

Malignant Pertussis in Saudi Infant, Case Report

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Abstract

Case Report

Pertussis is a highly contagious respiratory tract infection caused by *Bordetella pertussis* (BP) characterized by a severe and persistent whooping cough that affects individuals of all age groups, but a severe course occurs in unimmunized and partially malignant pertussis “which defined by one or more pneumonia, refractory hypoxemia and rapidly increase of WBC count (hyper-leukocytosis) which leads to pulmonary hypertension, intracranial hemorrhage, and cardiopulmonary compromise. We present a case report of Saudi infant with malignant pertussis with favorable outcome.

Keyword: *Bordetella pertussis*, Leukocytosis, Hyperleukocytosis.

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INTRODUCTION

Pertussis is a highly contagious respiratory tract infection caused by *Bordetella pertussis* (BP), gram-negative bacteria, prevented with a vaccine [1, 2]. It is characterized by a severe and persistent whooping cough that affects individuals of all age groups, but a severe course occurs in unimmunized and partially immunized infant and children [3]. Despite presenting of a vaccine, pertussis is a severe epidemic disease particularly in newborn <2 months old that cause significant morbidity and mortality [1, 4, 5]. Besides the whooping cough, pertussis in infants and young children is characterized by a significant increase in the number of circulating leukocytes (leukocytosis) [2].

CASE REPORT

2 Months old male Saudi infant presented with Cough and shortness of breathing for 1 week. Cough was paroxysmal, episodic. Patient has history of multiple visits to emergency due to same complain for past 1 week. No history of fever, no history of abnormal movement. No history of cyanosis, no history of change in bowel habits, no history of change in urine colour, smell or amount. No history of skin rash. No history of contact with sick patient. Antenatal history he is full-term, product of normal spontaneous vaginal delivery, Birth weight is 2.5 kilograms, no neonatal intensive care unit admission, no complications during

pregnancy. He was admitted 2 weeks prior to his current admission to general ward due to similar complaint as a case of pneumonia discharged on good condition. No past surgical history, no known allergies either to food or medication.

Developmental history: appropriate for his age. He was feeding on formula milk 40-60 milliliters every 3hours. Received only Birth vaccines. Parents were First degree relatives, father is 27 years old healthy and mother is 24 years old healthy.

On examination he was Active, alert, well hydrated, in mild respiratory distress. His Growth parameter within normal limits. Vital signs: temperature: 37 Respiratory rate: 50 per minute Oxygen Saturation: 95% on 1Liter/min Nasal cannula.

Regarding Respiratory system he had Good equal bilateral air entry with crepitations on right side. Cardiovascular Gastroenterology and Central nervous systems examination were unremarkable. Investigations Reveled Complte blood count showed significant leukocytosis (Table 1). Kidney function test and Liver function test were within the normal range. Chest X ray showed right sided infiltration (figure2).

Patient was admitted to the general pediatric ward as a case of bronchopneumonia and was started on

cefotaxime and nebulizations, after one day the condition of the baby became worse, the cough became more paroxysmal with frothy sputum and crepitations all over the chest. He was transferred to pediatric intensive care unit and Complete blood count repeated serially (Table 1).

Patient was intubated, clarithromycin and vancomycin were added, central line was inserted and Exchange transfusion was done.

Fig-1: Serial of complete blood count during admission

Test name	At admission	Before first exchange transfusion	After first exchange transfusion	18 hours After first exchange transfusion	After second exchange transfusion
White blood cells	43.82	81.34	22.9	59.31	19.9
Hemoglobin	10.4	9.9	9.7	10.2	10.8
Mean corpuscular volume	94.8	94.9	82.7	76.9	76.8
Mean corpuscular hemoglobin	31.8	31.5	25.5	26.2	26.4
Platelets	448	459	94	136	43
Neutrophil	30.8 %	44.8 %	55.7 %	58.4 %	60 %
Lymphocytes	57.6%	45.1 %	35.9 %	27.9 %	26.8%



Fig-2: Right sided chest infiltration suggestive of pneumonia

Complete blood count monitor was every 6 hours. Exchange transfusion was done for the second time. Nasopharyngeal swab came positive for bordetella pertussis. Blood culture and sensitivity came negative.

White blood cells after that raised to 33.3 then decreased to 24 and stayed in the same level for the next 5 days. Patient was extubated then transferred to the general pediatric ward and discharged home in good condition after 1 week.

DISCUSSION

Many children with pertussis who admitted to hospital or PICU experience apnea and desaturation episodes, they usually follow by benign course. In some cases, patients will develop a severe course “malignant pertussis” which defined by one or more pneumonia, refractory hypoxemia and rapidly increase of WBC count (hyper-leukocytosis) which leads to pulmonary hypertension, intracranial hemorrhage, and cardiopulmonary compromise[5, 3].

Leukocytosis in a patient with pertussis was first described in 1898, and as it presents in most cases, it is considered to be a diagnostic value [2]. Furthermore, lymphocytosis (increasing percentage of lymphocytes among circulating leukocytes) is also presented and describes pertussis [2]. Leukocytosis reaction is produced by BP toxin, but the exact mechanisms are not clearly understood [5]. Some studies found that the most probable mechanism of leukocytosis induced by BP toxin is inhibition of lymphocyte extravasation [4]. In addition to leukocytosis, BP toxin inhibits many G proteins that have a protective effect on the cardiopulmonary system which explains the rapid increase in pulse and respiratory rate in patient with pertussis. One study suggested that leukocytosis is a marker of BP toxin activity and G proteins inhibition in heart and lungs lead to developing heart and respiratory failure that end to death in young infants [6]. Leukocytosis with lymphocytosis is strongly related to pertussis infection, especially in young infants, although the timing of

measurement versus the beginning of infection and disease can affect the diagnostic value of this finding [2]. Hyperleukocytosis is suggested as a predictor of severe pertussis infection which associated with the fatal outcome especially when accompanied by low birth weight, prematurity age, seizure during infection and pulmonary hypertension [1].

Early recognition of predictors that increasing the chance to develop malignant pertussis in young children with suspected or confirmed pertussis may facilitate early referral to PICU for advanced life support and limited the complication and fatal outcome[3,7]. According to several studies, the most severe form of pertussis occur in young infant < 2-month-old who are ineligible to receive pertussis vaccine. Additional factors associated with an increased risk of malignant pertussis are fever, coinfection, and history of prematurity [7]. One study focused on clinical predictors that present in the first 48 hours of hospital presentation. Young infant will experience malignant pertussis if there is increasing in heart rate and temperature or increasing in leukocyte count, lymphocyte count, neutrophil count, NL ratio or presence of one or more of a heart rate greater than 180 beats/min, a total WBC count greater than $25 \times 10^9/L$, and NL ratio greater than 1.0⁽³⁾. Several studies and case reports showed that there is no effective treatment for malignant pertussis.

Patients with malignant pertussis are managed mainly with supportive care, macrolide antibiotics, and broad-spectrum antibiotics. Antibiotic therapy knowing as the first line treatment with airway management and

other supportive care. Invasive leukoreduction procedure has been associated with a high mortality rate and complications [1, 5].

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