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Neonatal Pertussis: An Uncommon Cause of Respiratory Distress in Neonates: A Case Report

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Abstract:
The aetiology of cough during the neonatal period has primarily been an indication of a respiratory infection or pathology. What is not common is to consider pertussis as a differential considering neonates cannot and will not whoop after the cough paroxysm. However, with increasing incidence of pertussis, and the decline in strength of maternal antibodies against pertussis, cases of neonatal pertussis are no coming to light. While a neonate does not have the intrathoracic volume to whoop, they would characteristically go apneic following a coughing paroxysm. This case report details a case of neonatal pertussis managed at the Special Care Baby Unit of the University of Abuja Teaching Hospital, Gwagwalada, Federal Capital Territory.
Key Words:*Pertussis, cocooning, maternal dTAP immunization, macrolides.*

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I. Introduction

Pertussis also known as whooping cough, due to its characteristic whoop heard at the end of a cough paroxysm, is caused by the gram negative bacteria *Bordetella Pertusis*[1] It is a vaccine preventable illness for which vaccines were introduced as far back as the early 1950s[1].A significant percentage of cases are missed or misdiagnosed due to a low index of suspicion. And the severity of pertussis infection is inverse with age, i.e. the younger the infant,the greater the severity of illness[2].

Transmission of pertussis can occur through direct face-to-face contact, through sharing of a confined space, or through contact with oral, nasal, or respiratory secretions from an infected source[3]. Although mothers have historically been the most common source of transmission of pertussis to their infant, data from a study found that the most common source of transmission to infants is through their siblings[2]. Because of the lack of maternal immunity transfer, up to 25% of all cases of pertussis occur in infants younger than 6 months;and more than 90% of all deaths occur in this same age group[2].

The most common symptoms a pertussis patient presents are cough with or without paroxysms, cyanosis, apnea, tachypnea, difficulty in breathing and leukocytosis[4].

The criterion standard for diagnosis of pertussis is isolation of *B pertussis* in culture[5]. However, laboratory confirmation of pertussis is difficult and delayed. Therefore, clinicians need to make aclinical diagnosis of pertussis presumptively in patients with a history of intense paroxysmal coughing with or without whooping, color changes, post-tussive vomiting, incomplete or absent pertussis vaccination, and a finding of lymphocytosis on laboratory examination[5].

This case report describes a neonate who developed pertussis following exposure to siblings with same illness. The adequacy of history taking was able to make early clinical diagnosis and treatment possible, with positive outcome.

II. Case Summary

Baby AA was a 25 day old female neonate, who was delivered at a gestational age of 36 weeks, was presented by the parents with a three day history of paroxysmal cough which started insidiously but gradually worsened till day of presentation when child was noticed to develop cessation of breathing at the end of each cough paroxysm and bluish discolouration of the lips. Fast breathing, poor suck and post-tussive vomiting were also associated features. There was no history of exposure to an adult being managed for a chronic cough, however, there was a positive history of exposure to older siblings whom also had paroxysmal cough shortly after her birth, who however had already been seen at a hospital and were being managed for whooping cough with erythromycin. Siblings and newborn are said to stay in the same room and history of full vaccination of siblings were not given.Baby was being fed with breastmilk and breastmilk substitute. Baby has had BCG vaccine.

A clinical diagnosis of neonatal pertussis was made based on the presence of paroxysmal cough, apneicspells,and cyanosis. Pulse oximetry revealed SpO2 of 80 to 82% in room air. Child was immediately admitted and commenced on supplemental oxygen via nasal cannula. Also commenced on oral azithromycin at 10mg/kg for a duration of two weeks and initial intravenous fluids because of poor intake and repeated apnea. Investigations carried out included a pharyngeal swap for which regular blood agar culture revealed klebsiellaspp sensitive to cefuroxime and child was equally commenced on intravenous cefuroxime. Full blood count showed leukocytosis of 17.5x109/L; packed cell volume of 40% and platelets of 202x109/L. peripheral blood film was within normal limits. Malaria parasite was negative. Blood culture was also negative, chest Xray was reported as essentially normal.

Baby did well on above treatment and apneic episodes waned off by the 5th day on admission. Child was subsequently commenced on oral feeds and oxygen gradually weaned off. Baby developed a fever while on admission and was investigated and managed for neonatal malaria. Baby also had blood transfusion following a packed cell volume result of 26% after a week of admission. Cough was still present though gradually subsiding. Baby was subsequently discharged on the 36th day of life after being on admission for 11 days. Baby has since been seen at the follow up clinic and she is doing well.

III. Discussion

The rising incidence of whooping cough, a highly contagious infection caused by Bordetella pertussis, is particularly significant for young infants who have the highest risk for morbidity and mortality[6,7].The incidence of pertussis, despite the initial sharp decline noted in the early 1970s following introduction of the pertussis vaccine, has been noted to be on the rise again following a decay in the herd immunity necessitated by the switch from whole pertussis vaccine to acellular vaccine. An increase in cases among those less than two monthshas also been seen[2], as was shown in the case report above. To mitigate this alarming trend, extra protective methods of protection for children which will be effective before the first dose of pertussis vaccine at 6 weeks are being advised. These include the concept of cocooning, and maternal immunization[6].

The immunization of mothers and households immediately after delivery is the cocooning strategy, and this has been recommended to protect infants who are too young to be immunized[7].Similarly, since evidence exists that a tetanus-diphtheria-acellular pertussis immunization (Tdap) is safe and efficacious in protecting the newborn when administered during pregnancy, several countries also introduced the immunization of pregnant women,(between the 27th and the 36th weeks of gestation)[7].The vaccination is recommended in every pregnancy[8]. The efficacy of this strategy in protection of neonates from pertussis was studied recently in Korea where cocooning and maternal immunization in pregnancy has been being practiced since 2011[9].

Early identification and treatment of cases of pertussis is important to prevent neonates and infants from developing the severe form of the disease. Late introduction of antibiotic regimen may not significantly alter the course of the disease. Clinicians should strongly consider treating prior to test results if clinical history is strongly suggestive or patient is at risk for severe or complicated disease (e.g., infants). If a clinician diagnoses the patient late, antibiotics will not alter the course of the illness[10].

A Macrolide is the drug of choice for the treatment of Pertussis[11].For infants younger than 1 month of age, macrolides should be used with caution as an association between orally administered erythromycin and azithromycin with infantile hypertrophic pyloric stenosis (IHPS) has been reported[10]. However, azithromycin remains the drug of choice[11] for treatment or prophylaxis of pertussis in very young infants because the risk of developing severe pertussis and life-threatening complications outweigh the potential risk of IHPS[10].

Pertussis in the very young infant is not a diagnosis that is made commonly. In a recent two year retrospective study of infants diagnosed with pertussis in a hospital in Turkey[12], only 18 patients were managed within the study period, of which 94.4% were 2 months and younger. The median duration of cough before presentation was 4 (2-9) days, similar to our case. Fever, difficulty with feeding and respiratory distress were also significant findings. There was an additional history of lack of vaccination in families of the patient.They concluded that Infants who are too young to be protected by active immunization are more frequently admitted to PICUs with severe pertussis. Maternal immunization and the cocoon strategy may provide success in protecting this age group[12].

The Expanded Programme on Immunization (currently referred to as the National Programme on Immunization) introduced in Nigeria in 1978 saw an initial rise in immunization coverage to a peak of 81.5% in the early 1990s, but a significant drop has resulted in an immunization coverage of approximately 30% by 1996 and 12.9% by 2003[13]. Specific DPT3 antigen coverage stand at a national value of 67.73% as at 2019[14]. It may be of immense benefit to consider the practice of cocooning and maternal immunization in our environment to help boost neonatal protection against pertussis even beyond the neonatal age.

The vaccination status of the index patient in this case report were incomplete. This left them predisposed to the infection, and adequate protection was not offered to the new born, with the baby ultimately

coming down with the infection. However, early diagnosis and prompt institution of medications aided the prevention of progression to severe disease. Counselling of the parents was done and the importance of complete immunization profiles for children was clearly communicated.

Part of our limitations in management was the absence of the specialized agar (Bordet-Gengou) for nasopharyngeal swab culture and the unavailability of PCR studies for pertussis. However child responded based on clinical diagnosis.

IV. Conclusion

A high index of suspicion is required for babies presenting with cough, respiratory distress and intermittent apnea to consider pertussis as a possible differential, especially considering the poor immunization coverage, we being in a resource-poor setting with limited facilities for diagnosis and the ability of siblings to infect neonates. The introduction of cocooning strategy and maternal immunization against pertussis in third trimester may be of benefit to the newborn as a form of primary prevention.

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