CASE REPORT

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Severe case of *Streptococcus suis* meningitis in Bali Mandara Hospital: a case report

I Wayan Agus Gede Manik Saputra[1*], Indira Chadijah Triatmoko[2], I Gede Eka Widarmawan[3], I Gede Hermawan[4], Putu Dwi Adi[5]

[1]Clinical Microbiology Laboratory, Bali Mandara General Hospital, Bali, Indonesia;
[2]Medical Staff Group of Neurology, Bali Mandara General Hospital, Bali, Indonesia;
[3]Medical Staff Group of Intensive Care, Bali Mandara General Hospital, Bali, Indonesia;
[4]Medical Staff Group of Radiology, Bali Mandara General Hospital, Bali, Indonesia;
[5]Health Epidemiology Unit, Bali Provincial Health Office, Indonesia;

*Corresponding to:
I Wayan Agus Gede Manik Saputra;
Clinical Microbiology Laboratory, Bali Mandara General Hospital, Bali, Indonesia;
gedemaniksaputra@gmail.com

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ABSTRACT

Background: *Streptococcus suis* meningitis (SSM) is one of the zoonotic disease that can cause serious illness in humans. The major risk factor in many cases of SSM is associated with pig husbandry and consuming undercooked pork products. In Indonesia, especially in Bali, the cases of this acute bacterial meningitis has been strongly correlated with consuming Balinese traditional food called "red *lawar*", a mixture of raw pork, fresh pork blood and traditional Balinese herbs. This study aims to report a case of SSM in Bali Mandara Hospital.

Case description: A 63-year-old man admitted to the Emergency Department because of a decrease in consciousness (Glasgow coma scale 3/15). This patient was transferred from a private hospital with septic shock and suspicious to acute bacterial meningitis. He had other related symptoms like fever, headache, and cough since two days prior to admission. He also had a history of consuming "red *lawar*" 2 days before the symptoms appeared. Laboratory findings from cerebrospinal fluid analysis and septic marker indicate the patient had bacterial meningitis. The patient was initially started by Meropenem due to his septic shock. The broad spectrum antibiotics were then de-escalate to Ceftriaxone once the culture and sensitivity test completed and yielded *Streptococcus suis*. The course of Ceftriaxone as definitive therapy has been administered for 14 days and showed clinical improvement without specific sequelae related to SSM infection like hearing loss.

Conclusion: Severe meningitis e.c *Streptococcus suis* leading to septic shock is a life threatening health condition. Adequate antibiotic therapy and multidisciplinary approach can reduce mortality and morbidity of this case.

Keywords: *Streptococcus suis*, meningitis, pork.
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INTRODUCTION

Streptococcus suis meningitis (SSM) is one of the bacterial meningitis caused by Gram-positive cocci bacteria.[1] This facultative anaerobic bacterium can cause zoonotic disease that become special concern and endemic in some countries in Asia.[2,3] The first *Streptococcus suis* case in human was reported in Denmark in 1968, however some regions in Asia such as Vietnam, China, Hong Kong, Thailand and Philippines have been reported of increasing number of cases dramatically since the past few decades.[4,5] Transmission of *Streptococcus suis* from pig to human by two mechanisms such as ingestion of undercooked pork products and direct exposure through skin wounds.[6-11] The incubation period of SSM varying between 60 hours to 1 week characterized by common clinical features to those of other acute bacterial meningitis like headache, fever and meningeal signs.[1] *Streptococcus suis* meningitis case in Indonesia, especially in Bali has also been documented from previous study. The Serotype 2 were the most predominant isolates found in SSM cases during 2014-2017 in Bali.[4] Based on recent data from Bali Provincial Health Office, there were numbers of SSM clusters in Bali since 2015, and the cases were also sporadically spread in some district and municipality in Bali in 2022 as many as 19 confirmed cases. *Streptococcus suis* meningitis in Bali has been associated with Balinese tradition consuming undercooked pork products and fresh blood pork made into special Balinese food named "red *lawar*" especially served at the moment of Hindu ceremonies.[5] Therefore this case report aims to describe a case of SSM in Bali Mandara Hospital.

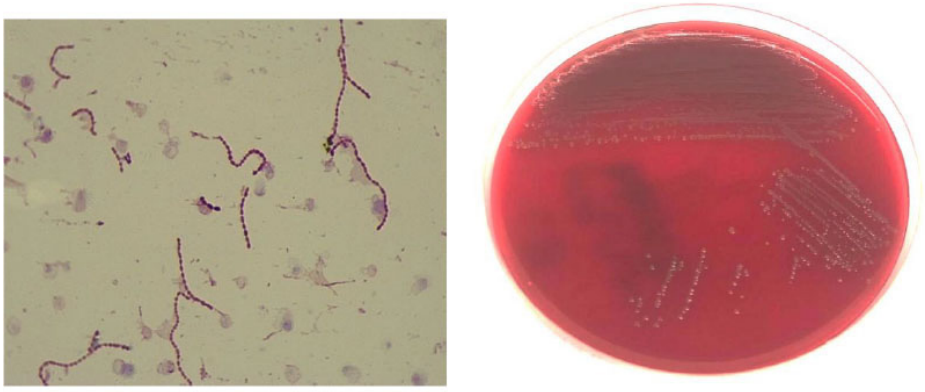
CASE DESCRIPTION

A 63-year-old man has been referred from a private hospital to Bali Mandara Hospital for further medical therapies. The patient came to the Emergency Department Bali Mandara Hospital with decreased consciousness at the last 11 hours prior to admission. This patient had a fever for 2 days after consuming traditional Balinese food "red *lawar*". The other specific symptoms related to bacterial meningitis are headache and neck stiffness started at the day admitted to hospital. He also had a cough, nausea and vomiting. Previous episodes of severe infections were denied and there was no history of draining ears and dental infections. Upon the admission his hemodynamic condition and respiratory condition were unstable. He was in a coma state (Glasgow coma scale 3/15) on ventilator oxygen saturation 98%, blood pressure 150/90 mmHg, heart

rate 112 beats per minutes, respiratory rate 28 times per minutes and axillary temperature 37,4°C.

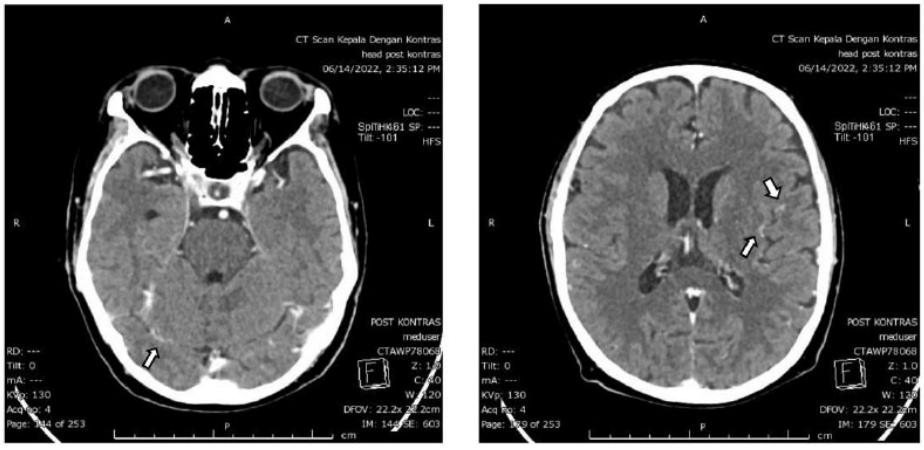
Blood results showed an increase of white blood cells (WBC 35.67^103/uL), neutrophil count 92,7% and Procalcitonin 138.79 ng/mL. Others blood parameters such as blood glucose level 162 mg/dL, renal function SC 1.4 mg/dL, BUN 86 mg/dL and electrolyte level i.e sodium (150 mmol/L), potassium (3,4 mmol/L) and chloride (114 mmol/L).

This patient had therapies Dexametason i.v 10 mg every 6 hours, Mecobalamin i.v 500 mg every 8 hours, Paracetamol i.v 1000 mg every 8 hours. The broad spectrum antibiotic (Meropenem) was considered for initial empirical antibiotic therapy due to his severe septic shock condition and need to be transferred to intensive care unit (ICU). Cerebrospinal fluid (CSF) analysis has been taken before antibiotics administered and revealed a clue diagnostic for bacterial meningitis. The leucocyte count was polymorphonuclear predominant (83,5%), low glucose level (64) and elevated protein levels (312,8 mg/dL) and cell count (2270 leucocyte/mm^3). Microbiology findings for CSF were performed by molecular diagnostic using Meningitis/Encephalitis – ME Panel IVD from Biofire® and phenotypic diagnostic by culture and sensitivity test. The advanced technology from Biofire® by bioMérieux based on syndromic approach can detect the most possible pathogen related to meningitis which can be processed within hours like Bacteria (*Escherichia coli* K1, *Haemophilus influenzae*, *Listeria monocytogenes*, *Neisseria meningitidis*, *Streptococcus agalactiae* and *Streptococcus pneumoniae*), viruses (Cytomegalovirus, Enterovirus, Herpes simplex virus 1, Herpes simplex virus 2, Human herpesvirus 6, human parechovirus and Varicella zoster virus) and Yeast (*Cryptococcus neoformans/gatii*). Based on this study no pathogens listed above were detected by this molecular diagnostic platform. It suggested that no viruses were likely to be the cause of meningitis in this case. The CSF specimens were then incubated in BacT/Alert bottle culture and yielded positive results within a few hours of incubation. Gram-positive cocci in chains were obtained from Gram staining of positive bottles (Figure 1a). Small colonies with alpha haemolysis seen from CSF culture onto 5% defibrinated sheep blood agar (SBA) plate (fig. 1b). The colony resembles a negative catalase test, yet it is an optochin test. The identification and sensitivity test were performed by Vitek2 Compact System (bioMérieux, Inc., Marcy-l'Etoile – France), and the organism known as *Streptococcus suis* 2 and sensitive to any group of antibiotics i.e., ampicillin, penicillin, ceftriaxone, and levofloxacin.



(a) (b)

Figure 1. (a) Gram positive cocci in chains revealed from Gram stain of *S. suis* (subculture by indirect method from positive bottle of BacT/alert) (b) alpha-hemolysis colonies of *S. suis* on sheep blood agar (SBA).



(a) (b)

Figure 2. Contrast-enhanced brain computed tomography (CT) Scan 14th day post therapy demonstrated minimal leptomeningeal enhancement (white arrow).

Ceftriaxone as a definitive therapy to eradicate *Streptococcus suis* as a causality of acute bacterial meningitis for this case has been administered for 14 days. Under this antibiotic therapy the patient has good clinical outcome and could be finally transferred after 12 days at intensive care to the ward, where he stayed for another 5 days. The clinical improvements were also proven by the result of CT scan result 14th days post therapy (Figure 2a-b) and the patient could be discharged with full recovery.

DISCUSSION

Streptococcus suis is one of the Gram-positive coccus bacteria that can cause acute bacterial meningitis. The spread of this bacterium to humans through close contact with pigs or history of consuming raw pig products. Traditional cuisine in Bali named "red *lawar*" becomes a high potential risk factor of SSM to anyone who consumes that local specific food. Eating of high risk food has pooled estimate 37.3% (95% CI 20.2 – 58.3%) and proportion

53.3% to risk factor of *Streptococcus suis* infection.[6] Another study from Thailand, of 31 MSS cases as many as 27 cases (71%) had history consumption of raw pork product.[10-14]

The classic triad of acute bacterial meningitis are fever, neck stiffness and altered mental status.[11] *Streptococcus suis* meningitis has the same symptoms as those that occurred in acute bacterial meningitis. Some SSM show symptoms of hearing loss. In this case report, the patient has fever, headache, neck stiffness and altered mental status, fortunately this patient had no complaint of hearing loss. Huong et al, found that among the survivors of the SSM, the hearing loss rate is 39,1%. The higher prevalence of hearing loss in SSM patient occurred 53%.[2]

One of the clinical syndromes in SSM is sepsis. It occurs in 25% of the clinical symptoms in SSM.[6] In this case report, sepsis developed into a severe condition which is septic shock that becomes life threatening. Huong et al found there are significantly more deaths were found is SSM cases with septic shock.[6]

The principles of management of SSM are the same as those of acute bacterial meningitis. Ceftriaxone as an empiric antibiotic is administered without any delays. This patient has been administered Ceftriaxone 2 gram BID for 14 days. Adjunctive therapy such as Dexamethasone 10 mg daily for 5 days has also been administered for this patient. Mai et al, reported severe hearing loss was associated without therapy Corticosteroid and older age patients (>50 years). In this case, the patient had no complaint of hearing loss. The occurrence without hearing loss in this patient probably due to administered of adequate Dexamethasone in early acute phase of the disease.[9]

Based on culture and sensitivity tests, most of *Streptococcus suis* isolate showed sensitivity to Ceftriaxone. Ceftriaxone is one of third generation Cephalosporin which has best penetration to Blood Brain Barrier (BBB) and become first line therapy for acute bacterial meningitis.[8] Another study from Aryasa et al, intravenously 2 g ceftriaxone therapy for 14 days has revealed good patient outcome. The multidisciplinary approach for management of severe cases of SSM is an essential strategy to achieve good outcomes for patients. Synergistic collaboration among Intensivist, Neurologist and Clinical Microbiologist is an important determinant related to management of this case especially during the acute phase.[8-11] The early diagnostic to determine the etiology of acute bacterial meningitis of this case is using molecular diagnostic. Film array platform is one of molecular based tests using a syndromic approach yielding a result within hours. Meningitis/encephalitis (ME) panel film array Biofire® by bioMérieux can detect a broad spectrum of pathogens that cause acute bacterial meningitis including viruses. The use of diagnostic stewardship using this ME panel unfortunately can not determine the etiology of acute bacterial meningitis because *Streptococcus suis* is not one of the listed pathogens tested on this panel. From history taking and analysis of CSF can strongly suggested the cause of this meningitis is bacterial, and the administered of empirical antibiotic is appropriate decision.[12-14]

In general, prevention measures of SSM include control and prevention in swine and human. In the swine perspective, we have to eradicate or reduce the colonization of *Streptococcus suis* from pigs i.e eradicate sick animals by proper antibiotic and disinfection to the slaughterhouse regularly. Prevention of human infection needs comprehensive approaches especially enhancing the promotive and educative to people who used to eat raw pork product, besides educate the workers at slaughterhouse to use appropriate personal protective equipment to prevent the evidence bacteria evades the erosion skin or mucosal.[1] Health promotion could be the most fundamental strategy to reduce the MSS cases in Bali. The Bali Health Office in collaboration with other related sectors has taken some efforts to control the spread of MSS cases in Bali. Health promotion to small communities in Bali or *"Banjar"* is the primary effort, moreover food handlers where the initial MSS cases had their Balinese Food "red *lawar*" are also needed to be educated. Synergistic efforts between the health and animal sector are also beneficial to strengthen the prevention strategy to maintain the health condition of swine which can be a reservoir of this disease.

CONCLUSION

The outcome of severe acute bacterial meningitis depends on the appropriateness of diagnosis and therapy workup in patients. The multidisciplinary approach to manage this case is one of the success stories to achieve a good prognosis and outcome. Health issues related to culture need further intervention to control the widespread of MSS in Bali.

CONFLICT OF INTEREST

The authors declare that this research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

FUNDING

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ETHICAL CLEARANCE

Authors have secured informed consent from patient regarding this case report.

AUTHOR CONTRIBUTION

Conceptualization, methodology and writing original draft preparation conducted by Saputra IWAGM; Formal analysis by Triatmoko IC, Widarmawan IGE, Hermawan IG, Adi PD; validation by Saputra IWAGM; writing, review and editing by Saputra IWAGM, Triatmoko IC; approval of final manuscript by all authors.

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