked. *P. agglomerans* naturally inhabits plant surfaces and soil, making herbal preparations a plausible vector for transmission.[3,6] This aligns with findings by Dutkiewicz *et al.*, who documented multiple cases of *P. agglomerans* infection following plant material exposure.[12] The traditional practice described in our case underscores the importance of considering cultural practices in infection risk assessment, especially in neonates.

Rapid automated diagnostic systems played a crucial role in early detection and organism identification, allowing prompt diagnosis and targeted therapy. This approach aligns with recommendations by Shane *et al.*, who emphasized that rapid diagnostics significantly improve outcomes in neonatal sepsis.[13] Kaur *et al.* found that while Gram-negative organisms predominate in neonatal sepsis in northern India, species-level identification is often limited to common pathogens, potentially missing atypical organisms like *P. agglomerans*. [14]

The antimicrobial susceptibility profile of the isolate revealed broad susceptibility to beta-lactams and carbapenems, with intermediate susceptibility to aminoglycosides and resistance to ciprofloxacin. This pattern is generally consistent with previous reports. Mallick *et al.* reported carbapenem-resistant *P. agglomerans* causing bacteremia in a tertiary care hospital in Kolkata, India, highlighting the importance of antimicrobial stewardship and susceptibility-guided therapy.[15]

Our case appears to be community-acquired but linked to a specific exposure event. The favorable outcome in our case, despite the patient's preterm status and low birth weight, may be attributed to several factors, which include rapid identification, appropriate empiric therapy, and susceptibility-guided de-escalation. Accurate identification of these rare yet significant pathogens is crucial for understanding their role in nosocomial and community-acquired infections, improving knowledge of their epidemiology and clinical impact. The successful management of this case demonstrates that with appropriate diagnostic methods and targeted therapy, favorable outcomes are achievable even in high-risk neonates.

CONCLUSION

This case highlights several critical aspects of neonatal sepsis management. A detailed history, encompassing cultural practices that might otherwise be overlooked, and consideration of atypical pathogens like *Pantoea* spp. in the differential diagnosis is crucial for guiding targeted

therapy, especially in infection-prone preterm neonates. The integration of automated diagnostic systems with timely microbiological testing facilitates rapid diagnosis and targeted treatment of neonatal sepsis, where early management is critical.

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