Pyogenic brain abscess caused by Serratia marcescens in a Brazilian premature neonate: case report

Abscesso cerebral piogênico por Serratia marcescens em um recém-nascido prematuro: relato de caso

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RESUMO
O abscesso cerebral configura-se como uma grave doença infeciosa do sistema nervoso central ainda associada a significativa morbidade e mortalidade apesar dos avanços neurocirúrgicos, de neuroimagem, cuidados médicos intensivos e antibióticos. O tratamento do abscesso cerebral normalmente envolve a drenagem cirúrgica, antibioticoterapia apropria e direcionada ao agente principal e erradicação do foco primário. Embora incommuns na população pediátrica, os abscessos cerebrais apresentam uma importância particular na esta faixa etária devido as potenciais conseqüências neurológicas devastadoras, especialmente nos prematuros. O objetivo deste trabalho é relatar o caso de uma recém-nascido prematuro brasileiro com abscesso cerebral causado por Serratia marcescens e discutir as abordagens diagnósticas e terapêuticas. A suspeita precoce, o diagnóstico apropriado e a imediata avaliação neurocirúrgica associados ao tratamento antibiótico adequado e de amplo espectro representam os passos essenciais para o manejo adequado e seguro de pacientes pediátricos de elevado risco.

Palavras-chave: abscesso cerebral piogênico; Serratia marcescens; recém-nascido prematuro.

ABSTRACT
Bacterial brain abscess remain a serious central nervous system infectious disorder despite advances in neurosurgical, neuroimaging, clinical support on intensive care units, microbiological techniques and availability of new antibiotics. The successful treatment of brain abscess usually requires surgery, appropriate antibiotic therapy and eradication of the primary source. Although uncommon, brain abscesses are particularly important in the pediatric population due to its devastating potential to cause severe neurologic deficits, especially in preterm newborns. The purpose of the present report is to describe the case of a Brazilian premature neonate with pyogenic brain abscesses caused by Serratia marcescens and to discuss therapeutic and diagnostic approaches. The early suspicion, proper diagnostic measures and immediate neurosurgical consultation associated with aggressive antibiotic therapy seem to be the essentials steps on the management for those high-risk pediatric patients.

Key words: pyogenic brain abscess; Serratia marcescens; premature neonate.
INTRODUCTION

Brain abscess is a serious life-threatening intraparenchymal infectious disease of the central nervous system (CNS), usually coming from local or remote infectious sources. It is extremely uncommon during childhood with about 25% of all brain abscesses occurring in children, mostly in the 4- to 7-years of age group. The most frequently identified organism is Streptococcus spp. in most international series. However, brain abscess has been rarely described in preterm newborns and few reports exist on English medical literature pointing Serratia marcescens as the causative agent on those high-risk pediatric patients.

The aim of the present report is to describe the case of a Brazilian premature neonate presenting with pyogenic brain abscesses caused by Serratia marcescens in our neonatal intensive care unit (NICU) and to perform a concise literature review discussing the potential risk factor involved, diagnostic measures and therapeutic possibilities.

CASE REPORT

A male was delivered by cesarean section at 32 weeks of gestation with a weight of 1985g. The gestational period was uneventful and the mother was being followed regularly by an obstetrician who identified no metabolic, infectious or hemorrhagic complications during all appointments. On the first day of life, the patient presented shortness of breath and chest discomfort. He was found to be cyanotic and blood oxygen saturation maintained around 78% and 82% despite the use of artificial respiratory ventilation with continuous positive airway pressure (CPAP). The patient underwent mechanical ventilation and surfactant associated with empiric antibiotic therapy (Penicillin and Gentamicin) were initiated. He presented a good clinical recovery of the respiratory distress and was extubated on the fifth day of life, however could not be maintained without CPAP. An atrial septal defect was also identified on day 4 during echocardiogram examination.

On day 11, the patients presented with fever, tachypnea and reduced activity on bed. Blood culture yielded Serratia marcescens and antibiotics were changed to Meropenem, according to in vitro sensibility assays. Over the next nine days, his general clinical conditions gradually improved. However, on day 21, the infant became febrile again and laboratorial studies revealed C-reactive protein and leukocyte count increased. Cerebrospinal fluid examination yielded 65 cells, elevated protein and low glucose. Cerebral ultrasound exam performed on day 24 revealed the presence of a large heterogeneous mass on the right frontal lobe. Magnetic resonance imaging (MRI) of the brain showed a right frontal lobe lesion (3.6x6.4cm), with regular gadolinium-enhancing boards and water restriction on Diffusion-Weighted MRI (Fig. 1 and 2). Spectroscopy revealed lipid content on the lesion (Fig. 3). Neurosurgical consultation was immediately obtained and abscess drainage was performed by direct needle aspiration. Culture of abscess fluid also revealed Serratia marcescens with similar sensibility spectrum to antibiotics. Once again the infant presented improvement of general clinical conditions and an uneventful remaining clinical course.

Figure 1. Sagital (A) and coronal (B) brain MRI showing right frontal lobe abscess.

Figure 2. Diffusion-Weighted brain MRI showing restriction on the right frontal lobe.
Brain abscess is a serious life-threatening condition characterized as a focal infection of the brain parenchyma, commonly caused by bacterial, fungal, and parasitic pathogens. It affects more men than women and the majority of cases occur between the second and fourth decade of life. Most patients have a demonstrable infectious source leading to the intracranial suppuration and chronic otitis media has been found as the main source of microorganism in most cases and streptococci seems to be the most common agent isolated from cultures of the purulent material obtained during surgical drainage. However, brain abscess in premature neonates is a rare condition and few reports exist in English literature pointing Serratia marcescens as the causative agent.

According to a revision made by Honda and colleagues (2009), the etiological agent of brain abscess varies considerably, however streptococci are the most common cause of pyogenic brain abscess due to the contiguous spread of infection from the oropharynx, middle ear and parasal sinus. In Brazil, both Staphylococcus spp. and Streptococcus spp. seem to be the most common agents in pediatric population. Serratia marcescens, a Gram-negative opportunistic bacterium, is considered an unusual cause of pyogenic brain abscess in premature neonate. It has been originally described by Bizio, in 1823, and was initially considered non-pathogenic to man; however, due to the many reports of Serratia marcescens outbreaks, particularly in neonatal and pediatric intensive care units, it turned particularly alarming, since septic patients have very high morbidity and mortality rates. In the present report, the patient was maintained in NICU due to important respiratory distress and presented with Serratia marcescens brain abscess on the twenty fourth day. It seems reasonable to believe that immunology immaturity and fragility of premature neonate may contribute to CNS spread of bacterial agents in septic patients.

Some studies describe congenital heart diseases as the leading underlying condition in pediatric patients with brain abscess, after prematurity. Tetralogy of Fallot and transposition of great vessels are the most commonly cited predisposing factors between all congenital heart diseases. However, atrial septal defect is an unusual predisposing factor for development of brain abscess in the pediatric population, accounting for about 2% of all predisposing causes. The right-to-left shunt is well-known to be associated with systemic desaturation and paradoxical embolization which would allow septic microemboli to pass through the pulmonary circulation and avoiding the normal pulmonary capillary filter, thereby affording direct access to cerebral circulation. We believe that, in the present report, the congenital heart disease also facilitated the hematological spread of the opportunistic systemic bacterial infection by Serratia marcescens to the CNS.

The therapeutic management of premature neonatal patients with brain abscess requires a multidisciplinary approach involving intensivists, neurosurgeons, radiologists and infectious diseases specialists. Treatment with broad-spectrum intravenous antibiotics and early neurosurgical drainage performed by experienced hands seems to be the most effective approach in patients with stable clinical conditions. In the present report, we performed percutaneous drainage of the abscess and used Meropenem as antibiotic therapy, according to the antimicrobial susceptibility of Serratia marcescens. Our patient presented with a good clinical recovery and is currently being followed on outpatient appointments.

In conclusion, the present report highlights Serratia marcescens as an important agent of brain abscess in premature newborn patients in neonatal intensive care units and the early suspicion, proper diagnostic measures and immediate neurosurgical consultation associated with aggressive antibiotic therapy seems to be the essentials steps on the management for those high-risk pediatric patients.
REFERENCES


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