

Streptococcus Intermedius Liver Abscess in a Healthy Person

I-Min Tsai¹, Chung-Feng Huang^{2,3,4} and Zu-Yau Lin^{2,3,4,*}

¹Department of Internal Medicine, Kaohsiung Medical University Hospital, Kaohsiung, Taiwan

²Division of Hepatobiliary Medicine, Department of Internal Medicine, Kaohsiung Medical University Hospital, Kaohsiung, Taiwan

³Department of Internal Medicine, Faculty of Medicine, College of Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan

⁴Center for Cancer Research, Kaohsiung Medical University, Kaohsiung, Taiwan

*Corresponding author: Zu-Yau Lin, Division of Hepatobiliary Medicine, Department of Internal Medicine, Kaohsiung Medical University Hospital. No. 100 Tzyou 1st Road, Kaohsiung 807, Taiwan

Received: June 27, 2023

Published: November 15, 2023

Abstract

We introduce a middle-aged male without underlying disease nor noticeable precipitating factors suffered from the pyogenic abscess, which cultivated relative rare pathogen *Streptococcus intermedius*. Besides, we discussed the possible pathogenesis and overviewed the past studies regarding those also no more underlying disease, but no similar precipitating factors found in the past studies. After analysing possible risk factors and comparison to previous studies, we speculated the possible infection route, only leafy salad intake for one week, which induced several outbreaks of foodborne disease in western countries.

Keywords: Liver abscess; *Streptococcus intermedius*; Food hygiene; Healthy People

Introduction

The most common pathogens of pyogenic liver abscess include Gram-negative enteric bacteria (*Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas sp.*, and *Proteus sp.*), Gram-positive aerobes (*Streptococcus anginosus* group, *Enterococcus sp.*, *Staphylococcus aureus*, *Staphylococcus epidermidis*, and *Streptococcus sp.*), anaerobic organisms (*Bacteroides sp.* and *Fusobacterium*), *Actinomyces*, *Candida albicans*, *Salmonella typhi*, *Brucella melitensis*, or other protozoa (*Entamoeba histolytica* and *Echinococcus granulosus*) [1]. Among these pathogens, *K. pneumoniae* is the most prevalent pathogen in Asia [2]. Patients who are susceptible to develop pyogenic liver abscess typically have an underlying disease such as diabetes mellitus, hepatopancreatic disease, receiving liver transplantation, being treated with long-term proton-pump inhibitors medication, or having colon neoplasia [3]. We will introduce an immunocompetent male patient who had pyogenic liver abscess caused by rare pathogen and review the possible pathogenesis.

Case Report

A 53-year-old male businessman, Taiwanese, was totally independent in daily activity, without notable family history of systemic disease or malignancy, and had no past medical history (including diabetes mellitus) except receiving laparotomy appendectomy at about 25 years ago. He came to our emergency room for general weakness, fatigue, and intermittent spiking fever up to 39.5 °C for one week, despite of visiting local clinic with antibiotic treatment. He denied the following symptoms: dyspnea, productive cough, watery or loose stools, burning voiding sensation, skin lesions or defects, headache, nor arthralgia. Tracing his history, the patient had received diet

control with raw leafy salad daily for more than one week prior to this episode. There was no other raw food consumption. The patient did not receive dental procedure or other invasive surgery recently.

On physical examination, blood pressure was mildly elevated (149/91 mm Hg) with a normal sinus rhythm (86 beat/min) and respiratory pattern (rate 16/min). Only mild hyperthermia (37.8°C) was detected. The abdomen was soft, no tenderness, distention, muscle guarding or sign of peritoneal irritation. The blood test showed leukocytosis (10760 /μL, normal range 6000-10400/μL) with neutrophilia (72.3%, normal range 27-57%), extreme elevated C-reactive protein level (205 mg/dL, normal range <5mg/dL), elevated aspartate aminotransferase (AST) (74IU/L, normal range 10-42/μL), alanine aminotransferase (ALT) (89 IU/L, normal range 10-42/μL), alkaline phosphatase (417 μ/L, normal range 32-92 IU/L), and γ-Glutamyltransferase (313 IU/L, normal range 7-64 IU/L). Abdominal computed tomography (CT) revealed a hypodense focal lesion of 3.3 x 3.7 cm with double target sign over segment 7 of the liver (**Figure 1**).

A Hepatic abscess was highly suspected. The lesion was drained by a pigtail drainage tube which was removed when no more drainage fluid came out. The *Streptococcus intermedius* grew in the abscess culture, but no bacteria grew in the blood culture collected at the same time. The patient became afebrile after 5 days of intravenous Piperacillin/Tazobactam. After then, the antibiotic was de-escalated to oral form of Ampicillin/Sulbactam according to the pathogen susceptibility. He had overall undergone antibiotics treatment for a total of six weeks. Following abdominal imaging study performed two months later revealed resolution of hepatic abscess.

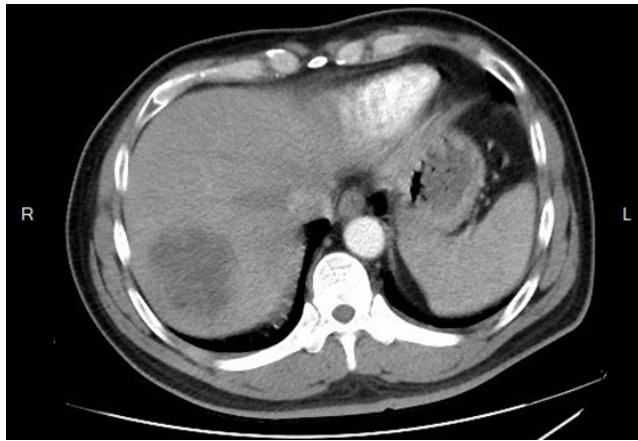


Figure 1

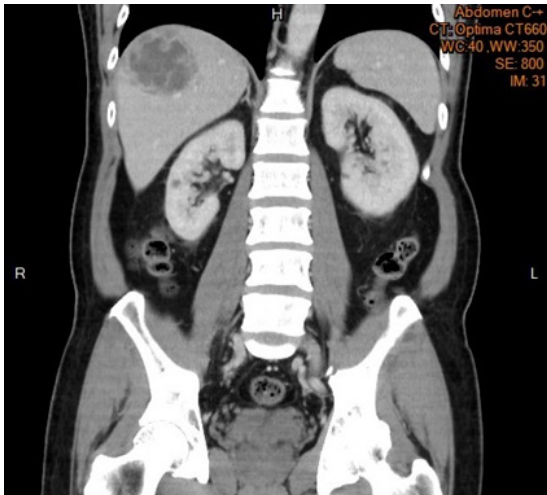


Figure 2

The abdomen CT: a multiloculated septated hypodense lesions with relative hypovascular and peripheral enhancement in S7 segment of liver, present in transverse view (**Figure 1**) and coronal view (**Figure 2**).

Discussion

Streptococcus intermedius is small, Gram-positive, non-spore-forming, nonmotile, cocci, and aerotolerant anaerobe. It's the member of the *Streptococcus milleri* group (also known as *Streptococcus anginosus*) [4], which is an oral commensal bacterium and part of the intestinal flora in 20–50% of the population [5]. Previous dental manipulation and sinusitis were reported as most common risk factors for *Streptococcus intermedius* infection (up to 18%). Diabetes mellitus, excessive alcohol consumption, congenital heart disease and heart-related conditions, and cancer were all also reported to be the risk factors [6].

Streptococcus intermedius secretes a human-specific cytolyisin, named intermedilysin (ILY), that can directly damage the host cells [7]. *Streptococcus intermedius* surface protein antigen I/II also can adhere to fibronectin and laminin, which is an important step in the pathogenesis of endocarditis and abscess formation. As a result, *Streptococcus intermedius* was associated to deep-seated infection, such as brain abscess, liver abscess, or even rare infectious endocarditis, rather than the superficial infection [8]. Particularly, *Streptococcus milleri* group was the most common organism of pyogenic liver abscess found in Australians [9].

The foodstuffs consist of fresh vegetables especially leafy green vegetables, sprouted seeds, soft fruits and fruit juices are notably vulnerable to be contaminated by microbial pathogens

including bacteria, virus, protozoa, or parasite. The bacteria can grow and proliferate on foodstuffs under certain conditions. Contamination with low numbers of bacteria in foodstuffs also has the possibility to induce human infectious disease. Although streptococcus group was not the main cause of bacterial food-borne disease, large food-borne outbreak due to group A streptococci causing mostly acute tonsillo-pharyngitis had been reported in industrialized countries including USA and Europe [10]. In this case, the only available risk factor for *Streptococcus intermedius* liver abscess was persistently eating raw leafy salad daily for more than one week. Lack of other identifiable sources of infection and no growth of pathogen in blood culture, support the evidence of transmission of pathogen from portal flow via enteral intake of contaminated row leafy salad.

Conclusion

This case report emphasize that an immunocompetent person may suffer from hepatic abscess due to inadequate food hygiene.

Authorship Criteria:

Zu-Yau Lin: supervisor and main corresponding author

Chung-Feng Huang: supervisor

I-Min Tsai: manuscript author

Conflict of interest: None to declare

Grant Information: The author received no specific funding for this work

Acknowledgement: None to declare

References

- Ioannou A, Xenophontos E, Karatsi A, Petrides C, Kleridou M, Zintilis C. Insidious manifestation of pyogenic liver abscess caused by *Streptococcus intermedius* and *Micrococcus luteus*: a case report. *Oxf Med Case Reports*, 2016; 2016(1): 1-3.
- Lübbert C, Wiegand J, Karlas T. Therapy of liver abscesses. *Visceral Medicine*, 2014; 30(5): 334-341.
- Chan KS, Chen CM, Cheng KC, Hou CC, Lin HJ, Yu WL. Pyogenic liver abscess: a retrospective analysis of 107 patients during a 3-year period. *Jpn J Infect Dis*, 2005; 58(6): 366-368.
- Tran MP, Caldwell-McMillan M, Khalife W, Young VB. *Streptococcus intermedius* causing infective endocarditis and abscesses: a report of three cases and review of the literature. *BMC Infect Dis*, 2008; 8: 154.
- Hardwick R, Taylor A, Thompson M, Jones E, Roe A. Association between *Streptococcus milleri* and abscess formation after appendicitis. *Annals of the Royal College of Surgeons of England*, 2000; 82(1): 24.
- Issa E, Salloum T, Tokajian S. From Normal Flora to Brain Abscesses: A Review of *Streptococcus intermedius*. *Front Microbiol*, 2020; 11: 826.
- Nagamune H, Ohnishi C, Katsuura A, Fushitani K, Whiley RA, Tsuji A, et al. Intermedilysin, a novel cytotoxin specific for human cells secreted by *Streptococcus intermedius* UNS46 isolated from a human liver abscess. *Infect Immun*, 1996; 64(8): 3093-3100.
- Macey MG, Whiley RA, Miller L, Nagamune H. Effect on polymorphonuclear cell function of a human-specific cytotoxin, intermedilysin, expressed by *Streptococcus intermedius*. *Infect Immun*, 2001; 69(10): 6102-6109.
- Pang TC, Fung T, Samra J, Hugh TJ, Smith RC. Pyogenic liver abscess: an audit of 10 years' experience. *World journal of gastroenterology: WJG*, 2011; 17(12): 1622.
- Falkenhorst G, Bagdonaite J, Lisby M, Madsen SB, Lambertsen L, Olsen KE, et al. Outbreak of group A streptococcal throat infection: don't forget to ask about food. *Epidemiol Infect*, 2008; 136(9): 1165-1171.