

## Cerebral Abscess Secondary to Mild Scalp Infection: A Case Report and Literature Review

Guichen Li, Yang Zhang, Xiaobo Zhu, Kun Hou\*

Department of Neurosurgery, Changchun, Jilin, China

### Abstract

The mortality and morbidity of cerebral abscess has greatly decreased since the widespread usage of antibiotics. Victims of cerebral abscess are often predisposed to many risk factors such as otitis, mastoiditis, sinusitis, immunodeficiency, blood infection and congenital defects. But cerebral abscess secondary to mild scalp infection is scarcely reported. We would like to report on a case of cerebral abscess secondary to the delayed diagnosis and management of a mild scalp infection. We will also discuss the possible mechanisms of intracranial spreading and draw a lesson that we can learn from it with a literature review. Mild scalp infection is a risk factor of cerebral abscess and we should not take it as insignificant. Timely and appropriate management is essential to avoid unintended outcomes.

**Keywords:** Cerebral abscess; Mild scalp infection; Male

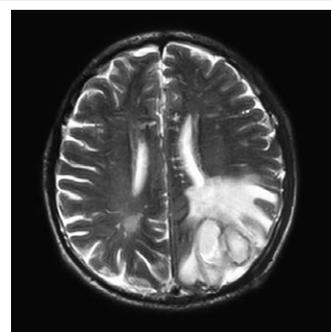
### Introduction

Cerebral abscess is an uncommon entity in the daily medical activities of modern society because of the world-wide usage of antibiotics. The incidence has been reported to be 0.3 to 1.3 per 100,000 people per year [1,2]. But it can be severe even potentially fatal in case of delayed diagnosis and intervention. Generally, predisposing factors are present in most of the cases, with mastoiditis or otitis the first one, sinusitis the second and then meningitis and odontogenic infections [2]. There are also some sporadic reports of cerebral abscess secondary to some rare circumstances such as peritonsillar surgery, eyelid pencil tip injury and paranasal sinus osteoma [3-9]. Here, we would like to report on an even rare case of cerebral abscess secondary to local spreading of mild scalp infection. The mechanisms of cerebral involvement and the lesson we can learn from it would be discussed in detail.

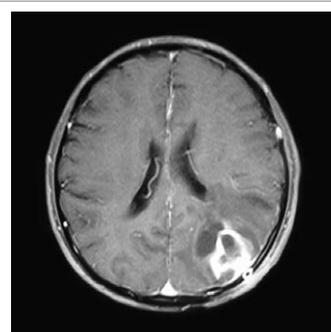
### Case Report

An immunocompetent 65-year-old male was admitted to our hospital complained of continuous headache in the left hemisphere and slight somnolence for 3 days. Physical examination the day on admission showed a scalp sinus tract with slight local inflammation and some purulent exudation in the left parietal region. Further inquiry revealed that the focal scalp discharge had been lasting for 6 months with neither remission nor exacerbation. He denied history of fever or sensible fever in the past 6 months. As lived in the remote rural area of northeastern China, he did not take any medical management. Motor system examination revealed nothing remarkable except right limbs hemiparesis. His axillary temperature was 37°C on admission. Blood count revealed a peripheral leukocyte of  $18.61 \times 10^9$ . His hepatitis B surface antigen and core antibody were positive. Liver function test showed that glutamic oxalacetic transaminase was 72 U/L (normal limit, 15-40) and direct and indirect bilirubin were all slightly higher. MRI the day on admission showed a double-cystic lesion in the left parietal lobe, which demonstrated hyperintensity on T2-weighted images with evident perilesional edema (Figure 1). Gadolinium contrast administration resulted in the cystic wall and the adjacent scalp enhancement (Figure 2). We could also notice an enhanced bar structure (arrow) that connects the intracerebral lesion and the affected scalp.

An initial diagnosis of cerebral abscess was made. Two days after admission a left parietal craniotomy was performed. Intraoperatively, we found that the skull and dura mater under the scalp sinus were all



**Figure 1:** MRI shows a double-cystic lesion in the left parietal lobe, which demonstrated hyperintensity on T2-weighted images with evident perilesional edema.



**Figure 2:** Gadolinium contrast administration results in the cystic wall and the adjacent scalp enhancement, an enhanced bar structure is also noted between the intracerebral lesion and the adjacent scalp.

\*Corresponding author: Kun Hou, Department of Neurosurgery, Changchun, Jilin, China, Tel: 18704479380; E-mail: [hkyayz@yeah.net](mailto:hkyayz@yeah.net)

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pathologically altered. The lesion in the brain was in line with brain abscess. The bone flap was put back with the part of pathologically changed drilled out. The scalp sinus and its surrounding inflammatory tissue were fusiformly excised. Pathological examination of the tissue from the cerebral lesion and the scalp sinus revealed no heterocyst. Abundant infiltration of lymphocytes and neutrophils were seen microscopically. *Staphylococcus aureus* was isolated from both the abscess cavity and scalp sinus. Drug susceptibility test showed Ampicillin was sensitive. He was discharged after intravenous administration of Ampicillin for 3 weeks. Outpatient follow-up was sustained for 6 months without recurrence.

## Discussion

It has been reported that predisposing factors could be identified in 86% of the patients with cerebral abscess [2]. And parameningeal foci such as sinusitis, otitis and odontogenic infections have accounted for 40% to 70% of cases [2,4]. The phenomenon of susceptibility to adjacent infectious foci in cerebral abscess might easily lead us to think that distance from the origin of infection to brain tissue plays an important role in cerebral abscess formation. In their analysis of brain abscess following tonsillectomy, Taghipour M and his colleagues recommended four possible ways of intracranial spreading [10]. They are 1) direct spread from the infection site, 2) invasion from an artery or perivascular sheath, 3) retrograde spread from the valveless veins, 4) via perineural sheaths of extracranial nerves. In fact, the infection origin characteristic of cerebral abscess is determined by the congenital features of the scalp and skull. Firstly, the scalp has a relatively rich blood supply and venous drainage system. The veins and arteries in the scalp communicate with each other via complex communicating branches. There are also some emissary veins associate the intracranial structures with the scalp. And then, the domain of facial vein drainage is made up of valveless veins. Secondly, there are many natural orifices in the skull that passes a lot of vessels and nerves between the inner and outer cranial space. And the cranial bones form a lot of relative inclosed cavities. These cavities are warm bed for many microorganisms and vulnerable to local infections. All these characteristics listed above may in part explain the relation of distance and susceptibility in cerebral abscess.

When reviewing the published articles, we found an interesting phenomenon that cerebral abscess demonstrates an evident male dominance in children and the adult [1-4,7,8,11]. Although noticed by many authors, hardly is there anyone that has ever given a good and appropriate explanation. It is undeniable that perhaps there do have sex inclination of cerebral abscess. But there might be some confounding variables, living habit for example. It's anticipatable that males have more chances of getting physically hurt and infected compared with their female counterparts because of their natural conditions. And males pay less attention to their own body unfitness. The living habit difference between sexes makes more males get infected, neglected and

progressed. So, future studies should consider the confounding effect like living habit in the sex inclination in cerebral abscess.

As was discussed above, parameningeal foci such as sinusitis and otic and odontogenic infections are the most common local predisposing factors. There are also some sporadic reports of cerebral abscess secondary to penetrating head injury [5,12]. But cerebral abscess due to delayed diagnosis and treatment of mild scalp infection is so scarce that no similar report written in English has been published as far as we knew. The vascular and bony characteristics of the head and delayed diagnosis and medical intervention might conjointly contribute to the cerebral abscess formation in this male patient.

## Conclusions

The lesson we can learn from this case report is that mild scalp infection is a risk factor of cerebral abscess and we should not take it as insignificant. Without timely intervention serious consequence could happen. The male shows dominance in cerebral abscess morbidity, which may be due to their living habit in some extent. Males deserve more medical and living care as they were expected to have.

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