

Streptococcus Intermedius Brain and Liver Abscesses After Dental Manipulation: a Case Report

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Abstract

Background: Brain abscesses are intracerebral infections with pus accumulation that can be fatal in most cases without appropriate treatment. The most common cause of brain abscesses are infections with streptococci and staphylococci. *Streptococcus anginosus* is a group of streptococci that are part of the normal flora of the oropharynx and are rarely the cause of severe bacterial infections.

Case Report: Our patient is a 64-year-old man who underwent a dental procedure, and presented a few days later with a high-grade fever and decreased level of consciousness. He was found to have multiple brain abscesses and a liver abscess, and blood cultures revealed *Streptococcus intermedius*, which belongs to the *Streptococcus anginosus* group. The patient received appropriate treatment and recovered completely.

Conclusion: Dental procedures, even simple tooth brushing, can cause bacteremia leading to multiple abscesses in different parts of the body, especially if a germ of the *Streptococcus anginosus* group has been detected in the blood culture.

Keywords: Brain abscess, Liver abscess, *Streptococcus intermedius*, Dental procedure, Case report

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Introduction

Streptococcus intermedius (*S. intermedius*) is a gram-positive bacterium. It belongs to the *Streptococcus anginosus* group (SAG), formerly known as *S. milleri* [1]. They are considered part of the normal flora of the oropharynx, urogenital and gastrointestinal tracts [2]. Members of the *Streptococcus anginosus* group are reported to cause various purulent infections, and abscesses in the brain, heart, sinuses, liver, lungs, spleen, peritoneum, pelvis, and appendix [1-4].

Species of the *S.anginosus* group have been frequently isolated from dental abscesses, suggesting that this is one of the possible sources of bacteremia and, in contrast, the cause of metastatic purulent infections.

A brain abscess is a collection of pus within a well-vascularized capsule within the brain parenchyma, with a high morbidity and mortality rate. treatment usually requires surgical drainage in addition to appropriate antibiotics [5].

On the other hand, a liver abscess is a pus-filled mass within the liver, although it is most frequently associated with disorders of the biliary tract, direct extension from intra-abdominal infections and hematogenous spread should be considered [6].

Wagner et al. in 2006 reported a case of brain and liver abscesses due to coexisting severe periodontal disease and bacteremia, with *S. intermedius* growing from all four sources [7]. We present a rare case of liver and brain abscesses caused by *S. intermedius* bacteremia after a routine dental procedure.

This case underscores that bacteremia caused by SAG should alert physicians to look for purulent foci of infection in various body sites.

Case presentation

A 64-year-old Hispanic man, smoker, with a previous history of hydatid disease, was referred to our hospital for bilateral

weakness associated with high-grade fever that started one week after undergoing routine dental cleaning. He received one week of ciprofloxacin with no improvement. Before the presentation, a contrast-enhanced brain Computed Tomography (CT) done in another institution reported multiple ring-enhancing lesions with surrounding edema involving both hemispheres. The patient was electively intubated for airway protection after having recurrent seizures with a decreased level of consciousness. Magnetic Resonance Imaging (MRI) brain done in our hospital showed multiple brain abscesses, (Figure 1), the largest measuring 2 cm. He was started on meropenem and vancomycin for which metronidazole was added two days later.

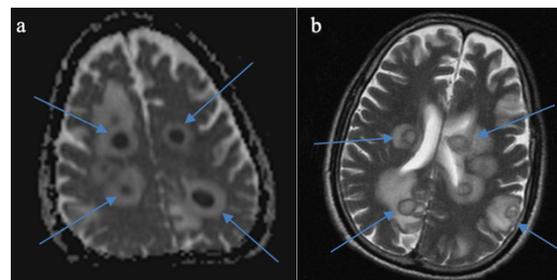


Figure 1: MRI brain showing multiple brain abscesses with surrounding edema arrows (a: diffusion, b: T2).

As part of the workup, contrast-enhanced CT of the chest, abdomen, and pelvis demonstrated evidence of a 7 x 6 cm solid heterogeneous lesion in the fourth segment of the liver which showed internal blood flow on screening ultrasound exam suggesting liver tumor (Figure 2).

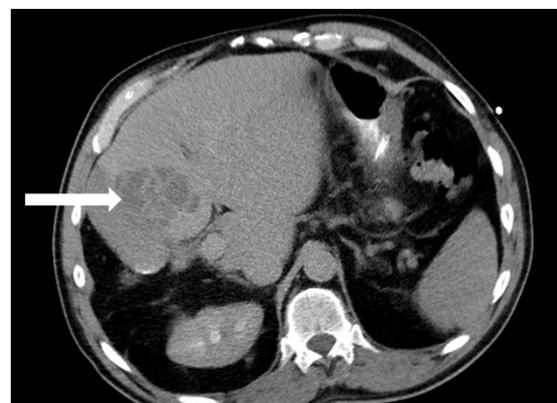


Figure 2: CT abdomen showing heterogeneous liver lesion (arrow).

Blood cultures grew *Streptococcus intermedius* in XXX bottles. Sensitivity tests for different antibiotics were performed showing the antibiogram in Table 1. Fungal culture was negative. Being a multi-sensitive germ, the antibiotic regimen was changed to a combination of ceftriaxone and metronidazole. Ear, nose, and throat-related and gastrointestinal infections were eliminated. Trans-esophageal echocardiogram (TEE) showed no signs of infective endocarditis.

Table 1: Antibiogram done on blood culture.

Minimum Inhibitory Concentration-P554 (MIC-P554)	Blood (<i>Streptococcus intermedius</i>)
Ampicillin	S
Ciprofloxacin	S
Erythromycin	S
Clindamycin	S
Vancomycin	S
Penicillin	S
Amoxicillin/clavulanic acid.	S
Cefotaxime.	S
Cefuroxime.	S

two weeks later, an MRI abdomen (Figure 3) was performed to evaluate the previously described liver mass. It showed an interval decrease in the size of the previously described solid heterogeneous mass lesion in the fourth segment of the liver, measuring about 4 x 3.5 cm, previously 7 x 6 cm, which is compatible with slightly resolving liver abscess. Five days after initiation of treatment, the patient showed dramatic improvement. He was extubated and transferred from the Intensive Care Unit (ICU) three days later, with full recovery of his neurological status. Serial MRIs of the brain were performed and showed resolution of the abscesses. He was discharged home a week later and resumed his treatment at home for eight weeks.

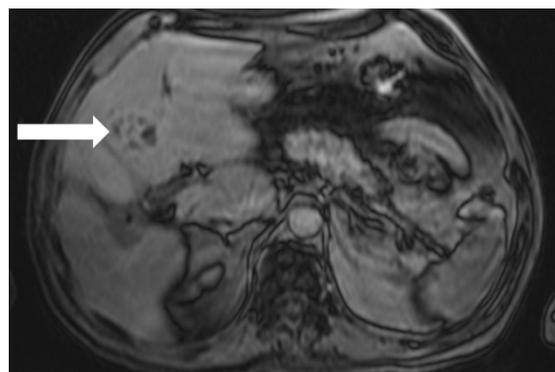


Figure 3: MRI abdomen showing a decreased in size liver lesion (arrow).

Discussion

Brain lesions can be infectious, inflammatory, neoplastic, or vascular [8]. Fever, headaches, and focal neurologic defects are considered the three presenting symptoms of the abscess triad [9]. Abscesses may occur from a contiguous focus of infection or by hematogenous spread from a distant focus [10]. Diagnosis is often challenging and requires a high index of suspicion. Cerebral abscess should be considered in the presence of a ring-enhancing lesion with perilesional edema on a CT scan. Diffusion-weighted (DWI) MRI is capable of differentiating ring-enhancing lesions due to brain abscesses from other lesions [8].

The acute presentation and the high-grade fever helped eliminate vascular and neoplastic causes. The brain MRI eliminated Inflammatory causes and confirmed the diagnosis.

Multiple abscesses are more likely to occur with hematogenous spread, as in our case. On the other hand, dental procedures are rarely the cause of pyogenic liver abscesses, with only a few cases in the literature. Schiff et al. (2003) reported a case of multiple liver abscesses in a previously healthy woman after a root canal filling [11], and more recently, Livingston et al. (2014) reported a case of *Streptococcus intermedius* causing liver abscess after routine dental cleaning [12].

Nonetheless, *Streptococcus intermedius* is known to cause abscesses in the head, neck, central nervous system, respiratory

tract, gastrointestinal tract, genitourinary tract, skin, and soft tissues [13]. In our case, the patient's dental procedure caused bacteremia leading to brain and liver abscesses formation via a hematogenous route. The lack of other identifiable sources of infection and the isolation of *S. intermedius* from blood support this conclusion.

Antibiotics, drainage, and surgical excision are the mainstay of abscesses treatment. In brain abscesses, Surgical therapy is considered for multi-loculated, fungal, and traumatic causes or if no treatment response was recorded within a week of treatment initiation [14]. In our case, the patient showed excellent response a few days after initiation of the treatment. The British Society of Antimicrobial Chemotherapy recommends a third-generation cephalosporin and/or other beta-lactam agents together with anaerobic coverage (e.g. Metronidazole) as empirical treatment. The recommended duration of parenteral antibiotics is 4 to 6 weeks when abscesses are excised or aspirated and 6 to 8 weeks if treated without drainage [15]. Since our patient was in critical condition, a broad spectrum of antibiotics was prescribed, with a carbapenem, vancomycin, and metronidazole. Then he was switched to the recommended regimen after the culture result. Treatment was resumed for a total of 8 weeks.

As for the liver abscess, proper antibiotic treatment and adequate drainage are essential. Medical management is considered only in patients at high risk for drainage procedures or with small/multiple abscesses (less than 3-5 cm in diameter) not amenable to drainage [16]. Fluoroquinolones, third- and fourth-generations cephalosporins, piperacillin/tazobactam, aminoglycosides, and carbapenems are empiric treatment options, in addition to metronidazole for amebic and anaerobic coverage [17]. Due to the clinical condition of our patient and the presence of concomitant brain abscesses, no drainage was performed. However, proper antibiotic coverage with

meropenem and metronidazole led to a favorable outcome.

To our knowledge, this is the first reported case of pyogenic brain and liver abscess related to *S. intermedius* following a routine dental cleaning.

Conclusion

Bacteremia should alert the clinician to the possibility of underlying abscess as a source of infection, especially in the presence of the *S. anginosus* group.

Even routine dental cleanings can predispose patients to the development of bacteremia leading to organ abscess, so detailed history taking and thorough physical examination including the oropharynx are quite essential.

References

1. 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. Published 2008 Nov 10. PMID: 18992173. <https://doi.org/10.1186/1471-2334-8-154>
2. Ng KW, Mukhopadhyay A. Streptococcus constellatus bacteremia causing septic shock following tooth extraction: a case report. Cases J. 2009;2:6493. Published 2009 May 18. PMID: 19829816. <https://doi.org/10.1186/1757-1626-2-6493>
3. Neumayr A, Kubitz R, Bode JG, Bilk B, Häussinger D. Multiple liver abscesses with isolation of Streptococcus intermedius related to a pyogenic dental infection in an immunocompetent patient. Eur J Med Res. 2010;15(7):319-322. PMID: 20696645. <https://doi.org/10.1186/2047-783x-15-7-319>
4. Whiley RA, Beighton D, Winstanley TG, Fraser HY, Hardie JM. Streptococcus intermedius, Streptococcus constellatus, and Streptococcus anginosus (the Streptococcus milleri group): association with different body sites and clinical infections. J Clin Microbiol. 1992;30(1):243-244. PMID: 1734062. <https://doi.org/10.1128/jcm.30.1.243-244.1992>
5. Alvis Miranda H, Castellar-Leones SM, Elzain MA, Moscote-Salazar LR. Brain

- abscess: Current management. J Neurosci Rural Pract. 2013;4(Suppl 1):S67-S81. PMID: 24174804. <https://doi.org/10.4103/0976-3147.116472>
6. Murarka S, Pranav F, Dandavate V. Pyogenic liver abscess secondary to disseminated streptococcus anginosus from sigmoid diverticulitis. J Glob Infect Dis. 2011;3(1):79-81. PMID: 21572613. <https://doi.org/10.4103/0974-777x.77300>
7. Wagner KW, Schön R, Schumacher M, Schmelzeisen R, Schulze D. Case report: brain and liver abscesses caused by oral infection with Streptococcus intermedius. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2006;102(4):e21-e23. PMID: 16997089. <https://doi.org/10.1016/j.tripleo.2006.02.010>
8. Al Moussawi H, Krzyzak M, Awada Z, Chalhoub JM. Streptococcus Intermedius Brain and Diverticular Abscesses After Dental Manipulation: A Case Report. Cureus. 2018;10(1):e2061. Published 2018 Jan 13. PMID: 29545984. <https://doi.org/10.7759/cureus.2061>
9. Manzar N, Manzar B, Kumar R, Bari ME. The study of etiologic and demographic characteristics of intracranial brain abscess: a consecutive case series study from Pakistan. World Neurosurg. 2011;76(1-2):195-83. PMID: 21839974. <https://doi.org/10.1016/j.wneu.2011.02.011>
10. Carpenter J, Stapleton S, Holliman R. Retrospective analysis of 49 cases of brain abscess and review of the literature. Eur J Clin Microbiol Infect Dis. 2007;26(1):1-11. PMID: 17180609. <https://doi.org/10.1007/s10096-006-0236-6>
11. Schiff E, Pick N, Oliven A, Odeh M. Multiple liver abscesses after dental treatment. J Clin Gastroenterol. 2003;36(4):369-371. PMID: 12642750. <https://doi.org/10.1097/00004836-200304000-00020>
12. Livingston LV, Perez-Colon E. Streptococcus intermedius Bacteremia and Liver Abscess following a Routine Dental Cleaning. Case Rep Infect Dis. 2014;2014:954046. PMID: 25197585. <https://doi.org/10.1155/2014/954046>
13. Mishra AK, Fournier PE. The role of Streptococcus intermedius in brain abscess. Eur J Clin Microbiol Infect Dis. 2013;32(4):477-483. PMID: 23187823. <https://doi.org/10.1007/s10096-012-1782-8>
14. Brouwer MC, Tunkel AR, McKhann GM 2nd, van de Beek D. Brain abscess. N Engl J Med. 2014;371(5):447-456. PMID: 25075836. <https://doi.org/10.1056/nejmra1301635>
15. Infection in Neurosurgery Working Party of the British Society for Antimicrobial Chemotherapy. The rational use of antibiotics in the treatment of brain abscess. Br J Neurosurg. 2000;14(6):525-530. PMID: 11272029. <https://doi.org/10.1080/02688690020005527>
16. Carpenter CF, Gilpin N. Hepatic Abscess. Johns Hopkins ABX Guide. The Johns Hopkins University. 2017. https://www.hopkinsguides.com/hopkins/view/Johns_Hopkins_ABX_Guide/540259/all/Hepatic_Abscess .
17. Lübbert C, Wiegand J, Karlas T. Therapy of Liver Abscesses. Viszeralmedizin. 2014;30(5):334-341. PMID: 26287275. <https://doi.org/10.1159/000366579>