



Case report

Streptococcus suis meningitis complicated with acute cerebral infarction: A case report

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ABSTRACT

A case of suppurative meningitis complicated with acute cerebral infarction caused by *Streptococcus suis* was reported to provide reference for the diagnosis and treatment of *Streptococcus suis* infection. The diagnosis, treatment, follow-up and epidemiological materials in the case of suppurative meningitis complicated with acute cerebral infarction caused by *Streptococcus suis* in Heyuan People's Hospital were reviewed, and the relevant literature was reviewed. The clinical manifestations of this case were headache and fever, which progressed rapidly. After effective anti-infection treatment, the patient improved and discharged from the hospital, but there was profound hearing impairment.

1. Introduction

Streptococcus suis is a pathogen of animal origin, which can cause acute infectious diseases common to humans and animals, mainly through the wound infection. It is most prevalent in Southeast Asia and is the principal pathogen causing meningitis, hearing impairment, skin damage and bacteremia. Virulence genes of *Streptococcus suis* include capsular polysaccharide gene, lysozyme releasing protein gene, hemolysin gene, cytokine gene and glyceraldehyde-3-phosphate dehydrogenase gene. These virulence genes are significant indicators of the virulence of *Streptococcus suis* [1]. A case of *Streptococcus suis* infection with acute cerebral infarction was diagnosed and dealt with in Heyuan People's Hospital. It reports as following.

2. Case presentation

A 62-year-old farmer was admitted to Heyuan People's Hospital on 13 August, 2021, due to headache and fever lasting for 8 days and aggravating for 5 h. On 5 August, 2021, the patient suffered from headache and fever with a temperature of 38.0 °C. Accompanied by binaural tinnitus, vomiting, lifting pain of the right upper limb, limited movement and weakness of the left lower limb. He had been to an external hospital for treatment. Magnetic resonance imaging (MRI) of the right shoulder joint showed that effusion in the descending capsule of the right acromion, the joint cavity of the right shoulder and around the tendon of the right biceps brachia. The effect of anti-inflammatory and analgesic treatment

was not ideal. Severe headache, sweating, hearing impairment in both ears, poor consciousness and indifferent response occurred before admission.

With a temperature of 38.2°C on admission. Narcolepsy, binaural hearing impairment, the muscle strength of left lower limb was grade 4, the distance from chin to chest was four transverse fingers, and the patient's bilateral Kernig's signs and bilateral Brudzinski's signs were positive. The patient is a farmer who mainly cultivates fields and raises livestock. Before the onset, his left index finger was scratched by trees, with a swollen wound of about 0.5 cm. Blood and cerebrospinal fluid culture were *Streptococcus mitis*. Through the analysis of the second-generation sequencing detection of pathogenic microbial infection in cerebrospinal fluid samples, it was found the *Streptococcus suis* type II. It is resistant to aminoglycosides, macrolides lincomycin streptomycin and tetracycline. Before treatment (14 August), enhanced MRI scan of the brain showed multiple cord like slightly high signal shadows in the sulci of both cerebral hemispheres and cerebellar hemispheres on the fluid attenuated inversion recovery (FLAIR) sequence. The pia mater was thickened and significantly enhanced on the enhanced scan, which was obvious in the flair enhanced series. Brain MRI showed that the right semioval center and basal ganglia saw spotted abnormal signal shadow, showing long T1 and long T2 signal, flair showed high signal, diffusion weighted imaging (DWI) showed high signal, the corresponding apparent diffusion coefficient (ADC) value decreased, the boundary was unclear, and there was no enhancement on the enhanced scan. Acute lacunar infarction was considered. No obvious abnormality was found in

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magnetic resonance angiography (MRA) of the brain. After treatment (6 September), brain MRI enhanced scan showed that the pia mater thickening was less than before (Figure 1).

After admission, the patient was given anti-infection treatment with cefotaxime sodium and sulbactam sodium empirically from 13 August to 14 August. During this period, the temperature fluctuated between 38.5 °C to 39.0 °C. Dehydrant and dexamethasone therapy was administered to reduce intracranial pressure and inflammation. Antiplatelet aggregation, lipid regulation and plaque stabilization therapy were the highest priorities of the treatment for cerebral infarction. Drugs to enhance blood circulation and cerebroprotein hydrolysate were used to increase the blood supply to the ischaemic focus and nourish nerves. Additionally, gastric mucosal protection, expectorant treatment and nutritional support was also administered. According to the blood and cerebrospinal fluid bacterial culture result, *Streptococcus mitis* was detected. The preliminary diagnosis was suppurative meningitis. The upgraded antibiotic was meropenem from 15 August to 24 August. The temperature fell to normal from 17 August. Headache and neck stiffness of the patient were much improved since 19 August. The antibiotic was downgraded to ceftriaxone sodium injection from 25 August, and anti infection treatment was carried out until discharge (11 September). At the time of discharge, the patient had no headache and muscle strength of the left lower limb was grade 5. No pathogenic microorganisms were found in the cerebrospinal fluid, but he left severe binaural nerve deafness. In a telephone follow-up on one month and three months after discharge,

the patient reported that he had no special discomfort, and the binaural hearing loss was the same as before.

3. Discussion and conclusions

Streptococcus suis can be separated from the sick pigs or from the nasal cavity of healthy pigs. There are two types that type I only infects pigs and does not infect humans, and type II can infect humans and cause disease. It mainly causes suppurative meningitis, often accompanied by the involvement of the eighth cranial nerve, manifested as ataxia and deafness, with an incidence of 50%–70% [2]. The bacterium can also cause internal ophthalmia, pneumonia, septicemia, diarrhea and arthritis. According to the clinical manifestations, human infection with *Streptococcus suis* can consist of four types, including the common type, meningitis or meningoencephalitis type, shock type and mixed type. Meningitis or meningoencephalitis is the most common type, with good therapeutic effect, but it is easy to leave neurological sequelae such as hearing impairment. Shock type and mixed type have rapid progress and poor prognosis. The proportion of common type is small and the prognosis is well. This patient is of meningitis type, complicated with acute cerebral infarction, sepsis and arthritis. After effective anti-infection treatment, the overall prognosis is good, but he left with severe binaural nerve deafness and unrecoverable.

The patient had skin damage and developed disease after contacting livestock. The patient left severe hearing impairment, and its mechanism is cochlear sepsis caused by the pathogen entering the peripheral lymph

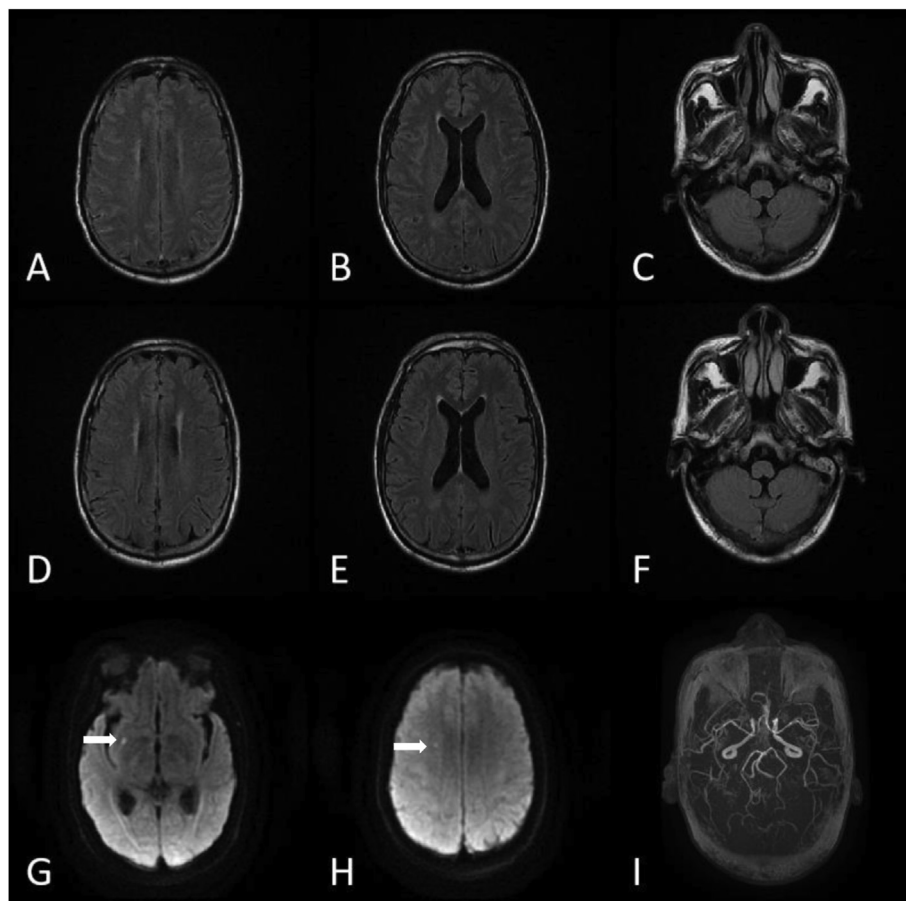


Figure 1. Imageological examination. FLAIR sequence of brain magnetic resonance imaging (before treatment (A, B, C) - after treatment (D, E, F)). DWI sequence and MRA of brain magnetic resonance imaging (G, H and I).

from the subarachnoid space through the cochlear aqueduct [3]. It is reported that one case of *Streptococcus suis* showed acute otitis media by otorhinolaryngology, and another case of MRI showed labyrinthitis and suppurative ventriculitis [4, 5]. *Streptococcus suis* infection should be considered when patients with bacterial infection have hearing impairment. Timely and sufficient dexamethasone treatment can effectively improve the hearing impairment caused by *Streptococcus suis* infection [2]. A study speculated that the occurrence of hearing impairment in *Streptococcus suis* patients is not only related to the use of glucocorticoids, but also may be dependent on the use of antibiotics. The use of ototoxic drugs should be prevented [6]. This case began to use dexamethasone at the time of admission. The course of treatment was more than ten days. There was no use of ototoxic antibiotics in the whole process, but there were still serious hearing impairment. Therefore, it is speculated that the hearing impairment caused by *Streptococcus suis* is not related to the use of ototoxic antibiotics, and the effect of hormone on improving hearing loss remains to be discussed.

In addition to severe hearing impairment, this patient was also complicated with acute cerebral infarction, which has not been reported. A study in the Netherlands found that patients infected with *Streptococcus suis* had other neurological sequelae except hearing impairment, including ataxia and cognitive impairment [7]. Literature reported that patients infected with *Streptococcus suis* had sequelae, including deafness with mental retardation, hearing impairment and sluggish response [8]. A serious complication of infections affecting the central nervous system is cerebral ischemia. Ischemic stroke secondary to infection (infective endocarditis, meningitis, etc.) is uncommon in adults and was observed in 11 patients in a series of 70 cases (15%) in a clinical study of ischemic stroke of unusual cause [9]. Combined with this case and relevant literature, it is inferred that other neurological sequelae may be related to cerebral ischemia. Hypoxia and necrosis can cause by severe inflammation. This case indicates that ischemic stroke can be a complication of *Streptococcus suis* meningitis.

Streptococcus suis causes human infection with an acute onset and rapid progress. Identifying the pathogen as soon as possible and selecting effective antibiotics for treatment can quickly control the disease, but more clinical researches are needed to improve the sequelae, so as to provide a more effective treatment scheme.

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Data availability statement

Data will be made available on request.

Declaration of interest's statement

The authors declare no conflict of interest.

Additional information

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