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Article

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Successfully treated multiple brain abscess in a newborn: a case report

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Abstract: Multiple brain abscesses are exceedingly uncommon in newborns and represent a serious medical problem associated with high morbidity and mortality. Treatment is also controversial issue, and can require surgery, abscess aspiration, antibiotic therapy, and eradication of the primary source. We report a case of successfully treated multiple brain abscess in a newborn with combined therapy which consisted of abscess aspiration and prolonged antibiotics. Patient developed hydrocephalus as late complication which was also successfully treated with ventriculoperitoneal shunt.
Key words: multiple brain abscesses, neonates, infants

Introduction

Brain abscess in newborns is a very rare disease and despite advances in neurosurgical, neuroradiological, and microbiological techniques, as well as the availability of new antibiotics, still remains a serious medical problem associated with high mortality and clinically significant neurological morbidity (1, 2). Brain abscess represents cerebral infection that started as a localized area of cerebritis, after which becomes a pus collection surrounded by well vascularized capsule (1). Cerebral abscess can be single or multiple (3). Treatment of brain abscess is controversial issue, and can require surgery, abscess aspiration, antibiotic therapy, and eradication of the primary source. Young patients, especially infants with multiple or large abscesses have unfavorable outcome (4). We present a case of successfully treated newborn with multiple cerebral abscesses.

Case report

We present a case of male infant, referred to our neonatology department, 24 days after birth, from another clinic for further treatment of suspected multiple brain abscesses. The infant was delivered vaginally as a fourth child from healthy father and mother with previous medical history of hypothyroidism treated with PTU and high-grade fever for 10 days before delivery. Apgar

scores at 1 and 5 minutes were 8 and 9 respectively. Patient had a history of admission to the neonatal intensive care unit in another hospital the second day after birth due to lethargy and fever (38.3C). At that time, laboratory findings showed polycythemia (Hb >225 g/dl, Hct >68% in capillary blood sample) and unconjugated hyperbilirubinemia (280 micromol/L), so phototherapy was started. During the 6 day of life he was still adynamic and presented shortness of breath and chest discomfort. He was cyanotic and blood oxygen saturation maintained around 78% and 82%. The anterior fontanel was prominent and suture lines were widened. Patient had septic appearance. The sepsis screen showed leukopenia (total leukocyte count 4200/mm, absolute neutrophil count 1450/mm) and raised C-reactive protein (84 mg/dL). Chest X-ray and echocardiography showed normal findings. Results of cerebrospinal fluid study were suggestive of bacterial meningitis (WBC 1890/mm3, hypoglycorrhachia 1,8 mmol/l, proteinorrhagia 34 g/l), and empiric antibiotic therapy (ceftriaxone, amikacin, amplicillin) was initiated. During the next day patient had focal epileptic seizure with secondary generalization. Blood and CSF culture were sterile. However, urine culture was positive for Proteus mirabillis, and antibiotics were changed to meropenem and ciprofloxacin due to antibiogram. On the same day, the cranial ultrasonogram showed multiple bilateral cystic formations with blurred content, indicative for brain abscesses. Also, diffuse brain edema was noted. The brain computed tomography (CT) showed multiple well-circumscribed mass lesions with surrounding edema, with the midline shifting to the right, which was consistent with multiple brain abscesses (Figure 1). Following the CT result, neurosurgery consultation was performed in our hospital, which resulted in the decision of abscesses drainage, which was immediately performed under ultrasound guidance. The microbiological examination and culture of obtained cysts material were sterile. In the following period, the patient was well with no neurological abnormalities. However, on the 30th day after birth, patient become febrile again (38,2C) and the sepsis screening showed increased CRP (72 mg/l). The patient's head circumference was 36 cm. Control lumbar puncture was not performed because the patient was receiving an antibiotic regimen and there was a risk of brain shift. Urine culture again revealed Proteus mirabilis, so the same antibiotic therapy was continued. On day 34, the neurological examination was normal. Antibiotic therapy was continued for six weeks, and oral cefalexin was prescribed upon discharge. The patient's neurological examination was normal at discharge. A cranial MRI performed at 4 months revealed multiple bilateral abscesses in recovery, but with significant lateral and third ventriculomegaly. Since hydrocephalus was diagnosed, following the MRI result, a neurosurgery consultation resulted in ventriculo-peritoneal shunt insertion. Antibiotic therapy was also continued. Postoperative control CT scan showed regression of brain abscesses (Figure 2). Ultrasonographic follow-up was performed weekly, and lesions became cystic and decreased after day 50. On the last check-up patient had no neurological deficit.

Figure 1 - Brain CT scan showing multiple brain abscesses with the midline shifting to the right

Figure 2 - Control CT scan

Discussion

Cerebral abscesses are uncommon in infants and the treatment of such brain lesions is still in debate, despite many advances in neuroimaging, neurosurgical and microbiological techniques, as well as the availability of new antibiotics (4, 5). High morbidity and mortality of cerebral abscesses necessitates finding appropriate diagnostic and therapy methods (6). In the study of Sharma et al, mortality in patients with multiple pyogenic brain abscesses is 32% (7). We reported a good outcome in patient treated with antibiotics and ultrasound guided aspiration with full neurological recovery, without seizures or infections after hospital discharge. Control MRI performed at the end of the second year showed no signs of any abscesses recurrence.

Although similar to other space-occupying lesions (like neoplasm), brain abscesses symptoms tend to be more rapidly progressive. Infants usually present with combination of poor feeding, vomiting, irritability or lethargy, seizures, prominent fontanel and sometimes enlarging head circumference with widening of suture lines (8). In our case, clinical presentation was in accordance with mentioned symptoms. However, our patient had early respiratory discomfort with an oxygen saturation drop. Although often described as late onset complication (9), respiratory discomfort can be present at the early stage of disease, as seen in our case.

Most common cause of brain abscess in neonates are meningitis and septicemia. In the

study of Reiner et al. which included 30 patients, brain abscess was found in 20 patients with meningitis, and 13 patients with septicemia (6). Rarely abscess can be a complication of head trauma, congenital heart disease, or shunt surgery. Multiple abscesses are more frequent in immunocompromised patients. Most common causes of meningitis and abscess in infants are Proteus mirabillis and Seratia marcescens (10-12). In our case blood, CSF and aspiration material culture were sterile, but urine culture was positive for Proteus mirabillis, so antibiotics were given according to this results.

According to many authors, CT and MRI are the best diagnostic procedures in patients with multiple brain abscesses (13). However, according to Anca et al, ultrasound examination seems to be more effective tool than CT and MRI, and they strongly suggest that all patients under 6 months of age with suspected or diagnosed bacterial meningitis undergo ultrasound transfontanelar examination followed by CT and/or MRI (9). Also, besides being excellent tool for initial diagnosis, it is recommended for follow-ups (9, 14, 15). In our case, clinical presentation raised suspicion of central nervous system involvement, and ultrasound examination indicated presence of brain abscesses, and definitive diagnosis was confirmed with CT and MRI afterwards. Taking into account the ease of use and its high accuracy, we propose ultrasound examination as the first diagnostic tool in infants with suspected bacterial meningitis or brain abscess, followed with MRI as a second imagistic tool. However, since differentiation between an ischemic lesion and an abscess in the early phase of development is sometimes difficult with ultrasound, and if clinical data and findings are not sufficient for diagnosis, CT scan should be performed (16).

Treatment of this rare and devastating condition still remains a challenge. The majority of authors agree that combined therapy with surgical drainage or aspiration with specific antibiotics is basic treatment protocol (17, 18). Mamelak et al, suggest the aggressive surgical drainage of all abscesses larger than 25 mm in diameter, combined with 6 – 8 weeks of antibiotics (17). Also the indications of surgery, as well as the type of surgery are still subject of much debate among neurosurgeons (19). The choice of procedure can be influenced by many factors such as: age, neurological condition, location and number of lesions, and stage of the abscess. Minimally invasive methods are mainly done in easy accessible or deep lesions. This methods (single burr hole aspiration or transfontanelar aspiration) achieve fast and safe drainage of abscess material, produce minimal brain tissue damage, and provide immediate reduction of intracranial pressure. Additionally, rapid evacuation of pus allows a more favorable local environment in which antibiotics function more effectively (19, 20). On the other hand, some authors consider formal craniotomy equal to minimally invasive aspirational procedures. However, multiple abscesses are not amenable to craniotomy excision. Today, craniotomy is recommended in children older than 3 years of age with well-formed brain abscess, traumatic and mycotic abscesses, multiloculated abscesses, as well in traumatic abscesses with foreign bodies (19, 21). In our

case we used combined therapeutic approach. Antibiotics were initial therapy, followed by ultrasound guided aspiration of cystic material. Since definitive microbacterial diagnosis was not obtained, antibiotics were firstly given ex juvantibus, but were later replaced by the finding of urine culture, positive for Proteus mirabilis. Since there are no precise guidelines for treatment of brain abscesses, individualized and personalized medical approach must be considered, taking into account the factors mentioned above.

Hydrocephalus is a common complication of brain abscesses, and may occur as a result of abscess drainage or surgery. Also, lowering of intracranial pressure and decompression of structures in one hemisphere can result in relative enlargement of the contra lateral ventricular system. In cases with the absence of signs of elevated intracranial pressure, shunt surgery is not required. Also, infection is probably still present even though surgical procedures are completed, and thus ventriculoperitoneal shunt may be hazardous. So, the distinction between hydrocephalus and ventriculomegaly is crucial for shunt surgery indication (19, 22). Although our patient significantly improved on received therapy, and there were no clinical signs of increased intracranial pressure, we decided to perform ventriculoperitoneal shunt surgery since MRI finding was very indicative of active hydrocephalus.

In conclusion, despite huge progress of neurosurgical and neuroradiological techniques, as well as introduction of new antibiotics, brain abscesses still represent difficult medical problem with many possible complications, so personalized medical approach still remains the best choice.

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