Case report

Two human Streptococcus suis infections in Borneo, Sabah, Malaysia

Rajahram, Giri Shan; Hameed, Ahneez Abdul; Menon, Jayaram; WILLIAM, Timothy; Tambyah, Paul Anantharajah; Yeo, Tsin Wen

Published in:
BMC Infectious Diseases

DOI:
10.1186/s12879-017-2294-z

Published: 04/03/2017

Document Version
Publisher's PDF, also known as Version of record

Link to publication

Citation for published version (APA):
Rajahram, G. S., Hameed, A. A., Menon, J., WILLIAM, T., Tambyah, P. A., & Yeo, T. W. (2017). Case report: Two human Streptococcus suis infections in Borneo, Sabah, Malaysia. BMC Infectious Diseases, 17(1), 1-3. [188]. https://doi.org/10.1186/s12879-017-2294-z

General rights
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

• Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
• You may not further distribute the material or use it for any profit-making activity or commercial gain
• You may freely distribute the URL identifying the publication in the public portal

Take down policy
If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.
Case report: two human Streptococcus suis infections in Borneo, Sabah, Malaysia

Giri Shan Rajahram¹²*, Ahneez Abdul Hameed³, Jayaram Menon²⁴, Timothy William⁵, Paul Anantharajah Tambyah⁶ and Tsin Wen Yeo⁷⁸⁹

Abstract

Background: Streptococcus Suis (S.suis) is increasingly being recognised as a potentially preventable emerging zoonotic infection in humans with a global distribution. It is a major cause of meningitis especially among those in contact with pigs and has also been associated with a toxic shock syndrome.

Case presentations: We report the first two human cases from Sabah, Borneo, Malaysia which expands the global reach of this important pathogen. Here, we illustrate their epidemiological risk factors, clinical presentation and resulting sequelae of both patients.

Conclusion: The continued public health threat of zoonotic infections such as S.suis, highlights the need for accurate epidemiological surveillance, regulation of pig farming, slaughtering and continued advocacy of best practices for pork preparation and consumption.

Keywords: Streptococcus suis, Meningitis, Sabah, Case report

Background
Streptococcus suis (S.suis) is a porcine zoonotic infection which is increasingly recognised. Meningitis and septicaemia have been described as the most common clinical syndromes [1]. Since the first reported human case in Denmark, increasing numbers have been reported worldwide [2]. In South East Asia, Thailand and Vietnam have reported the largest number of cases with sporadic reports from Singapore, Philippines and Laos [2]. To date, there have not been any cases reported from Malaysia or Indonesia partly because of the limited pig rearing due to cultural reasons. We report two cases from Sabah, Borneo, Malaysia.

Case report
The first patient was a 41-year-old previously healthy man who presented with 2 day history of fever, headache, vomiting, neck pain and behavioural change. He reared four pigs at home and had daily contact with them. On examination, he was confused and disorientated, with a Glasgow Coma Scale (GCS) 7/15, hypotensive with a blood pressure of 89/57 mmHg, and had meningeal signs, however there was no rash noted. He was intubated for airway protection, started on noradrenaline, ceftriaxone and acyclovir. Blood tests indicated leucocytosis (13.7 × 10⁹ white blood cell/L), neutrophilia (12.63 × 10⁹ neutrophils/L), lymphopenia (0.72 × 10⁹ lymphocytes/L), elevated C-reactive protein (320 mg/L), and hypoalbuminemia (28 g/L). Contrast enhanced computed tomography of the brain and transthoracic echocardiogram were normal.

Lumbar puncture done 12 h after admission and initial antibiotic administration showed an opening pressure of 27 cmH₂O and the cerebrospinal fluid (CSF) was noted to be cloudy with a protein level of 2.16 g/L, a glucose level of 1.98 mmol/L (concomitant serum glucose was 7.6 mmol/L), and 95 leukocytes/μL (30% neutrophils and 65% lymphocytes). CSF gram stain and culture did not reveal any organism however blood cultures after 3 h of incubation were positive for gram positive cocci in chains. Culture specimens were plated on blood agar and after 18 h of incubation in 37 °C under aerobic conditions, the growth showed alpha haemolytic colonies which were catalase negative. These colonies were identified using matrix-assisted laser desorption ionization time-of-flight...
is consistent with previous reports of *S. suis* tibular symptoms during the course of admission. This with bacteraemia and developed hearing loss and ves-

mal preparation and consumption of pork and its organs in the second patient, it is increasing recognised that subopti-

tion infection. In Asia, besides direct trauma as with our first patient, presentation of *S. suis* meningitis associated with vertigo, loss of balance and nausea. He was scheduled for a pure tone audiometry on clinic follow up upon discharge however defaulted his appointment and we do not have any rec-

The second patient was a 44-year-old man, presented with a 2 day history of fever with chills and rigors associ-

ated with headache and vomiting. On examination he was alert and conscious with no signs of meningism. He had no fever on admission, the blood pressure was 124/68 mmHg and heart rate 81 beats per minute. Systemic examination was unremarkable. He worked as a butcher in local market handling pork and had injured his thumb while slaughtering a pig two days prior to onset of symp-

toms. Blood tests showed leucocytosis \((35.4 \times 10^9)\) white blood cell/L), neutrophilia \((33.04 \times 10^9)\) neutrophils/L), lymphopenia \((0.70 \times 10^9)\) lymphocytes/L), elevated C-reactive protein \((226.8 \text{ mg/L})\), and hypoalbuminemia \((29 \text{ g/L})\). Blood culture on admission and antibiotic susceptibility testing performed by methods described above was positive for *Streptococcus suis* which was sensitive to penicillin. Lumbar puncture performed 48 h after admission was normal with no white blood cells and normal glucose and protein. His echocardiogram also did not show any evidence of endocarditis. He completed two weeks of intravenous penicillin G and made complete recovery on discharge without any residual neurological or otological deficits.

**Discussion**

Consistent with previous reports [1, 2, 4] both our pa-

tients had significant exposure to pigs prior to developing

infection. In Asia, besides direct trauma as with our second patient, it is increasing recognised that subopti-

mal preparation and consumption of pork and its organs may increase the risk of acquiring this disease [1, 2, 4].

The first patient presented with meningitis associated with bacteraemia and developed hearing loss and ves-

tibular symptoms during the course of admission. This is consistent with previous reports of *S. suis* meningitis with labyrinthitis [5] and sensory neural hearing loss occurring in up to 2/3rd of patients with a guarded prognosis for recovery [4]. The use of dexamethasone therapy in association to reducing hearing loss is contro-

versial, with one study showing reduction in severe hearing loss [4] and a subsequent case series demonstrating hearing loss continued to occur despite therapy [6]. As with other forms of bacterial meningitis, the best out-

comes are likely to be obtained by early recognition and rapid administration of parenteral antibiotics, combined with labyrinthitis [5] and sensory neural hearing loss [4] and a subsequent case series demonstrating hearing loss continued to occur despite therapy [6]. As with other forms of bacterial meningitis, the best out-

comes are likely to be obtained by early recognition and rapid administration of parenteral antibiotics, combined administration of dexamethasone patients with a history of porcine exposure, and in regions with a high prevalence of *S. suis* meningitis [7]. Referral to the Otorhinolaryngolo-

gist for audiometry and vestibular testing may be needed including early evaluation for cochlear implant [8].

Although meningitis is the most common described presentation of *S. suis* infection, sepsis, uveitis, endoptahl-

atitis, endocarditis, arthritis and spondylodiscitis have all been previously reported [1, 2]. Of note, large outbreaks in China have described streptococcal toxic shock syndrome (STSS) associated with *S. suis* infection with rapid clinical deterioration including purpura fulminans and high mortality [9, 10]. While this syndrome has not been recognised outside of China, there is a concern that limited diagnostic resources and a lack of accessibility to healthcare may be the reason why this is so in other parts of Asia.

To date, 29 serotypes *S. suis* have been described [11]. The majority of human cases have been attributed to serotype 2 with also some sporadic cases from other se-

rotypes, mainly serotype 14 [10]. Reliable multiplex PCR methods are replacing traditional biochemical based methods in detecting these serotype [12], this coupled with multilocus sequence typing (MLST) this has led to better epidemiological characterization and improved understanding virulence patterns of this organism [11]. Unfortunately, these were not available in our regional hospital as the need for specialised expertise and funding limits such testing to regional and national reference laboratories or in an academic setting.

**Conclusion**

In summary our cases illustrate the common clinical pres-

tentation and sequelae associated with *Streptococcus suis* infection. Although it is a common zoonotic infection in certain parts of Asia, the true burden of illness in Malaysia in not know. The continued public health threat of zoonotic infections such as *S. suis*, highlights the need for accu-

rate epidemiological surveillance, regulation of pig farming, slaughtering and continued advocacy of best practices for pork preparation and consumption.

**Abbreviations**

CSF: Cerebrospinal fluid; MALDI-TOF MS: Matrix-assisted laser desorption ionization time-of-flight mass spectrometry; MIC: Minimal inhibitory concentration; MLST: Multilocus sequence typing; S.suis: Streptococcus suis; STSS: Streptococcal toxic shock syndrome.
Acknowledgments
The authors would like to thank the Director General of Health, Malaysia for permission to publish this report. We would also like to thank Dr. Goh Pik Pin and Clinical Research Centre, Malaysia for their continued support to publish this report.

Funding
Nil.

Availability of data and materials
All data are available in the patients’ admission records to the hospital.

Authors’ contributions
GSR, AAH, YTW, TW, and PAT prepared the manuscript. All authors read and approved the final manuscript.

Competing interests
The author(s) declare that they have no competing interests.

Consent for publication
Verbal informed consent was obtained from the patients for publication of this report.

Ethics approval and consent to participate
Not applicable.

Author details
1 Infectious Diseases Unit, Department of Medicine, Queen Elizabeth Hospital, Kota Kinabalu, Sabah, Malaysia. 2 Clinical Research Centre, Queen Elizabeth Hospital, Kota Kinabalu, Sabah, Malaysia. 3 Microbiology Unit, Department of Pathology, Queen Elizabeth Hospital, Kota Kinabalu, Sabah, Malaysia. 4 Department of Medicine, Queen Elizabeth Hospital, Kota Kinabalu, Sabah, Malaysia. 5 Jesselton Medical Centre, Kota Kinabalu, Sabah, Malaysia. 6 Yong Loo Lin School of Medicine, National University Health System, National University of Singapore, Singapore, Singapore. 7 Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore, Singapore. 8 Institute of Infectious Disease and Epidemiology, Tan Tock Seng Hospital, Singapore, Singapore. 9 Global Health Division, Menzies School of Health Research, Darwin, Australia.

Received: 16 December 2016 Accepted: 28 February 2017
Published online: 04 March 2017

References
1. Huong VTL, Ha N, Huy NT, Horby P, Nghia HDT, Them VD, et al. Epidemiology, clinical manifestations, and outcomes of Streptococcus suis infection in humans. Emerg Infect Dis. 2014;20:1105–14.
2. Hughes JM, Wilson ME, Wertheim HF, Nghia HD, Taylor W, Schultz C. Streptococcus suis: an emerging human pathogen. Clin Infect Dis. 2009;48(5):617–25. doi:10.1086/596763.
3. CLSI. Performance Standards for Antimicrobial Susceptibility Testing. 26th ed. CLSI Supplement M100S. Wayne: Clinical and Laboratory Standards Institute; 2016.
4. Mai NT, Hoa NT, Nga TV, le Linh D, Chau TT, Sinh DX, et al. Streptococcus suis meningitis in adults in Vietnam. Clin Infect Dis. 2008;46:659–67. doi:10.1086/527385. pmid:19413493.
5. Donakul K, Dejthevaporn C, Wiltoonpanich R. Streptococcus suis infection: clinical features and diagnostic pitfalls. Southeast Asian J Trop Med Public Health. 2003;34:154–8.
6. van Samkar A, Brouwer MC, Schultz C, van der Ende A, van de Beek D. Streptococcus suis meningitis in the Netherlands. J Infect. 2015. doi:10.1016/j.jinf.2015.07.001. pmid:26166610
7. van Samkar A, Brouwer MC, Schultz C, van der Ende A, van de Beek D. Streptococcus suis meningitis: a systematic review and meta-analysis. PLoS Negl Trop Dis. 2015;9(10):e0004191. doi:10.1371/journal.pntd.0004191.
8. Barbosa MH, Felix F, Ribeiro MG, Tomita S, Pinheiro C, Baptista MM. Profile of patients assessed for cochlear implants. Braz J Otorhinolaryngol. 2014;80:303–10. doi:10.1016/j.bjorl.2014.05.011. pmid:25183180.
9. Yu H, Jing H, Chen Z, Zheng H, Zhu X, Wang H, et al. Human Streptococcus suis infection outbreak, Sichuan, China. Emerg Infect Dis [2006 Jun] [date cited]. http://dx.doi.org/10.3201/eid1206.051194
10. Tang J, Wang C, Feng Y, Yang W, Song H, Chen Z, et al. Correction: Streptococcal Toxic Shock Syndrome Caused by Streptococcus suis Serotype 2. PLoS Med. 2006;3(8):e377. doi:10.1371/journal.pmed.0030377.
11. Goyette-Desjardins G, Auger JP, Xu J, Segura M, Gottschalk M. Streptococcus suis, an important pig pathogen and emerging zoonotic agent—an update on the worldwide distribution based on serotyping and sequence typing. Emerg Microbes Infect. 2014;3:e46.
12. Kedsin A, Akeda Y, Hatrongjit R, Detchavuna U, Sekizaki T, Hamada S. Streptococcus suis serotyping by a new multiplex PCR. J Med Microbiol. 2014;63:824–30.