Infectious diseases

Fulminant Pertussis in infancy: The Critical Role of Clinical Acumen and Therapeutic Strategies - A case report

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Keywords

Bordetella • Whooping cough • Pertussis • Infant • Vaccination • Nigeria

Summary

Background. *Pertussis, also known as whooping cough, remains a significant cause of morbidity and mortality in early childhood, particularly in low- and middle-income countries (LMICs) with delayed vaccination schedules. Despite global immunization efforts, pertussis has re-emerged, presenting diagnostic and management challenges. Early recognition requires clinical acumen, as atypical presentations—especially fulminant cases—can mimic other respiratory conditions.*
Case Report. *This case report highlights a 9-week-old female infant with severe paroxysmal coughing and progressive respiratory distress, initially mismanaged due to delayed clinical suspicion and missed vaccination. Following appropriate antibiotic therapy and supportive measures, dramatic symptom resolution was observed. This case underscores the critical need for heightened awareness, rapid intervention, and strategic therapeutic approaches, particularly in vulnerable infant populations at risk for severe pertussis complications.*
Conclusion. *Persistent coughing, although a frequent clinical presentation in paediatric patients, requires an intuitive history and thorough evaluation to determine underlying etiologies. Accurate diagnosis of pertussis is essential for timely intervention, and prompt vaccination remains the most effective preventive measure.*

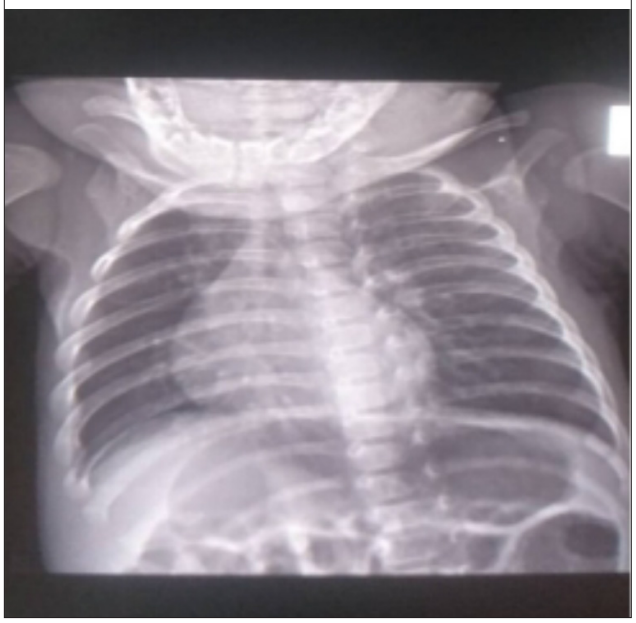
Introduction

Pertussis, commonly known as whooping cough, is a highly contagious respiratory infection caused by Bordetella pertussis [1]. It remains a major contributor to infant morbidity and mortality, particularly in low- and middle-income countries (LMICs), where diagnostic limitations and competing health priorities exacerbate the disease burden [2]. Infants under six months of age are disproportionately affected, accounting for approximately 10-15% of all reported pertussis cases, with over 90% of pertussis-related deaths occurring in this vulnerable group [3]. In Nigeria, routine pertussis vaccination does not commence until six weeks of age, leaving neonates and younger infants highly susceptible to severe infections [3]. This case highlights the critical need for earlier preventive strategies, improved diagnostic capacity, and timely therapeutic intervention in endemic regions. Additionally, it emphasizes the growing global resurgence of pertussis, even in high-income countries with strong vaccination programs, reinforcing the need for robust surveillance systems and enhanced vaccine strategies.

Case report

A 9-week-old female infant was brought to the hospital with progressive respiratory distress, paroxysmal coughing episodes, and cyanotic spells. The symptoms had evolved over several weeks with a prodrome of coryza that began six weeks prior to presentation, persistent machine-gun-like coughing that started five weeks earlier, and breathing difficulties that became apparent three weeks before admission. Fever was, however, not noted. The coughing episodes were paroxysmal, violent, and triggered by crying or feeding, occasional post-tussive vomiting, often culminating in cyanosis at their peak. A detailed immunization history revealed that the infant had missed a scheduled six-week vaccination for Pentavalent (DPT, Hep B, HiB), OPV1, Rota1, and PCV1 vaccines, as the child was ill and admitted at the time.
Initially, the mother administered home remedies for one week, including syrup Vitamin C, Paracetamol, and Probiotics. Later, at a private clinic, the child was admitted and nebulized with hypertonic saline and treated with Azithromycin, Cetirizine, Ketotifen, Prednisolone, and Montelukast. Relief of symptoms was transient with repeated episodes of fulminant paroxysmal cough, prompting referral to the teaching hospital.
Initial assessment at the Teaching Hospital showed an afebrile child with a body weight of 3,5 kg in a 9-week-old who was in obvious respiratory distress, with subcostal and substernal recessions and increased work of breathing. Her respiratory rate was 52 per minute, and oxygen saturation (SpO_2) was 97% in room air. Auscultation of

Fig. 1. AP view of patient Chest Radiography showing reticular shadows.



all lung zones had bronchovesicular breath sounds. The severity of the paroxysms was fulminant, with attendant central cyanosis, hypoxia, and apnea. Skin examination showed coalesced hypopigmented patches and papules on the scalp, neck, shoulders, and forearms. The remaining systemic examinations were unremarkable. The following diagnoses were considered: 1. Failure to thrive 2^0 Pertussis (R/o Bronchopneumonia and possibly cyanotic congenital heart disease) 2. Seborrheic dermatitis. Laboratory findings revealed an elevated peripheral white blood cell count of 13,480 cells/mm³ with lymphocytosis of 54.60% and thrombocytosis of 490,000 cells/mm³. The chest radiograph showed diffuse nodular reticular shadows with intact costophrenic angles. The test for HIV antibodies was negative, and echocardiography revealed a bicuspid aortic valve but no hemodynamic compromise, aortic stenosis, or coarctation.

Given the classical history of paroxysmal cough, the delayed immunization for up-to-date vaccination, and the relative lymphocytosis, Pertussis was strongly suspected. She was commenced on oral azithromycin while receiving intermittent intranasal oxygen support during paroxysmal episodes. A symptom-tracking chart was introduced for the mother to log paroxysms and cyanotic episodes. Within the week, the paroxysms reduced to a bare minimum, with resolution of cyanotic episodes. Before discharge, she was counseled on possible disease progression, vaccination importance, and home management strategies. All household contacts received Azithromycin prophylaxis to prevent further infections.

Discussion

Pertussis progresses through three clinical stages: the catarrhal stage, lasting one to two weeks and characterized by coryza, sneezing, mild cough, and low-grade fever; the paroxysmal stage, which lasts one to six weeks and involves rapid cough bursts, cyanosis, a high-pitched whoop, and possible vomiting; and the convalescent stage, which spans weeks to months and is marked by gradual recovery with persistent cough [4]. Our patient likely presented at the paroxysmal stage. Complications of pertussis can include pneumonia, subconjunctival haemorrhage, pulmonary hypertension and encephalopathy [5]. Other infections that present with similar complaints to pertussis are viral upper respiratory infection, bronchiolitis, pneumonia, and tuberculosis. The differentiating features however are the progression through the three stages and the persistent cough with mild or no fever [6].

Despite high vaccination coverage in many countries, pertussis continues to re-emerge worldwide [3]. In 2024, reported cases surged across the United States, with incidence six times higher than in 2023 [4]. In Nigeria, 11,281 cases were documented in 2009, ranking second globally [7].

Beyond clinical evaluation, various diagnostic approaches exist, including culture, which is the gold standard, polymerase chain reaction (PCR), which is a rapid method, and serology, which is particularly valuable in late-stage detection [8]. Unfortunately, in LMICs, limited accessibility and affordability make clinical evaluation with laboratory support the primary means of diagnosis, as seen in this case. The diagnostic challenges differ significantly between high-income countries and LMICs [9]. High-income countries benefit from advanced molecular techniques such as PCR and serology, which facilitate early and accurate diagnosis. LMICs, however, face limited access to PCR and culture, delayed clinical suspicion, and under-reporting, which often lead to missed or late diagnoses, contributing to higher mortality rates [9].

Approach considerations for treatment include supportive and pharmacological therapy [1]. Antibiotic options for management include Azithromycin, Clarithromycin, Erythromycin, and TMP-SMX (Septrin), alongside supportive care such as nutritional rehabilitation, oxygen therapy, and mechanical ventilation when indicated [1]. The goals of supportive therapy include limiting the number of paroxysms, observing the severity of cough, providing assistance when necessary, and maximizing nutrition, rest, and recovery and infants must be carefully observed for apnea, cyanosis, or hypoxia [1]. Antibiotics are of more value if administered early (1 or 2 weeks before the paroxysmal stage), but can still be used during the paroxysmal stage to hasten the eradication of *B. pertussis* and help prevent spread. They can also prevent or alleviate secondary bacterial infection [10].

The best way to prevent pertussis is through vaccination, using the three-dose primary series, diphtheria-tetanus-pertussis (DTP3). The world health organization (WHO) recommends the first dose be administered as early as 6 weeks of age; with subsequent doses given 4-8 weeks apart, at age 10-14 weeks and 14-18 weeks [11]. For the prognosis, most people infected with pertussis fully

recover, though this is usually after a prolonged illness that can span for months. Infants and older adults tend to have the highest mortality and morbidity, respectively. The infant death rate being about 2% of cases and accounting for 96% of pertussis-related deaths [6]. The index case however missed the timely immunization, which may have predisposed her to the infection.

Conclusion

Timely diagnosis and immunization are critical in pertussis management. Healthcare providers should maintain a high index of suspicion for pertussis in cases of persistent cough, even without typical fever. Early detection and intervention are vital to reducing mortality, particularly in neonates. Expanding diagnostic capabilities in LMICs, including accessible PCR testing, is strongly recommended. Vaccination policies should be advanced to start earlier in high-risk regions, and strengthening surveillance systems is essential to monitor and predict outbreaks.

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Conflict of interest statement

None.

Authors' contributions

OO: participated in patient management and data collection, drafted the initial manuscript and contributed to literature review; CFA: supervised clinical management and contributed to case analysis, and critically revised the manuscript for important intellectual content; ACA: provided senior clinical oversight and diagnostic guidance, reviewed and edited the final manuscript and approved the final version for submission.
All authors read and approved the final manuscript.

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