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Multiple Brain Abscesses In a Baby: Case Report and Review of the Literature

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OBJECTIVE: Brain abscess is a rare and dangerous condition in infants. These abscesses are usually solitary and treated surgically. Multiple brain abscesses are very rare in the pediatric age group and surgical drainage has a life saving role in treatment.
CLINICAL PRESENTATION: We report one case of multiple brain abscesses in a 4-month baby who presented with enlargement of head. Cerebral Computed Tomography (CT) scan and Magnetic resonance Imaging (MRI) showed multiple abscesses in the left hemisphere**.**
INTERVENTION: Surgical drainage of the abscesses was performed over multiple sessions. The course was uneventful.
CONCLUSION: Multiple brain abscesses are rare and life-threatening conditions, particularly in children. Surgical drainage combined with specific antibiotic therapy is recommended in these patients.

Key Words: Infant ● Drainage ● Multiple ● Brain ● Abscesses

Introduction

Multiple brain abscesses are rare and can be responsible for enlarging heads in infants [11]. The treatment of this group of abscesses consists of surgical drainage and antibiotic therapy. The prognosis in cases with large or multiple abscesses is poor [11].

We report one case of multiple brain abscesses in a baby aged 4 months. He presented with the enlargement of head which begun at birth and progressively worsened. The diagnosis was made by computed tomography (CT) and magnetic resonance imaging (MRI). Surgical drainage was performed with multiple burr holes in different sessions and a good outcome was obtained.

Case Report

A 4-month-old male baby was referred to our clinic from the department of pediatrics with the complaint of progressive enlargement of the head which begun at birth. He is the product of a normal delivery. There is no history of infection at birth. There is no history of nausea and vomiting or seizure. The anterior fontanel was tight. The diameter of his head was 45 cm at his admission. His neurological examination was normal. His psychomotor development was also normal. The cranial CT showed multiple contrast-enhancing well-circumscribed mass lesions with massive edema. The MRI of the patient revealed multiple contrast-enhancing mass lesions with brain edema and midline shift (Fig.1a, 1b and 1c). After the radiological evaluation of the patient the decision for surgery was made.

The patient underwent surgery with general anesthesia. The largest lesions, which were located in left parietal lobe, were evacuated with a twist drill. The inner space of cyst wall was irrigated with isotonic saline solution mixed with

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vancomycin HCL by thin catheters until the purulent cyst material disappeared. The microbiological examination and culture of the cyst material revealed methicillin-sensitive Staphylococcus Aureus and antibiotics with ampicillin+sulbactam and vancomycin HCL intravenous (IV) were begun. After an initial ten days of IV treatment, ampicillin+sulbactam was continued orally for one month. Vancomycin HCL was administered only for ten days. A follow-up MRI performed after surgery showed that the abscesses located in the occipital lobe were enlarging. Then, a second surgical drainage procedure was performed with the same technique and the occipital lesions almost completely resolved. After these two operations, a MRI revealed the remaining brain abscess in the midline. The third procedure was performed with same technique to evacuate this cyst. At the end, the last MRI was performed and it showed only three small contrast-enhancing mass lesions without brain edema and midline shift. Mild hydrocephalus was also detected in the right ventricular system, probably due to decompression of the intracranial structures especially in the left hemispheres (Fig. 2). We did not plan any shunt procedure for two reasons: there was an absence of signs and symptoms of hydrocephalus in this patient both in the pre- and postoperative period and a concern was raised regarding the risk of spreading of infection via the cerebrospinal fluid (CSF) route resulting in sepsis. After this significant radiological improvement, we did not plan any additional surgery and continued antibiotic therapy for one month.

After the operation, we looked for a source of primary infection. No focus was detected in the paranasal sinuses, ear and cardiovascular system. Following these procedures, the patient did not have an enlarging head. The anterior fontanel was relaxed and the patient was discharged without any complications.

The patient was followed-up every three months to the present time. The baby is well without any neurological deficit. His head size is in the normal range. He had not any seizures or infections. In his postoperative MRI at the end of the first year, we did not observe any recurrence of abscess (Fig. 3).

Discussion

Brain abscesses are rare in infants and the first-line treatment of such lesions is still in debate [11,15,20,23]. Although stereotactic aspiration of these lesions has gained ground as a valid alternative to traditional medical and/or surgical treatments, recurrence of the abscess occurred in some cases after a few periods [18,20]. Multiple locations for brain abscess are a poor prognostic factor, especially in infants [18].

Clinical presentation of brain abscess is usually similar to other intracranial space-occupying lesions. However, the symptoms of an abscess tend to be more rapidly progressive then those associated with a neoplasm [2]. Headache, nausea and vomiting, alteration of the level of consciousness, seizures, neurological disturbances according to the location of abscess and increased fever are the commonest presentations characteristic of brain abscesses in adults. Infants usually present with a combination of enlarging head circumference, bulging fontanel, separation of cranial sutures, vomiting, irritability, seizures and poor feeding [2]. Our patient presented only with an enlarged head circumference. His feeding was adequate and his neurological status was normal in his admission. No fever or seizure was observed during his hospital stay. This is an interesting syndrome and not reported until today in the literature.

Sharma et al. [19] reported their experiences during 12-year period with multiple pyogenic brain abscesses and found an overall mortality rate of 32%. Level of consciousness at the time of admission was the most significant factor affecting the outcome. Surgery is the definitive therapy and has a life-saving role in the management of multiple pyogenic abscesses. Systemic treatment is required for multiple abscesses. In our case, the patient's level of consciousness level was preserved and, therefore, we obtained a good outcome with surgery and specific antibiotic therapy.

Multiple abscesses have been noted in 10 to 50% of all bacterial brain abscess [13]. CT and MRI are the best diagnostic tools in such patients.

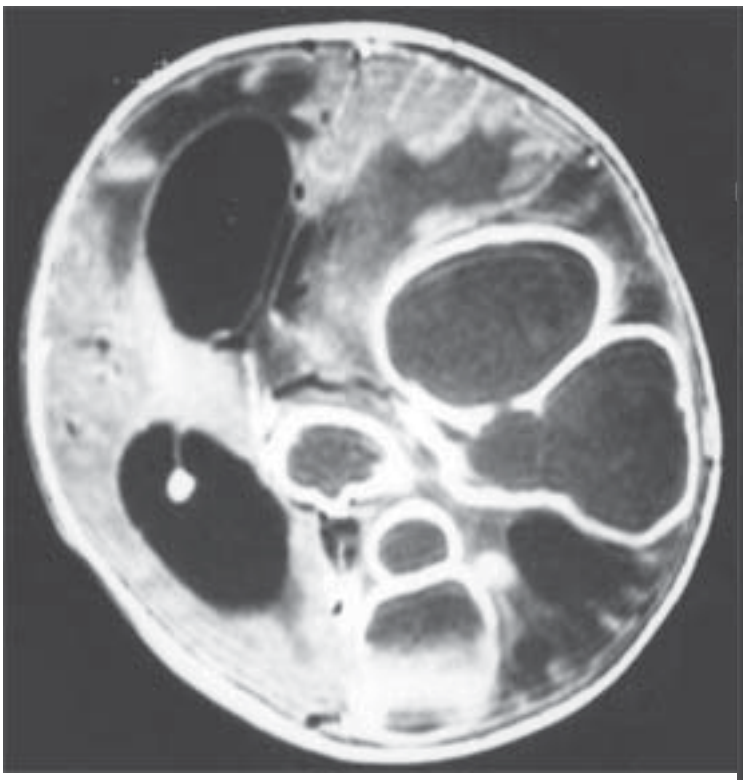

Figure 1a

Figure 1b

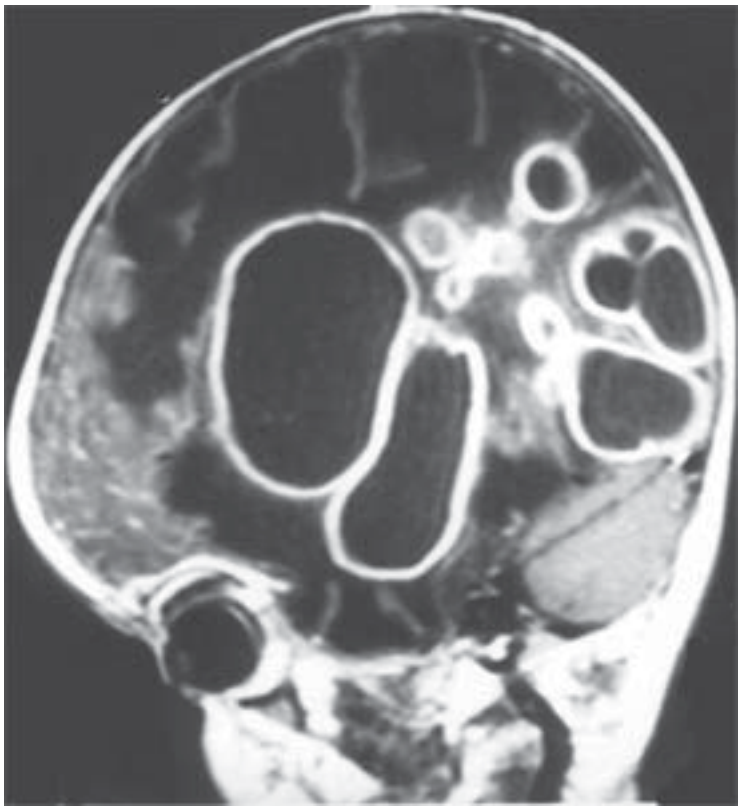

Figure 1c

Figure 1

a: The axial T1-weighted MRI scan of the patient showing multiple cystic lesions with massive edema and midline shift located in the left hemisphere.

b: The coronal T1-weighted MRI scan of the patient showing multiple abscesses.

c: The sagital T1-weighted MRI scan of the patient showing multiple abscesses.

Capsular staining and regular and uniform ring-like enhancement were the observed radiological features of these lesions [21]. They also cause mass effect with massive edema and midline shift, requiring surgery.

Combined therapy with surgical drainage and specific antibiotics is the generally accepted treatment protocol by the majority of authors [5,7,13,15,21,23]. The indication for surgery and the type of surgery are still a point of contention among neurosurgeons. Various types of procedures have been used in the operative management of brain abscesses.

The choice of one procedure over another may be influenced by age, neurological condition of patient, location and stage of the abscess, type of abscess and whether multiple lesions are present. Minimally invasive methods are mainly preferred for easy accessible lesions and stereotactic aspiration is appropriate for deep situated abscesses [1,4,20]. Aspiration via single burr hole does have a number of advantages, including rapidly and safely drainage of abscess material, minimal damage on cerebral tissue and immediate reduction of intracranial pressure. Additionally, rapid removal of purulent material allows a more favorable local environment in which antibiotics effectively function.

Although aspiration has often proved successful, excision via formal craniotomy has also been effective [3,8,9,10,22]. But craniotomy have some disadvantages as follows; inappropriate technique for lesions in early cerebritis, ill advised for deep abscess and abscess in eloquent regions of the brain. Multiple lesions are not amenable to excision via craniotomy. But, craniotomy is an appropriate technique for traumatic abscesses with foreign bodies, mycotic abscesses and multiloculated abscesses [2,6]. Operative evacuation by craniotomy is recommended by some authors for the children above 3 years of age with mature brain abscess [16].

In general each case must be individualized and treated in its own right with consideration of the factors outlined above. In our patient, we avoided craniotomy and performed a craniostomy with a twist drill for surgical drainage. We carried out this procedure in three sessions and obtained good results. We did not perform a craniotomy because our patient was considered too young for such an invasive method. The risk of bleeding and spreading of infection via the hematogenous route may be hazardous for this child. The duration of craniotomy is also too long for a child of age 4-months.

Hydrocephalus may occur as a result of abscess surgery. Decreasing of intracranial pressure and decompressing of intracranial structures in one hemisphere can cause relative enlargement in the ventricular system of the other hemisphere. A shunt is usually not required because of the absence of signs and symptoms of elevated intracranial pressure [17]. On the other hand, the infectious manifestations still continue even if the surgical procedures were completed. Ventriculitis may be present and therefore ventriculoperitoneal shunt procedure may be hazardous for the patient [17]. Therefore, we did not perform any shunt procedure. The distinction between ventriculomegaly (without elevated intracranial pressure) and hydrocephalus is important especially for the infants.

The origin and the agent of infection in intracerebral abscesses are usually difficult to find. Staphylococcus aureus sepsis from an infected peripheral site may be complicated with brain abscess especially in adults. But it may rarely occur in children and usually overlooked if there is not any clinical presentation of intracranial mass lesion. Staphylococcus aureus is also most common cause of post-traumatic brain abscess and best treated with a semi-synthetic penicillinase-resistant penicillin and vancomycin [2]. The duration of antibiotic therapy should be determined by the result of surgery and the clinical condition of the patient. The most commonly accepted duration is 4-6 weeks [2,7,11,12,13,14,21]. In our patient, we had begun vancomycin and ampicillin + sulbactam intravenously as initial treatment after the first operation. Vancomycin was stopped at the end of 10 days because of its nephrotoxicity. Then, we continued oral antibiotherapy with ampicillin + sulbactam and we used the same antibiotic for 4 weeks after the third operation. The duration of antibiotic therapy for our patient is similar with those of the literature. Sharma et al., found that in their series of 38 patients with multiple pyogenic brain abscesses, 24% had Staphylococcus aureus as the inciting organism. In their series, most patients were adults and only 9 of 38 were infants [19]. In the series of Kratimenos, staphylococci were found as the second most common agent with 21% in 14 patients [12].

Conclusion

Multiple brain abscesses are rare and a life-threatening condition, particularly in children.

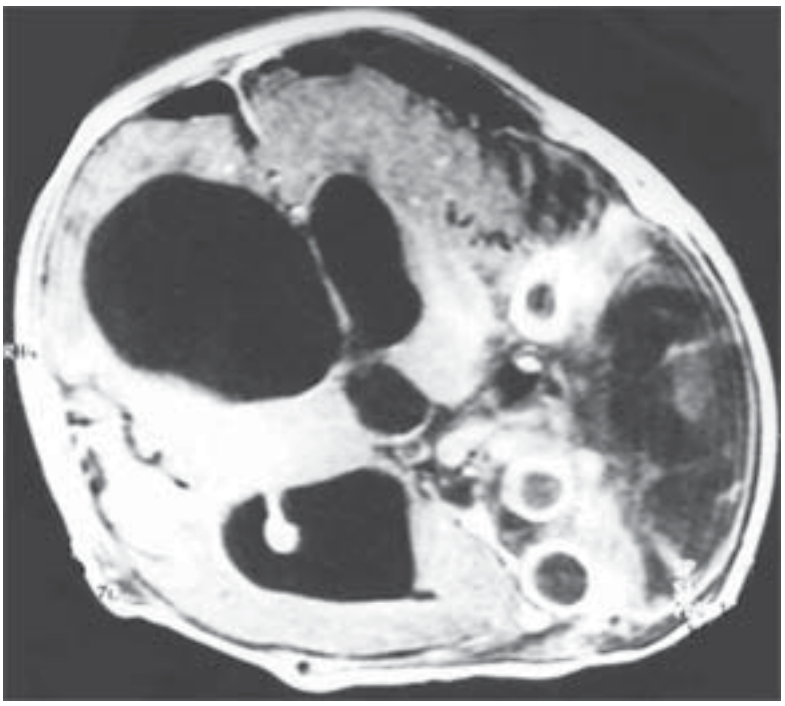

Figure 2: The postoperative axial T1-weighted MRI scan of the patient showing three small abscesses in the left hemisphere without edema and shift.

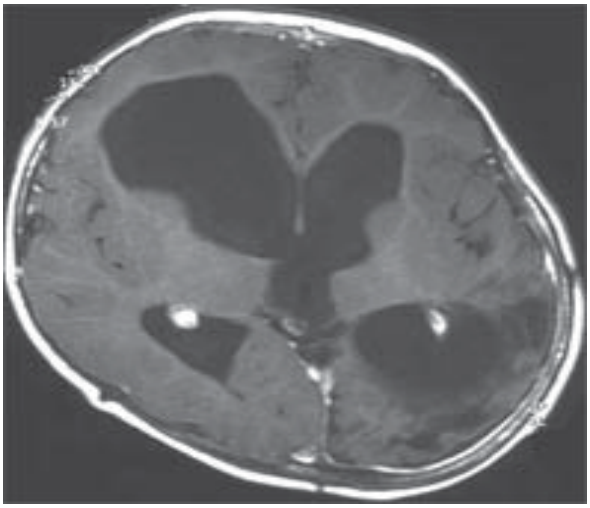

Figure 3: The postoperative axial T1-weighted MRI scan of the patient at the end of first year.

They are usually situated in one hemisphere but may seldom spread to other one. Surgical drainage combined with specific antibiotic therapy is the procedure of choice in these patients. If there are multiple abscesses located inmany sites of brain, surgical drainage in several sessions should be potentially considered.

References

1. Alderson D, Strong AJ, Ingham HR, Selkon JB. Fifteen-year review of the mortality of brain abscess. **Neurosurgery** 8:1-5, 1981
2. Britt RH. Brain abscess. In Wilkins RH, Rengachary SS (eds): **Neurosurgery.** New York: McGraw-Hill, 1985, pp:1928-1956
3. Choudhury AR, Taylor JC, Whitaker R. Primary excision of brain abscess. **Br Med J** 2: 1119-1121, 1977
4. Dyste GN, Hitchon PW, Menezes AH. Stereotaxic surgery in the treatment of multiple brain abscesses. **J Neurosurg** 69: 188-194, 1988
5. Ersahin Y, Mutluer S, Guzelbag E. Brain abscess in infants and children. **Childs Nerv Syst** 10:185-189, 1994
6. Hagan RE. Early complications following penetrating wounds of the brain. **J Neurosurg** 34: 132-141, 1971
7. Hoffmann I, Kesmarki I, Kincses J, Ekler K. Non-invasive management of multiple brain abscesses. Case report and review of the literature. **Orv Hetil** 140:2111-2115, 1999

8. Hubschmann OR, Weisbrot FJ, Smith LG. Multiple streptococcal brain abscesses successfully treated by craniotomy and needle aspiration. **Surg Neurol** 17: 57-61, 1982
9. Jooma OV, Pennybacker JB, Tutton GK. Brain abscess: aspiration, drainage or excision? **J Neurol Neurosurg Psychiatry** 14: 308-313, 1951
10. Kobrine AI, Davis DO, Rizzoli HV. Multiple abscesses of the brain: case report. **J Neurosurg** 54: 93-97, 1981
11. Krajewski R, Stelmasiak Z. Brain abscess in infants. **Childs Nerv Syst** 8:279-280, 1992
12. Kratimenos G, Crockard HA. Multiple brain abscess.: a review of fourtheen cases. **Br J Neurosurg** 5: 153-161, 1991
13. Mamelak AN, Mampalam TJ, Obana WG, Rosenblum ML. Improved management of multiple brain abscesses: a combined surgical and medical approach. **Neurosurgery** 36:76-85, 1995
14. Mampalam TJ, Rosenblum ML. Trends in the management of bacterial brain abscesses: review of 102 cases over 17 years. **Neurosurgery** 23: 451-458, 1988
15. Moss SD, McLone DG, Arditi M, Yogev R. Pediatric brain abscess. **Pediatr Neurosci** 14:291-296, 1988
16. Nowoslawska E, Polis L, Mikolajczyk W, Krawczyk J, Zakrzewski K. The treatment of cerebral abscesses in children-The clinical experiences of neurosurgical clinic of PMMH in Lodz. **Neurol Neurochir Pol** 35: 12-18, 2001
17. Piatt JH. Hydrocephalus: Treatment. In Wilkins RH, Rengachary SS (eds): **Neurosurgery.** New-York: McGraw-Hill 1996, pp: 3633-3643
18. Regev RH, Dolfin TZ, Zamir C. Multiple brain abscesses in a premature infant. Complication of staphylococcus aureus sepsis. **Acta Paediatr** 84:585-587, 1995
19. Sharma BS, Khosla VK, Kak VK, Gupta VK, Tewari MK, Mathuri A. Multiple pyogenic brain abscesses. **Acta Neurochir (Wien)** 133:36-43, 1995
20. Skrap M, Melatini A, Vassallo A, Sidoti C. Stereotactic aspiration and drainage of brain abscesses. Experience with 9 cases. **Minim Invasive Neurosurg** 39:108-112, 1996
21. Sommer F, Aldini R, Kolodziejczyk D. Systemic antibiotic therapy on multiple intracerebral abscesses with unknown origin. **Acta Neurochir (Wien)** 140:1095-1096, 1998
22. Taylor JC. The case for excision in the treatment of brain abscess. **Br J Neurosurg** 1:173-178, 1987
23. Voloshchuk SI. The treatment of multiple brain abscesses. [Ukrainian] **Lik Sprava** 8:134-136, 1998 (abstr)

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Comment

I think this is a very interesting manuscript of a rare disease process in children or infants. This case illustrates a very unusual presentation of multiple abcesses in an infant who presented with macrocephaly without other systemic manifestations. The authors concisely discuss the appropriate management for cerebral abscesses, with the need for multiple drainage procedures and prolonged intraveneous antibiotics. The reader should appreciate the need for close observation of any child with a cerebral abscess. The literature review supports the authors management strategy.

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New York