

## CASE REPORT

# Endogenous endophthalmitis and multifocal brain abscess—An interesting case

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## Abstract

We present an unusual case that staphylococcal brain abscess can present in an immunocompetent with endogenous endophthalmitis secondary to a septic foci and early prevention of dissemination with appropriate management to prevent its complications.

## KEYWORDS

brain abscess, Endophthalmitis, immunocompetent, Nepal, *Staphylococcus aureus*

## 1 | INTRODUCTION

Brain abscess due to *Staphylococcus aureus* endophthalmitis in an otherwise healthy individual is uncommon. It usually occurs in the immunocompromised patient. Staphylococcal brain abscess can be present in an immunocompetent person emphasizes the importance of early prevention of dissemination and appropriate management, minimizing the devastating complications in these patients.

*Staphylococcus aureus* is a common cause of bacterial endophthalmitis following cataract surgery or intraocular lens implantation. Endogenous bacterial endophthalmitis, resulting from hematogenous dissemination from distant

septic foci, is typically associated with a background of compromised immune system related to diabetes mellitus, cardiac disorders, organ transplantation, hematologic malignancy, or use of immunosuppressive agents.<sup>1</sup> It is a devastating infection that, despite aggressive medical and surgical management, often results in the blinding of the infected eye. Brain abscess, due to *Staphylococcus aureus*, is common in patients with a head injury, endocarditis, patients undergoing hemodialysis or peritoneal dialysis, but is uncommon in an otherwise healthy person.<sup>2</sup>

We report a novel case of endogenous endophthalmitis and multiple brain abscess following sore throat caused by *Staphylococcus aureus* in a young immunocompetent female.

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## 2 | CASE PRESENTATION

A 25-year-old female patient presented to an ophthalmologic center with sudden painful diminution of vision in the left eye with floaters. She was afebrile with no history of ocular trauma or surgery. She was diagnosed with endogenous endophthalmitis, the septic foci attributed to acute tonsillitis that she reported a week ago.

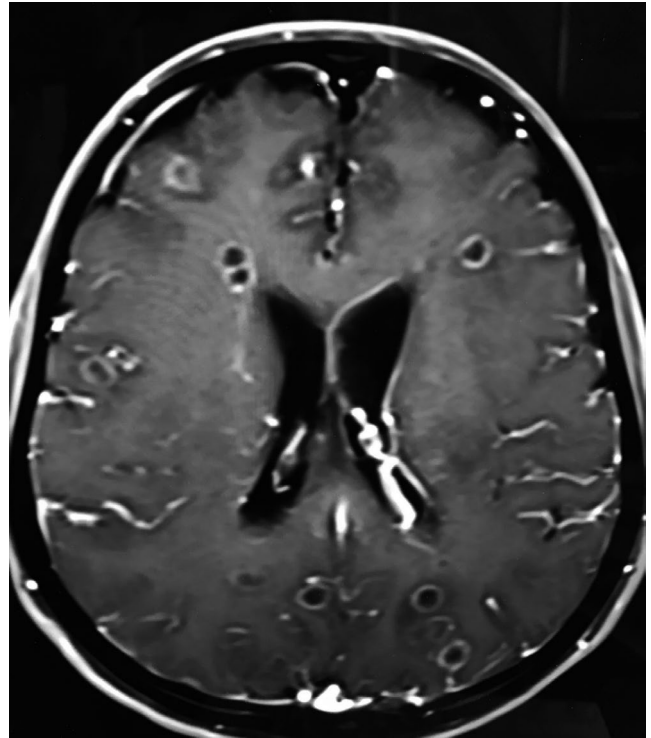
Left eye vitreous tap showed plenty of pus cells and isolates of *Staphylococcus aureus* resistant to cefixime on culture. Intravitreal vancomycin and ceftazidime were administered in the same setting along with systemic antibiotics. With no sign of clinical improvement after 48 h, left eye lensectomy with core vitrectomy was performed which revealed purulent exudation in her vitreous chamber along with necrotic foci in the retina.

One week later, she presented to the Emergency Department of our center with fever, chills and rigors, and headache. On arrival, she appeared ill and drowsy with a GCS of 15/15. Her vitals were stable, and she had neck stiffness with a positive Brudzinski sign. Other parts of CNS and other systemic examinations showed no abnormalities. On local examination of the left eye, multiple subconjunctival hemorrhages, hypopyon and hazy cornea, with leukocoria were observed. Her left pupil was dilated and fixed with no perception of light.

Her blood counts were normal, and CSF analysis was suggestive of acute bacterial meningitis with a negative CSF culture. Contrast MRI showed multiple, variable-sized, ring-enhancing lesions, with centrally restricted diffusion in bilateral cerebral hemispheres, right basal ganglia, bilateral thalami, and right cerebellar hemisphere with diffuse smooth leptomeningeal and left ventricular enhancement, suggestive of multifocal brain abscesses with meningitis and ventriculitis (Figures 1 and 2). A transthoracic echocardiogram revealed no evidence of shunts or vegetations. Ear, nose, and throat (ENT) consultation and dental examination were done, and no abnormalities were found.

### 2.1 | Contrast MRI Images

She was treated medically with intravenous meropenem, vancomycin, and metronidazole for two weeks followed by oral medication for 4 weeks. Symptomatic treatment with intravenous dexamethasone and anticonvulsants, and Methylprednisolone and Moxifloxacin eye drops were administered. External ventricular drain (EVD) was placed for decreasing the raised ICP and removed 12 days post-insertion with gradual improvement in the sensorium. During follow-up one-month post-discharge in our outpatient department, marked improvement was



**FIGURE 1** MRI of brain showing multiple variable-sized ring-enhancing lesions in bilateral cerebral hemispheres, right basal ganglia, and bilateral thalami

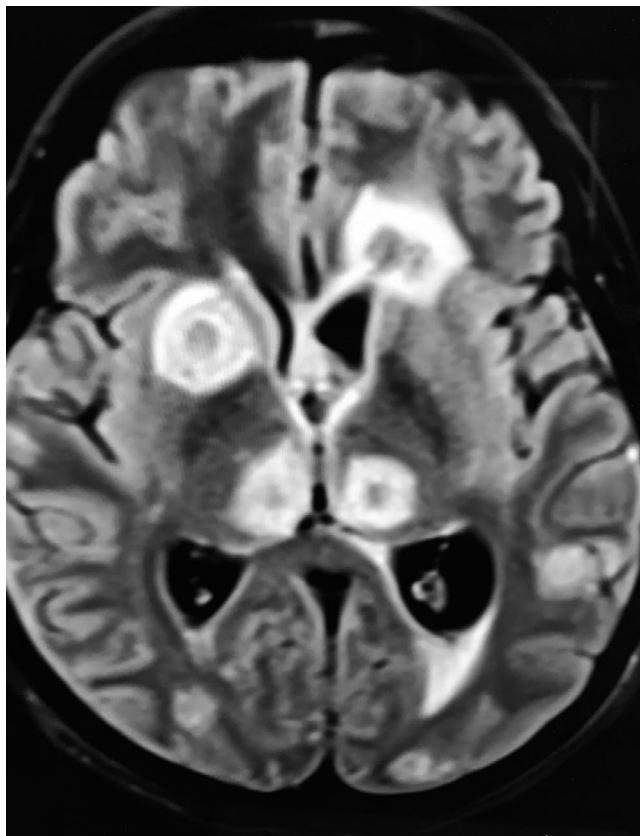
seen in her clinical symptoms and advised to follow-up every 4 weeks. MRI done at 12 weeks showed radiological resolution with no lesions and clinical deficit (Figures 3 and 4).

### 2.2 | Post-treatment MRI images

(Figures 3 and 4).

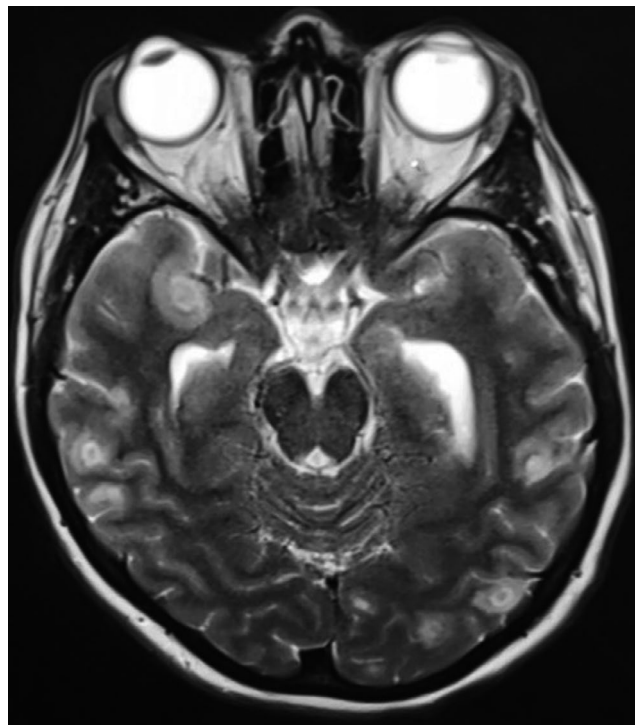
## 3 | DISCUSSION

Endogenous endophthalmitis is a rare disease caused by hematogenous germ spread to intraocular space from an internal focus through the blood-ocular barrier.<sup>3</sup> Endophthalmitis is a serious infection manifesting as ocular pain, blurred vision, chamber inflammation, raised intraocular pressure, swelling of the eyelid, or reduced red reflexes.<sup>4</sup> It accounts for about 2%–8% of all endophthalmitis cases.<sup>4–6</sup> Commonly implicated organisms are gram-negative bacilli, *Staphylococcus aureus*, and Streptococci.<sup>7</sup> In Asia, gram-negative bacilli, especially *K. pneumoniae*, cause the majority of cases of endogenous endophthalmitis.<sup>4,5,8,9</sup> Hematogenous seeding to the eyes may be attributed to the higher blood flow in the retina, choroid, and ciliary body.<sup>10</sup>

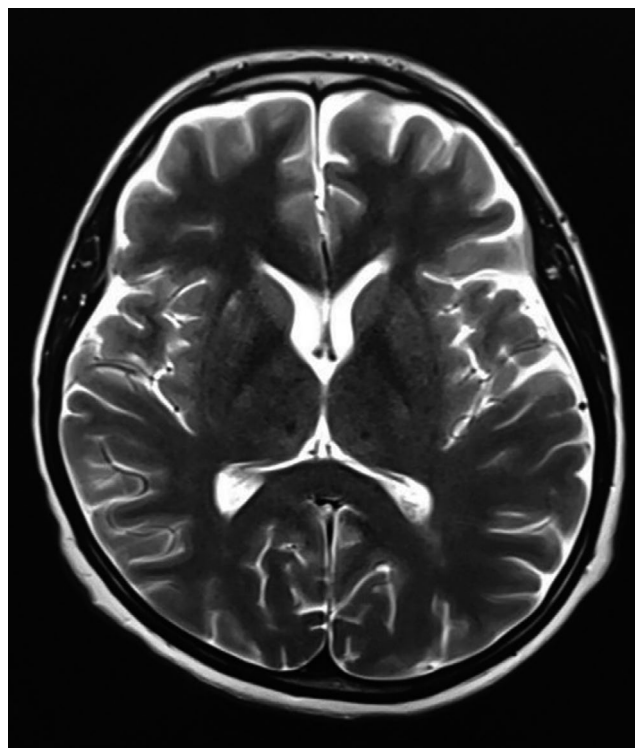


**FIGURE 2** MRI of brain showing ring-enhancing lesion in cerebellar hemisphere with diffuse smooth leptomeningeal and left ventricular enhancement

Our patient initially presented with endophthalmitis, but later developed MRI confirmed multifocal brain abscess within a duration of less than 7 days, which makes the simultaneous hematogenous spread of the pathogen from the infective foci of throat infection being more likely. Abscesses were mostly present at areas of gray-white matter differentiation, which supports the cause being hematogenous spread. Endophthalmitis due to *S. aureus* is well documented in patients who are immunocompromised, have a history of recent ocular surgery or trauma, or have artificial bypasses to natural host defenses.<sup>11</sup> There are reported cases of *S. aureus* endophthalmitis secondary to bacteremia in neonates,<sup>12</sup> patients with endocarditis, and/or diabetic patients.<sup>7</sup> *Staphylococcus aureus* accounts for 10%–20% of isolates of brain abscesses in a general population, usually reported in patients with cranial trauma or endocarditis, dialysis, either peritoneal or hemodialysis, diabetes, cancer, rheumatoid arthritis, HIV infection, intravenous drug use, or alcohol abuse.<sup>6,13,14</sup> Our report shows an unusual scenario of possible *S. aureus* acute tonsillitis being disseminated to cause endogenous endophthalmitis and multifocal brain abscess in a previously healthy adolescent, and to our knowledge, this is the first reported case of such kind.



**FIGURE 3** MRI of brain showing normal scan with no lesions



**FIGURE 4** Normal MRI scan of brain with no lesions

Previous literature has reported the simultaneous occurrence of endophthalmitis and brain abscess but in a patient with underlying disease and risk factors, including poorly controlled diabetes mellitus,<sup>15</sup> liver abscess,<sup>16</sup> and the isolated organisms, were *Klebsiella pneumoniae*,<sup>15,16</sup>

*Streptococcus agalactiae*,<sup>17</sup> and *Streptococcus constellatus*.<sup>18</sup> However, to our knowledge, there have been no studies regarding the neurological association, more specifically multifocal brain abscess, and *S. aureus* endophthalmitis.

For suitable treatment of endogenous endophthalmitis, identification of the foci of infection and prompt isolation of the organism is of paramount importance. A thorough examination to look for evidence of skin or soft tissue infection, empyema, intraabdominal abscess, bacterial endocarditis, dental infection, sinusitis, and mastoiditis should be done as a history of recent throat infection was present in our case. Blood, urine, and stool samples from the patient should be sent for culture. Intraocular sampling becomes necessary if the foci of infection and the pathogenic organism are not identified, as in our case, isolated *Staphylococcus aureus*.

Systemic antibiotics are key in treating endogenous endophthalmitis as foci of infection are distant from the eye and its choice should be guided by culture. Vitrectomy can be performed, as in our case, if the systemic and intravitreal antibiotics do not bring clinical improvement as it has a better chance of retaining useful vision and avoiding evisceration and enucleation.<sup>19,20</sup> A case series analysis found that vitrectomy was performed in 32% of eyes with endogenous endophthalmitis, which was usually accompanied by the administration of antibiotics.<sup>5</sup>

## 4 | CONCLUSION

Although *Staphylococcus aureus* leading to endogenous endophthalmitis in a previously healthy and immunocompetent patient is highly unusual, an early detection of the infection site and aggressive treatment of the infection reduces the risk of intermittent bacteremia with bacterial microemboli and thereby prevention of both endophthalmitis and brain abscess. If the foci could not be found, vitreous biopsy and isolation of the organism is of utmost importance in reaching a definitive diagnosis and preventing loss of vision.

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## CONFLICT OF INTEREST

The authors declare that they have no competing interests.

## AUTHOR CONTRIBUTIONS

Robin Rauniyar (RR) and Sagar Poudel (SP) involved in concept of study and study design. Subarna Giri (SG) and

Aman Mishra (AM) involved in review of previous literatures and preparation of draft of the manuscript. Amit Sharma Nepal (AN) and Gajendra Chaudhary (GC) involved in preparation of final manuscript and editing. Shambhu Khanal (SK) and Sunanda Paudel (SP) involved in treating physician of this case. All authors individually did final proofreading of the manuscript before submission.

## ETHICAL APPROVAL

As case reports are exempt from ethical approval in our institution, our article which describes a case report does not require additional permissions from the Ethics committee.

## CONSENT

Full written informed consent was obtained from the patient for publication of her case and radiographic images. A copy of written consent can be made available to editor in chief of this journal upon request.

## DATA AVAILABILITY STATEMENT

All the data generated or analyzed during this study are included in this article.

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