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Rare case of human *Streptococcus suis* purpura fulminans at Prof. Ngoerah Hospital, Denpasar, Bali

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ABSTRACT

Background: *Streptococcus suis* (*S. suis*) is a zoonotic bacterium capable of causing severe infections in humans, particularly those with occupational exposure to pigs or pork products. Notable manifestations include meningitis, endocarditis, sepsis, and distinct skin conditions such as purpura and necrotic lesions. Southeast Asia reports the highest incidence, correlating with prevalent pig farming practices. Though infrequent, *S. suis* infections can lead to severe outcomes if not promptly diagnosed and treated.

Case Presentation: We present a case involving a 73-year-old Balinese man without recent exposure to pigs or pork but with a history of pork consumption six months prior. He was admitted with symptoms including skin discoloration, respiratory distress, and loss of consciousness. Physical and laboratory examinations revealed pleural effusion, pneumonia, and high procalcitonin levels. Blood cultures identified *S. suis*, confirmed by VITEK® 2 system with susceptibility to multiple antibiotics, except tetracycline. Despite initial treatment with ceftriaxone, azithromycin, and levofloxacin; the patient's condition deteriorated, resulting in a fatal outcome.

Conclusion: This case underscores the importance of early diagnosis and rapid antibiotic intervention in *S. suis* infection. Delay in hospitalization significantly impacts prognosis, and timely, targeted treatment could improve survival rates. Enhanced awareness and preventive strategies in high-risk areas are vital to reducing the incidence and mortality associated with this infection.

Keywords: purpura fulminans, *Streptococcus suis* infection, zoonosis.

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INTRODUCTION

Streptococcus suis (*S. suis*) is a type of bacteria that can cause various diseases in both pigs and humans. These include conditions such as meningitis, endocarditis, endophthalmitis, arthritis, hearing loss and skin related disease. People who have come into close contact with pigs or pork products and consume undercooked pork may be more susceptible to contracting *S. suis* infections.¹

S. suis has been reported to have spread to 30 countries and resulted in the deaths of 1,600 individuals, some of which were fatal cases.² The majority of cases have been reported in Southeast Asia, where pig farming is prominent and there is a high density of hogs.³ A study on *S. suis* revealed that the pathogenic bacteria were found in the cerebrospinal fluid in 66.7%

of cases, blood in 50% of cases, and both cerebrospinal fluid and blood in 25% of cases.⁴ Six percent to 31% of patients also have skin findings, including petechiae, purpura, and ecchymoses, all of which can be extensive, and hemorrhagic bullae and skin necrosis (features of purpura fulminans). Gangrene of the fingers and toes may also be seen in a minority of patients at a later stage in the disease.⁵

In this case report, we describe a patient who was affected by *S. suis*. A 73-year-old Balinese man who experienced skin discoloration, loss of consciousness, and shortness of breath. A thorough analysis of the patient's medical history, microbiological diagnosis procedures, drug sensitivity testing, and treatment process were conducted. Additionally, relevant literature related to this topic was reviewed and discussed.

CASE PRESENTATION

A 73-year-old man, Balinese, was admitted to the hospital with loss of consciousness and shortness of breath. The patient was a rural man with no specific medical history. One week before the admission, The patient had discoloration of the skin (Figure 1). The patient also did not have recent exposure to pigs, other animals or even occasional exposure but had a history of eating pigs approximately 6 months ago.

On admission, the patient's temperature was 36.5 °C, the pulse was 102 beats/min, the respiratory rate was 24 beats/min, and the blood pressure was 120/80 mmHg. A physical examination revealed the patient had discoloration of the skin colour at 1/3 distal of manus dextra, manus sinistra, pedis dextra and pedis sinistra. The



Figure 1. Discoloration observed on both the patient's hands and feet, characterized by a noticeable change in skin tone, potentially indicating underlying vascular or systemic issues. The discoloration appears as darker.

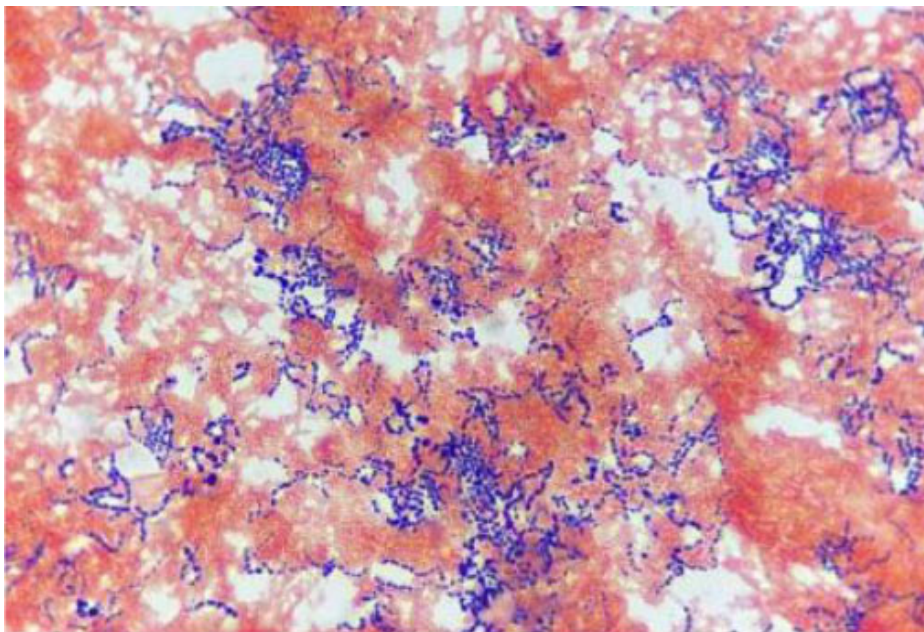


Figure 3. A large number of Gram-positive cocci were found in the blood smear (Gram stain, 100x magnification).

extremities capillary refill time was more than 2 seconds. Rhonchi was found in both of patient's lungs. Routine laboratory and imaging examination showed: leukocyte $21.79 \times 10^3/\mu\text{L}$, neutrophil 92.80%, AST/SGOT 177.6 U/L, ALT/SGPT 100.40 U/L, blood urea nitrogen 45.40 mg/dL, serum creatinine 2.42 mg/dL, procalcitonin 83.14 ng/mL. Thorax anterolateral-posterior (AP) imaging showed pleural effusion, pneumonia, and thoracalis spondylosis (Figure 2).

Blood was drawn from both arms for blood cultures. Gram stain of the blood showed Gram-positive cocci bacteria (Figure 3).

After one day, one of the blood culture bottles gave positive results with time of positivity 19 hours 53 minutes and a warning was issued. Positive samples were

transferred to blood agar plates for further culture. The next day, α -haemolytic colonies grew on sheep blood agar plates (Figure 4). Organisms that were gram-positive cocci were catalase-negative and identified as *S. suis* using VITEK® 2 system. The Analysis result was 99% probability.

Antimicrobial susceptibility test results revealed that the bacteria was sensitive to benzylpenicillin, ampicillin, cefotaxime, ceftriaxone, levofloxacin, erythromycin, clindamycin, linezolid, teicoplanin, vancomycin, chloramphenicol, and tigecycline but resistant to tetracycline. Ceftriaxone, azithromycin, and levofloxacin were administered intravenously for empirical treatment. After the pathogen and drug sensitivity were confirmed, ceftriaxone

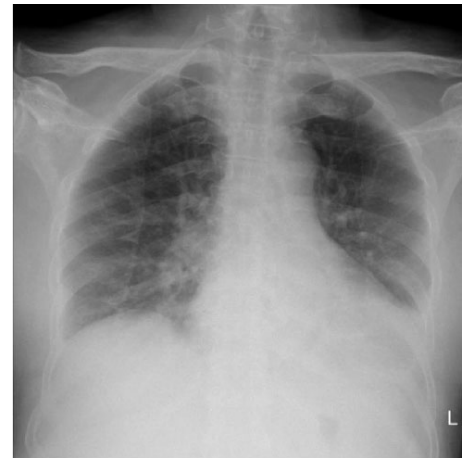


Figure 2. Thorax AP imaging showed pleural effusion, pneumonia, and thoracalis spondylosis.

was planned for definitive treatment. Heparin was used to reduce the blood clot. Acetylcysteine was used to reduce the cough symptom. Ceftriaxone was given for 7 days, azithromycin was given for 2 days, levofloxacin was given for 5 days. After the antibiotics were administered, the procalcitonin level was reduced to 6.93 ng/mL. Seven days after the patient's admission, the patient's condition deteriorated and blue code was initiated. The patient was still unresponsive after five cycles of cardiopulmonary resuscitation and then was declared dead.

DISCUSSION

S. suis is a Gram-positive facultative anaerobic bacterium with capsule structure. It belongs to the Lancefield group D streptococci based on its cell wall antigen composition. This pathogen has the ability to inhabit various parts of healthy pigs such as the upper respiratory system (specifically the nasal cavity and tonsils), genitalia, and digestive tract.⁶

The survival of *S. suis* in various environments, such as dust, fertilizer, and pig carcasses, for extended periods can contribute to human infections. The surrounding areas of hoggeries and slaughterhouses may serve as potential sources of *S. suis* transmission. Due to the limited living conditions for *S. suis*, infection cases caused by this pathogen are infrequent and typically isolated incidents. Occupational groups with frequent exposure to pigs or raw pork, including pig breeders, veterinarians, meat



Figure 4. *S. suis* showed α -hemolysis medium-sized, off-white, smooth, moist colonies on sheep blood agar.

processing workers, transport workers, butchers, and cooks, face a high risk of contracting *S. suis* infections, accounting for the majority of cases reported. Even minor skin lesions that may go unnoticed provide an entry point for the pathogen when individuals come into contact with infected pigs or raw pork carrying *S. suis*, resulting in direct bloodstream invasion and leading to infection.⁷

In this case report, it was discovered that the patient had a previous incident of consuming pork about six months ago. In one outbreak in China, the incubation period for *S. suis* infection ranged from 3 hours to 14 days (with a median of 2.2 days). This short incubation time suggests that the bacteria can directly enter the bloodstream through skin wounds. Other studies have also noted incubation periods ranging from few hours to few days.⁸

Meningitis is a common manifestation of *S. suis* infection in humans, with prominent features including hearing loss and/or vestibular dysfunction associated

with early damage to the eighth cranial nerve. Sepsis is a common clinical syndrome associated with *S. suis* infection, occurring in approximately 25% of cases. *S. suis* cases with septic shock were more likely to result in fatalities.⁹

Patients with *S. suis* infection may exhibit skin manifestations, such as petechiae, purpura, ecchymoses, hemorrhagic bullae and necrotic skin lesions (indicative of purpura fulminans). These dermatological symptoms can range from mild to severe in severity, affecting a varying percentage of patients ranging from six percent to 31%.⁵ The pathogenesis of purpura fulminans in streptococcal infections is unclear and thought to be related to the development of disseminated intravascular coagulation.¹⁰ In this case report, the patient is exhibiting purpura on 1/3 distal of manus dextra, manus sinistra, pedis dextra and pedis sinistra which start to manifest one week before hospital admission.

S. suis is susceptible to penicillin or

cephalosporin antibiotics. Intravenous penicillin G at high doses has shown efficacy in most patients. Resistance to tetracycline and macrolide drugs is common, but cases of multi-drug resistance are rare.⁹ The formation of biofilms likely contributes to the virulence and drug resistance observed in *S. suis*.¹ In this case report, empirical treatment with ceftriaxone was administered before confirming the identification of the pathogen. After identifying *S. suis* and obtaining drug sensitivity results, targeted treatment with ceftriaxone was continued until seven days. The effectiveness of the treatment was evident as indicated by a significant reduction in procalcitonin levels from 83.14 to 6.93 ng/mL within five days.

One of the main factors that likely contributed to the patient's death was their delayed admission to the hospital. The patient was not admitted to hospital until one week after symptoms appeared, whereas previous studies have shown that antibiotic therapy should be initiated as soon as possible after symptom onset.¹¹

A limitation of this case report is the challenge in sourcing references from the most recent five years, which may impact the comprehensiveness of the literature review and the context of the findings within current research developments.

CONCLUSION

The outcome of *S. suis* infection depends on the appropriateness of diagnosis and the proper implementation of therapeutic treatments. An interdisciplinary approach 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 *S. suis*.

CONFLICT OF INTEREST

The authors state that this study was conducted without any commercial or financial ties that could be seen as a possible conflict of interest.

FUNDING

The authors declare that there was no financial support or sponsorship for this study.

ETHICAL CLEARANCE

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

AUTHOR CONTRIBUTION

Henri Nara Dhany contributed to the study conception and design and drafted the manuscript; Komang Januartha Putra Pinatih and Ni Made Adi Tarini revised the manuscript critically for important intellectual content; Henri Nara Dhany and Ida Bagus Putu Putrawan, performed the main part of the data collection; and Ida Bagus Putu Putrawan provided help with analysis and interpretation of the patient's data.

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REFERENCES

1. Palmieri C, Valardo PE, Facinelli B. *Streptococcus suis*, an Emerging Drug-Resistant Animal and Human Pathogen. *Front Microbiol.* 2011;2:235. doi:10.3389/fmicb.2011.0023.
2. Wertheim HF, Nghia HD, Taylor W, Schultsz C. *Streptococcus suis*: an emerging human pathogen. *Clin Infect Dis.* 2009;48(5):617-625. doi:10.1086/596763.
3. Kim H, Lee SH, Moon HW, et al. *Streptococcus suis* causes septic arthritis and bacteremia: phenotypic characterization and molecular confirmation. *Korean J Lab Med.* 2011;31(2):115-117. doi:10.3343/kjlm.2011.31.2.115.
4. Suankratay C, Intalapaporn P, Nunthapisud P, Arunyingmongkol K, Wilde H. *Streptococcus suis* meningitis in Thailand. *Southeast Asian J Trop Med Public Health.* 2004;35(4):868-876.
5. Lee JM, Jansen R, Sanderson KE, et al. Public health emergency preparedness for infectious disease emergencies: a scoping review of recent evidence. *BMC Public Health.* 2023;23(1):420. doi:10.1186/s12889-023-15313-7.
6. Liu T, Liu H, Jia Y. *Streptococcus suis* meningitis in China: a case report. *Front Public Health.* 2024;12:1369703. doi:10.3389/fpubh.2024.1369703.
7. Zhao G, Ying L, Shi Y, et al. Potential mechanisms of *Streptococcus suis* virulence-related factors in blood-brain barrier disruption. *One Health Adv.* 2024;2:26. doi:10.1186/s44280-024-00059-7.
8. Gajdács M, Németh A, Knausz M, et al. *Streptococcus suis*: An Underestimated Emerging Pathogen in Hungary?. *Microorganisms.* 2020;8(9):1292. doi:10.3390/microorganisms8091292.
9. Li K, Li S, Hong J, et al. Meningitis and sepsis caused by *Streptococcus suis* in an elderly woman: A CARE-compliant case report. *Medicine (Baltimore).* 2023;102(43):e35780. doi:10.1097/MD.00000000000035780.
10. Feng Y, Zhang H, Wu Z, et al. *Streptococcus suis* infection: an emerging/reemerging challenge of bacterial infectious diseases?. *Virulence.* 2014;5(4):477-497. doi:10.4161/viru.28595.
11. Vaikutyte-Ramanauskienė R, Puslys T, Pukenyte E, Mickienė A. The first case of invasive *S. suis* infection in a human in Lithuania: Case report and literature review. *IDCases.* 2024;37:e02050. doi:10.1016/j.idcr.2024.e02050.



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