

Intra-Abdominal Abscess and Primary Peritonitis Caused by *Streptococcus anginosus*

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Abstract

Introduction: The *Streptococcus anginosus* group of bacteria are low-virulence bacteria existing as commensals in the oral flora and gastrointestinal tracts of humans. *S. anginosus* may spread to the blood in individuals with poor oral hygiene in cases of oral infections, such as gingivitis and tooth abscesses, that develop following the loss of mucosal unity. This may lead to infections in the whole body, primarily as brain and liver abscesses.

Case Presentation: A 32-year-old male patient presented with complaints of nausea, vomiting, and diffuse abdominal pain. Diffuse abdominal tenderness and rebound tenderness were detected particularly in the epigastrium and right upper quadrant. Laboratory assessment revealed a leukocyte count of 20,500/mm³. Free fluid around the liver and heterogeneous areas of abscess formation in the right lateral gallbladder were revealed on abdominal computed tomography. Diffuse adhesions between the bowel and seropurulent free liquid in the abdomen were detected on surgical exploration, and a sample was taken for cultures. The patient was discharged without complications on the sixth postoperative day and his antibiotic course was completed with 4 weeks of oral treatment. We reviewed the literature for similar cases of disseminated pyogenic infections caused by the *S. anginosus* group.

Conclusions: It should be kept in mind that the oral flora bacterium *S. anginosus* may cause transient bacteremia and deep-seated organ abscesses in immunodeficient patients with poor oral hygiene. Such patients with intra-abdominal abscesses should be treated with antibiotics and surgery.

Keywords: Abscess, Peritonitis, *Streptococcus anginosus*

1. Introduction

Intra-abdominal abscesses generally develop as a result of abdominal surgery, intra-abdominal pathologies (e.g. diverticulitis, appendicitis, biliary disorders, pancreatitis, and organ perforations), or penetrating abdominal trauma. Abscesses caused by infectious bacteremia reaching the abdomen from a distant focus are very rare (1).

The *Streptococcus anginosus* group of bacteria, formerly called the *S. milleri* group, has three members: *S. intermedius*, *S. constellatus*, and *S. anginosus*. These microorganisms are low-virulence bacteria existing as commensals in the oral flora and gastrointestinal tracts of humans (2). *S. anginosus* may spread to the blood in individuals with poor oral hygiene in cases of oral infections, such as gingivitis and tooth abscesses, that develop following the loss of mucosal unity. This may lead to infections throughout the body, primarily as brain and liver abscesses. While similar cases are more prevalent among patients with immunodeficiency and underlying gastrointestinal tract pathology, they also occur in immunocompetent patients, although

rarely (2). This paper describes a case of intra-abdominal abscess and primary peritonitis caused by *S. anginosus*, which is very rare and was considered to have been caused by oral flora in an immunocompetent patient.

2. Case Presentation

A 32-year-old male patient presented to the emergency department with complaints of nausea, vomiting, and diffuse abdominal pain in all quadrants, especially in the epigastrium. On physical examination, diffuse abdominal tenderness and rebound tenderness were detected, particularly in the epigastrium and right upper quadrant. Laboratory assessment revealed a leukocyte count of 20,500/mm³ with 85% polymorphonuclear leukocytes (PNLs)/neutrophils, hemoglobin of 12.5 g/dL, hematocrit of 37.2%, AST of 26 U/L, and ALT of 29 U/L. Abdominal computed tomography (CT) showed free fluid approximately 1 cm thick around the liver and heterogeneous areas of abscess formation in the right lateral gallbladder, which mea-

sured approximately 5×5 cm in size and was partly encapsulated, containing free air. The CT also demonstrated diffuse free fluid between the bowel loops and pelvis, as well as a hydropic gallbladder with pericholecystic fluid, wall thickening, and free air trapped in the lumen (Figure 1A - 1D).

Due to these findings on examination in the emergency department, the patient was scheduled for surgery with an initial diagnosis of intra-abdominal abscess and/or gallbladder perforation. Diffuse adhesions between the bowels and seropurulent free liquid in the abdomen were detected on exploration, and a sample was taken for cultures. A partly encapsulated abscess pouch was also identified near the gallbladder, and samples were collected for cultures. On continued exploration, no perforation was detected in the gallbladder, while hyperemia was noted on all peritoneal surfaces. Fluids within the abdomen were aspirated, adhesions between the bowels were opened, and approximately 100 cc of pus was drained from the abscess. An aspiration drainage tube was inserted in the abscess pouch.

Until the culture report was received, the patient was treated with intravenous ceftriaxone at a daily dose of 2 g per day and metronidazole 500 mg twice per day. *S. anginosus* was reproduced in the culture sample taken from the intra-abdominal abscess. Since the results of antibiotic susceptibility testing revealed that the reproducing microorganism was sensitive to ceftriaxone, the treatment was continued in the same manner. On clinical follow-up, the patient's leukocyte count was found to have fallen to $8,200/\text{mm}^3$ (with 55% PNLs). The patient was discharged without complications on the sixth postoperative day, and his antibiotic treatment was completed with 4 weeks of oral medication.

3. Discussion

Intra-abdominal infections are an inflammatory response of the peritoneum to microorganisms and their toxins, resulting in accumulation of purulent exudate in the abdominal cavity. Peritonitis is classified as primary, secondary, or tertiary. Primary peritonitis, also called spontaneous peritonitis, develops without any complications arising in the gastrointestinal system, such as a visible perforation or anastomotic leak. Thus, the infection is thought to reach the peritoneum in a hematogenous manner. Abscesses are another form of intra-abdominal infections. They develop in some patients depending on the type of microorganism that has led to the intra-abdominal infection, the quantity of inoculum, and the infection period (3).

The most common causes of intra-abdominal abscesses are gastrointestinal perforations, postoperative complications, penetrating traumas, and genitourinary infections. In one-third of cases, the abscess arises as a sequela of diffuse peritonitis (1). Furthermore, many publications have reported that organ abscesses may also be caused by oral infections, such as gingivitis and dental abscesses, with poor oral hygiene and dental problems. Various reports have shown that bacteremia development with impairment of mucosal integrity due to poor oral hygiene may lead to hepatic abscesses (4, 5). We present a patient with no regular teeth-cleaning regimen and poor oral hygiene, who had not undergone dental check-ups for a long period and had dental caries.

Ultrasonography (USG) is a useful non-invasive method that is easily applied for identifying intra-abdominal inflammatory processes (6). With USG, even peritoneal fluid of < 100 mL can be identified. If peritoneal fluid is detected on USG, diagnostic aspiration can be carried out under USG guidance. On Gram staining of the fluid, detection of white blood cells or bacteria generally indicates emergency laparotomy. Culdocentesis can be carried out in cases of pelvic peritonitis. A large number of white blood cells may be detected during abdominal aspiration, and an offensive odor may occur due to an exudative polymicrobial anaerobic infection (6). Since the patient presented to our hospital's emergency department with an acute abdomen history, including diffuse abdominal rigidity, diffuse peritonitis was initially considered. Therefore, contrast-enhanced CT of the abdomen was performed. Although the importance of USG and Gram staining in intra-abdominal abscesses is highlighted in the literature, this method is preferred mostly for elective patients and for isolated abscess formation. Since our case was assessed under emergency conditions and an abdominal CT scan was performed with a pre-diagnosis of acute surgical abdomen (diffuse peritonitis), there was no need for USG.

Computed tomography is an invaluable diagnostic procedure for patients with suspected intra-abdominal infections (7), and it should include images of the entire abdomen and pelvis. The diagnostic value of CTs performed using intravenous, oral, and rectal contrast materials is higher than without contrast. Intracavitary air, inhomogeneity of contents, and screening of one abscess capsule leads to a diagnosis of intra-abdominal abscess. If edema develops in the mesenteric adipose tissue, this indicates inflammation (7). On the contrast-enhanced abdominal CT of our patient, increased hypodensity around the right lobe of the liver was observed, which led to the diagnosis of abscess formation (Figure 1).

The treatment approach for intra-abdominal infec-

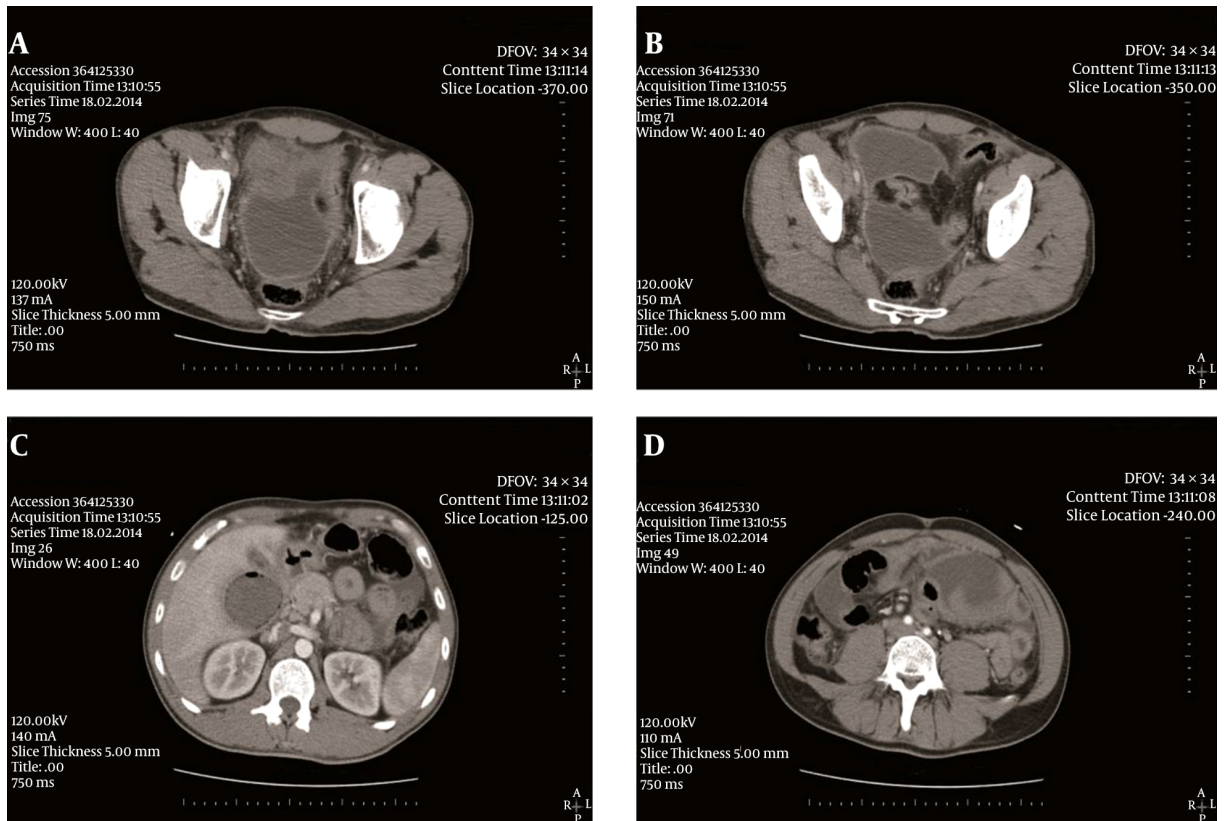


Figure 1. Sections of Contrast-Enhanced Abdominal CT of the Patient

tions encompasses surgical exploration, termination of the infectious period, and supportive care to enhance the patient's response to sepsis treatment. The underlying pathology should be removed surgically, and drainage of the infection is necessary (7). In our case, the abdominal fluids were aspirated and the abscess was drained. Meanwhile, intravenous ceftriaxone and metronidazole were administered (Table 1).

S. anginosus bacteria are commensal in the oropharyngeal isthmus, urogenital canal, and gastrointestinal tract (2). In cases of poor oral hygiene or alcoholism, its concentration in the saliva increases (15). In most publications, the clinical significance of bacteremia related to *S. anginosus* is noted (16), and it has also been reported that it can lead to serious pyogenic infections that cause abscess formation later on (16, 17). An infection may occur in the central nervous system, head and neck, abdominal cavity, or chest cavity (16, 17). While peritonitis and abscess formation due to *S. anginosus* is uncommon, such cases have not been defined in the literature. The poor oral hygiene of our reported patient suggests a hematogenous pathogenesis caused by a gastrointestinal focus.

In conclusion, except in immunodeficient patients or in pathologies of the bile duct and gastrointestinal system, the incidence of intra-abdominal abscesses caused by *S. anginosus* is relatively low. It should be kept in mind that this oral flora bacterium may cause transient bacteremia and deep-seated organ abscesses in immunodeficient patients with poor oral hygiene. Such patients with intra-abdominal abscesses should be treated with antibiotics and surgery.

Footnotes

Authors' Contribution: The authors alone are responsible for the content and writing of this article. Huseyin Agah Terzi, Tayfur Demiray, Guner Cakmak, Mehmet Koroglu, and Ihsan Hakki Ciftci worked on the study design, and wrote and drafted the manuscript. Huseyin Agah Terzi, Tayfur Demiray, Mehmet Koroglu, Guner Cakmak, Ihsan Hakki Ciftci, Ahmet Ozbek, Mustafa Altindis collected the data.

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Table 1. Case Reports of Disseminated Pyogenic Infections Due to *S. anginosus*

Reference	Patient Age (y)/Sex	Underlying Conditions	Blood Culture	Organ Dissemination				Antimicrobial Therapy After Diagnosis	Outcome and Follow-Up
				Brain	Liver	Spleen	Other		
Mofredj 1999 (8)	60/Male	COPD, tooth cavities	+	+	+			IV amoxicillin followed by 1 month oral amoxicillin	Healed, right-hand paresis (5 months)
Lee et al. 2005 (9)	58/Male	Total left hip arthroplasty		+	+		Peri-prosthetic abscess	IV ceftriaxone + arthroplasty removal + extraventricular drainage + hepatic	Deceased
Lombardi et al. 2008 (10)	35/Male	Chronic alcoholism, moderate BPCO, duodenal ulcer	-			+	Peritonitis	Splenectomy, appendectomy, peritoneal drainage	Healed
Kitagawa et al. 2010 (11)	66/Female	Neurofibromatosis type 1, gastro-intestinal stromal tumor (GIST)	+				Tumor abscess	Sulbactam/cefoperazone, partial resection	Healed
McKenzie et al. 2010 (12)	15/Male	Allergy	+		+			IV meropenem, vancomycin, appendectomy, debridement of abscess	Healed
Mutneja et al. 2014 (13)	57/Male	Osteoarthritis, urethral stricture, sinusitis	-	+			Lung abscess	IV ceftriaxone, vancomycin, metronidazole	Healed
Walky et al. 2014 (14)	47/Male	Alcoholism	+				Abscess in leg muscles	IV ceftriaxone, metronidazole	Healed
Present study	32/Male	Tooth decay					Abscess near liver	IV ceftriaxone, metronidazole	Healed

References

- Simon R, Swartz MN. Peritonitis and intraabdominal abscesses. In: Dale DC, editor. Infectious Diseases The Clinician's Guide to Diagnosis, Treatment, and Prevention. New York: Web MB; 2003. pp. 144-53.
- Spellerberg B, Brandt C. Streptococcus. In: Versalovic J, Carroll KC, Funke G, Jorgensen JH, Landry ML, Warnock DW, editors. Manual of clinical microbiology. Washington: ASM Press; 2011. pp. 331-49.
- Wittmann DH, Schein M, Condon RE. Management of secondary peritonitis. *Ann Surg.* 1996;**224**(1):10-8. [PubMed: 8678610].
- Petti CA, Stratton IV CW. Streptococcus anginosus group. In: Mandell G, Bennett J, Dolin R, editors. Principles and practice of infectious diseases. Philadelphia: Churchill Living-Stone; 2010. pp. 2681-5.
- Wagner KW, Schon 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):21-3. doi: 10.1016/j.tripleo.2006.02.010. [PubMed: 16997089].
- Terzi C. Acute abdomen in the intensive care unit [in Turkish]. *Turk J Intensive Care Med.* 2006;**6**:63-77.
- Haaga JR. Imaging intraabdominal abscesses and nonoperative drainage procedures. *World J Surg.* 1990;**14**(2):204-9. [PubMed: 2183483].
- Mofredj A. Streptococcus anginosus (milleri) septicemia: interest in systematically searching for parenchymatous abscesses. *Diagn Microbiol Infect Dis.* 1999;**33**(3):205-6. [PubMed: 10092970].
- Lee SB, Jones LK, Giannini C. Brainstem infarcts as an early manifestation of Streptococcus anginosus meningitis. *Neurocrit Care.* 2005;**3**(2):157-60. doi: 10.1385/NCC.3.2:157. [PubMed: 16174887].
- Lombardi A, Coppola M, Pennica A, Maglio R, Moscaroli A, Lo Russo M, et al. Splenic abscess due to Streptococcus anginosus. Case report. *G Chir.* 2008;**29**(8-9):359-61. [PubMed: 18834569].
- Kitagawa M, Koh T, Nakagawa N, Kondo Y, Nishio M, Oguro A, et al. Gastrointestinal Stromal Tumor in a Patient with Neurofibromatosis: Abscess Formation in the Tumor Leading to Bacteremia and Seizure. *Case Rep Gastroenterol.* 2010;**4**(3):435-42. doi: 10.1159/000321523. [PubMed: 21103203].
- McKenzie TJ, Lillegard JB, Grotz TE, Moir CR, Ishitani MB. Pyogenic liver abscess secondary to Streptococcus anginosus in an adolescent. *J Pediatr Surg.* 2010;**45**(5):15-7. doi: 10.1016/j.jpedsurg.2010.02.044. [PubMed: 20438908].
- Mutneja R, Shah M, Silverstein N. Concomitant lung and brain abscesses: a rare presentation of a common bacteria. *Conn Med.* 2014;**78**(1):25-7. [PubMed: 24600777].
- Walky A, Embil JM, Nichol K, Karlowsky J. An unusual case of Streptococcus anginosus group pyomyositis diagnosed using direct 16S ribosomal DNA sequencing. *Can J Infect Dis Med Microbiol.* 2014;**25**(1):32-4. [PubMed: 24634686].
- Morita E, Narikiyo M, Yokoyama A, Yano A, Kamoi K, Yoshikawa E, et al. Predominant presence of Streptococcus anginosus in the saliva of alcoholics. *Oral Microbiol Immunol.* 2005;**20**(6):362-5. doi: 10.1111/j.1399-302X.2005.00242.x. [PubMed: 16238596].
- Bert F, Bariou-Lancelin M, Lambert-Zechovsky N. Clinical significance of bacteremia involving the "Streptococcus milleri" group: 51 cases and review. *Clin Infect Dis.* 1998;**27**(2):385-7. [PubMed: 9709892].
- Salavert M, Gomez L, Rodriguez-Carballeira M, Xercavins M, Freixas N, Garau J. Seven-year review of bacteremia caused by Streptococcus milleri and other viridans streptococci. *Eur J Clin Microbiol Infect Dis.* 1996;**15**(5):365-71. [PubMed: 8793393].