Sui(s) Generis: A Unique Meningitis

Dear Editor,

Streptococcus suis infection is a zoonotic infection, reported predominantly from Asian countries, seen in butchers and abattoir workers, especially those with cuts or abrasions on their hands and also those who consume uncooked or undercooked pork. *Streptococcus suis* infection is very rare in India or in Western countries. *Streptococcus suis* infection is concentrated in the South East Asian countries such as Vietnam, Indonesia and Thailand. The primary clinical manifestations are meningitis and cochlea-vestibular damage. There is one case report of chronic finger osteomyelitis with *S. suis* infection from India. *Streptococcus suis* is commonly grown in culture media but is often misidentified or be unaware. *Streptococcus suis* meningitis is under-diagnosed in many cases, especially non-endemic areas. To the best of our knowledge, this is the first *S. suis* meningitis reported from India.

A 45-year-old building contractor presented with sudden onset of rigors, global headache, vomiting and altered sensorium of 1-day duration. Just prior to collapsing he complained of sudden onset hearing loss in the left ear. He had no history of seizures, head injury, ethanol intake or recent travel. On examination, the patient was drowsy, irritable febrile and had neck stiffness. His routine blood investigations and chest radiograph were normal. Lumbar puncture revealed 2265 cells with 90% neutrophils, protein of 426 mg% and low sugar (15 mg%). MRI showed ventricular debris in the occipital horn of the left lateral ventricle in the diffusion-weighted sequences and contrast imaging was negative for leptomeningeal enhancement [Figure 1a]. He was started on intravenous ceftriaxone 2 g BD.

The clinical picture, purulent CSF and ventricular debris were all suggestive of an acute bacterial meningitis. Possible infective agents considered were Streptococcus pneumoniae, Neisseria meningitides or *Mycobacterium tuberculosis*. The extremely high CSF protein and endemicity were thought to favour tuberculosis.

CSF Gene xpert™ for *Mycobacterium tuberculosis* was negative. He required a Dexmedetomidine infusion for agitation. Cerebrospinal fluid and blood cultures grew gram-positive cocci suggestive of *S. suis* on day 3 [Figure 1e]. He was started on intravenous Ceftriaxone 2 grams 12th hourly along with intravenous Vancomycin 1 gram 8th hourly. Dexamethasone 4 mg IV TID was added in view of his *Suis* meningitis and history of hearing loss. Detailed questioning revealed that he had sustained a laceration to his thumb while chopping raw pork 2 days prior to the onset of his illness [Figure 1d].

14 days later, his CSF examination revealed 105 cells, protein 66 mg%, sugar 70 mg%. A repeat MRI on day 14 continued to show ventricular debris in the left occipital horn [Figure 1b]. Audiometry revealed a profound hearing loss in both ears. BAEP (brainstem auditory evoked potentials) showed absence of waves from I, II, III, IV, V on left side and waves III, IV, V on the right side.

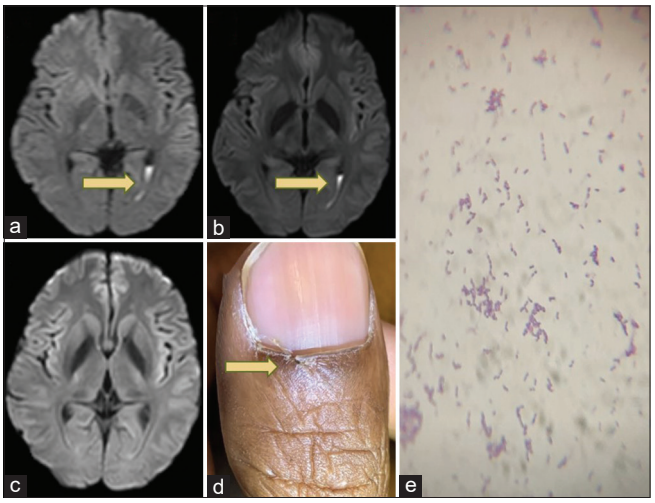

Figure 1: (a): Exudate with diffusion restriction seen in dependent aspect of occipital horn of left lateral ventricle. (b): Persisting minimal exudate with diffusion restriction seen in dependent aspect of occipital horn of left lateral ventricle. (c): Resolution of exudate in the occipital horn of left lateral ventricle. (d): Cut injury of the patient [Arrow] on the left thumb. (e): Gram positive cocci arranged in pairs and chains

The antibiotic regimen was continued for a total of 28 days and changed to oral Moxifloxacin 400 mg BD after the antibiotic susceptibility results. A repeat CSF and MRI [Figure 1c] at day 29 were normal. He had a persistent profound bilateral hearing impairment and was referred to ENT for cochlear implantation.

Streptococcus suis infection is a zoonotic infection, reported predominantly from Asian countries, where pig rearing and consumption of pork is widespread. *Streptococcus suis* is a gram-positive cocci arranged in chains or pairs. The primary clinical manifestations are meningitis and cochlea-vestibular damage.[1] Pneumonia, septic shock, arthritis, endocarditis, uveitis, spondylodiscitis and peritonitis have also been reported. It is predominantly seen in butchers and abattoir workers, especially those with cuts or abrasions on their hands. *Streptococcus suis* infection is concentrated in the South East Asian countries such as Vietnam, Indonesia and Thailand.[2] The bacterium enters the human host via direct skin abrasions or the oral or respiratory route. *Streptococcus suis* infection is very rare in India or in western countries, although there is one report of chronic finger osteomyelitis.[3]

Even though *S. suis* field isolates readily grow on media employed for culturing bacteria that cause meningitis, many laboratories are not aware of *S. suis*, and it is usually

misidentified as enterococci, Streptococcus pneumoniae, Streptococcus bovis, viridans group streptococci, or even Listeria monocytogenes.

The pathogenesis of *S. suis* infection relies on immunological, apoptotic, and inflammatory factors. Cell wall components of S. suis induce releases of interleukin-1 (IL-1), IL-8, and monocyte chemotactic protein-1 (MCP-1) in human brain microvascular endothelial cells (BMEC), which increases the blood-brain barrier permeability.[4,5] A novel murine ribonuclease, angiogenin inhibitor 1 (AI1) also binds to S. suis hyaluronidase (Hyl), and this interaction between host AI1 partner and bacterial Hyl protein might contribute to S. suis meningitis.[6]

The first step for processing any samples in Microbiology starts with Gram stain. *Streptococcus suis* are seen as Gram-positive cocci in pairs and chains. A negative Catalase test differentiates from Staphylococcus species. A Bile esculin test if negative, differentiates from Enterococcus and group D streptococci. On Blood agar, *S. suis* produces alpha haemolytic colonies that is Optochin resistant; differentiating from *S. pneumoniae* that is optochin sensitive.[7] Vitek 2 compact is an automated system that gives identification and sensitivity with accuracy. *Streptococcus* colonies require 24–36 h for growth to be loaded in VITEK for correct identification. With only marginal difference in the identification of Streptococcus isolates, based on conventional biochemical tests, automated system like VITEK 2 is truly a pathfinder for identification of these isolates.[8]

Although mortality rates are <3%, hearing loss secondary to *S. suis* meningitis is seen in >50% of patients and is usually irreversible.[9] Direct auditory nerve invasion, haemorrhagic or suppurative labyrinthitis are reasons for the high rates of inner ear dysfunction.[10] Early evaluation for cochlear implantation is advised, before labrynthine ossificans supervenes. Dexamethasone may ameliorate hearing impairment, if it is administered early before the onset of inner ear dysfunction.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Submitted: 27-Mar-2021 **Revised:** 18-Jul-2021 **Accepted:** 25-Aug-2021
Published: 22-Oct-2021

DOI: 10.4103/aian.aian_261_21