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Case Report

Suspected meningitis with fulminant septic shock due to community-acquired *Achromobacter xylosoxidans* in an immunocompetent child: A case report

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ABSTRACT

Septic shock is the most life-threatening complication of sepsis where the underlying circulatory and cellular/metabolic abnormalities are profound enough to substantially increase mortality. It is characterized by circulatory failure manifested by tachycardia, low blood pressure, and other features of organ failure. Septic shock is still one of the leading causes of Intensive Care Unit (ICU) admissions both in adult and pediatric age groups where the causative agents most commonly are Gram-negative enterobacteriaceae, Gram-positive cocci, and Gram-negative diplococci (meningococci). *Achromobacter xylosoxidans* is a Gram-negative bacilli rarely associated with human infection especially in children. It is mostly associated with catheter-related blood stream infections as well as arthritis and osteomyelitis secondary to open fractures, meningitis mostly in the neonatal period, peritonitis, and chronic otitis media. In the present paper, a case of fulminant septic shock with suspected meningitis in a 5-year-old girl where the blood culture revealed the growth of *Achromobacter xylosoxidans* which is very rarely associated with community-acquired human infection was presented.

Key words: Septic shock, *Achromobacter*, Infection, Immunocompetent

INTRODUCTION

Achromobacter xylosoxidans, formerly called *Alcaligenes xylosoxidans* is an aerobic, motile, catalase- and oxidase-positive, lactose non-fermenting, Gram-negative bacillus. The recent classification of the bacteria denotes two subspecies namely denitrificans and xylosoxidans.[1] Bacterial infection with *Achromobacter xylosoxidans* is thought to occur mostly in children who have central venous catheters,[2] shunts,[3] and peritoneal dialysis catheters[4] and is associated with high mortality. Infection in children with *Achromobacter xylosoxidans* have included bacteremia, meningitis, urinary tract infections, abscess, osteomyelitis, prosthetic valve endocarditis, peritonitis, and pneumonia in immunocompromised and immunocompetent hosts as well, mostly as nosocomial infection.[4] Our index case is a 5-year-old immunocompetent girl who developed community-acquired *Achromobacter xylosoxidans* sepsis and ultimately succumbed.

CASE REPORT

A 5-year-old girl was admitted to our hospital in a drowsy state with high grade fever, abnormal twitching movements of the face along with incontinence of bladder and bowel. She had history of high grade intermittent fever for the last 15 days associated with headache and non-bilious vomiting during the episodes of fever. The frequency of vomiting had increased since last 7 days and the child became drowsy 3–4 h before admission to our hospital. On examination, child was drowsy (GCS – 8/15), HR – 180/min, pulse volume was low and thready in character, BP – 80/50 mm of Hg, RR – 34/min, CBG – 106 mg/dl, temperature – 102.6°F, oral mucosa – dry, skin pinch > 3 s. Neurological examination revealed pupils – B/L equal in size and reacting to light, tone – increased in all four limbs with lower limbs > upper limbs, DTR was exaggerated in all the limbs, superficial reflexes – diminished, Plantar – B/L withdrawal response. Liver was 2 cm below the right costal margin in MCL.

The child was immediately shifted to PICU, airway was secured, adequate oxygenation was maintained, and normal saline boluses were given. Temperature was immediately brought down to normal with antipyretics and hydrotherapy. Active convulsions started which were controlled with intravenous bolus doses of lorazepam followed by loading dose of intravenous fosphenytoin. Blood was drawn for routine investigations and culture, then the child was started empirically on intravenous Ceftriaxone. Head end of the bed raised to 30° with head in midline position. Briefly, 3% NaCl infusion was also started to reduce the intracranial tension. Despite the initial fluid boluses the pulse volume was still low, hence an arterial access was done which showed BP – 60/40 mm of Hg. Dopamine infusion was started. In view of deteriorating respiratory pattern and poor GCS (7/15) after 1 h of admission, the child was intubated and put on mechanical ventilation in volume control mode. Mild hyperventilation with pCO_2 around 35–40 mmHg was targeted.

As the BP was persistently low and the dose of dopamine infusion had to be rapidly excalated, central venous line access was performed and the child was started on adrenaline followed by noradrenaline. Maintenance dose of intravenous fosphenyoin was continued.

Initial blood reports revealed Hb – 7.9 g/dl, TLC – 10,900/cmm (N84L14), platelets – 164,000, CRP – 320 mg/dl. Serum Na – 120 mg/dl, Ca – 7.9 g/dl, K – 3.7 g/dl. RFT was normal, LFT was normal except SGOT – 395 g/dl, LDH – 1273 IU/L. Briefly, 3% NaCl infusion was increased with the target Na level around 150 mg/dl. Routine serology for HIV was negative and CSF study could not be performed due to extremely fragile condition of the baby. The condition of the child continued to deteriorate over the hours and the antibiotics were upgraded to Meropenem and Vancomycin .The ventilator settings as well as doses of the inotropes had to be increased. After 8 h of PICU admission, the child had a sudden cardiac arrest from which the child could not be revived back despite our best resuscitative efforts. Briefly, 3 days later the blood culture reports came which yielded the growth of quite a rare organism called *Achromobacter xylosoxidans* which was found to be resistant to all cephalosporins, aminoglycosides, fluroquinolones and susceptible to piperacillin-tazobactum and Carbapenems.

DISCUSSION

Achromobacter xylosoxidans is a Gram-negative, aerobic, motile, oxidase- and catalase-positive, non-lactose fermenting bacillus that grows well in MacConkey agar medium.[5] In the community this organism has been recovered mainly from the water sources.[6] *Achromobacter xylosoxidans* has been well described in cancer patients[7] and occasionally in other immunodeficiency states resulting in a wide variety of illness including pneumonia,[8] meningitis,[9] and urinary tract infection.[10] Manifestations in children include chronic purulent otitis media, arthritis and osteomyelitis secondary to open fractures of the tibia,[12] and peritonitis because of peritoneal dialysis catheters.[4,13] Catheter-associated bacteremia has also been described in a few children with cancer[7] and with AIDS.[2] Meningitis is a frequent manifestation of *Achromobacter* infection in neonates resulting in ventriculitis and a high mortality.[9,11] Most cases in the neonatal period occurred in preterm or LBW babies. Nosocomial transmission is the usual mode of acquisition of *Achromobacter xylosoxidans* in the nursery although a case of well-documented perinatal transmission has been described.[14] In immunocompetent children *Achromobacter* can be isolated from throat or stools not being responsible for illness. It is regarded as an unusual and rare pathogen in nosocomial infection and that too in the immunocompromised. Bacteremia in our patient was diagnosed on the basis of blood culture report that was positive after 72 h of incubation and it was never suspected initially as the baby came from the community and was apparently immunocompetent. The pattern of susceptibilities of *Achromobacter xylosoxidans* to antibiotics is different to most Gram-negative rods. It has been suggested that a combination of antibiotics might be superior to a single antimicrobial based on some data showing that sometimes the antibiotics with good activity may not be bactericidal.[15] Because of scars reported experience on this infection, it is not possible to draw conclusions about the best treatment options and therapy must be individualized based mainly on the underlying disease and the site of infection. In recent years the incidence of infection due to *Achromobacter xylosoxidans* has increased along with placement of indwelling catheters and increase in the number of immunocompromised patients. Since the differentiation of *Achromobacter xylosoxidans* from other non-fermenting Gram-negative rods can be difficult, an accurate identification is necessary as the response to conventional antibiotics can be inadequate. In conclusion, *Achromobacter xylosoxidans* is a relatively new bacterium that may be pathogenic mostly in immunocompromised hosts in whom it may cause severe infections and mortality. The rarity in our case lies in this fact that the infection happened in the baby who was apparently immunocompetent and acquired from the community. Our findings further expand the knowledge about the clinical spectrum of infections by this rare but important opportunistic pathogen.

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