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Case Report
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Streptococcus gordonii Perihepatic Abscess: A Case Report

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Abstract

Streptococcus gordonii is one of the known commensal colonizers which makes up the human dental flora, capable of causing periodontal disease by plaque formation and dental caries. As a result of oral disease or trauma, *S. gordonii* may cause severe complications, most commonly bacterial endocarditis. After an extensive literature search, we found no reported cases of *S. gordonii* perihepatic abscess. We present a unique case of an 85-year-old man with metastatic colon cancer to the liver who was found to have a *S. gordonii* perihepatic abscess.

Keywords: *Streptococcus gordonii*; Perihepatic abscess; CEA; CT

Introduction

Streptococcus gordonii (*S. gordonii*), a member of the Viridans group, is a gram-positive, non-motile cocci that grows in pairs or chains. Organisms within this genus are comprised of both pathogenic bacteria (*S. pneumoniae* and *S. pyogenes*) and non-pathogenic bacteria (*S. gordonii* and *S. mutans*). *S. gordonii* most commonly colonizes tooth surfaces by creating biofilms known as dental plaque. Although known as a commensal organism, viridans streptococci are becoming recognized as an opportunistic pathogen in the immunocompromised host [1].

S. gordonii has been identified in cases of endocarditis, empyema [2], peritonitis [3-5], septic arthritis [6], prosthetic joint infection [7,8], spondylodiskitis [9], and Lemierre Syndrome [10]. To our knowledge, this is the first case of *S. gordonii* reported as a sole organism in a perihepatic abscess.

Case Presentation

An 85-year-old Caucasian man with a history of metastatic colon adenocarcinoma presented to his outpatient oncology and geriatric clinics on the same day for routine follow-up. The patient reported achronic, mild, and vague intermittent abdominal pain with bloating, which gradually worsened over the past two weeks. His denied nausea, vomiting, diarrhea, constipation, blood in the stool, or weight loss. His chronic well-controlled medical conditions included hypertension, hyperlipidemia, type 2 diabetes, asthma, hypothyroidism, chronic leukocytosis, and anemia of chronic disease. The patient reported a prior allergic reaction to cephalexin after developing a bilateral upper extremity superficial rash and pruritis while taking the medication eleven years ago as well as adverse reactions to wool (dyspnea) and aspirin (dyspnea).

The patient's past medical and surgical histories also included stage IIA left-sided colon adenocarcinoma four years prior, metastatic colonic adenocarcinoma to the liver followed by liver metastasectomy, as well as adenoidectomy/tonsillectomy during his childhood. Prior to resuming chemotherapy for metastatic colon cancer, dental evaluation was required due to concern for active infection in a tooth. Dental consultation revealed eight missing teeth, ten caries, four defective restorations, and moderate periodontal bone loss noted on radiograph. No active infection was identified and clearance for chemotherapy was given.

The following vital signs were reported

T 36.6°C, HR 68 bpm, BP 154/79 mmHg, RR 16 bpm, and pain 1/10. Upon physical exam, chronic missing teeth and poor dentition were noted. No cervical, axillary, supraclavicular or inguinal lymph nodes were palpated. His abdomen was noted to be large, soft, and nontender throughout. Laboratory reports revealed WBC 7.9/μL, Hgb 13.4 g/dL and a platelet count of 404 K/cmm. The metabolic panel revealed a baseline BUN 29 mg/dL and a baseline Cr of 1.0 mg/dL. His hepatic function panel was remarkable for elevated readings of SGOT at 43 units/L, SGPT at 70 units/L, and alkaline phosphate at 317 units/L. The serum Carcinoembryonic Antigen (CEA) level

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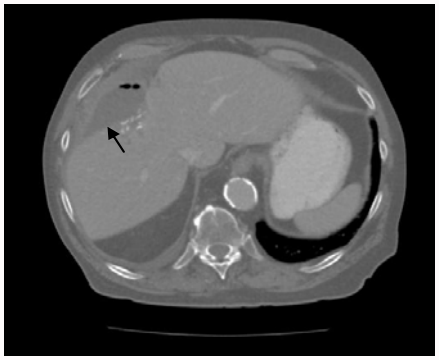

Figure 1: Axial CT abdomen and pelvis image slice demonstrating perihepatic collection (arrow).

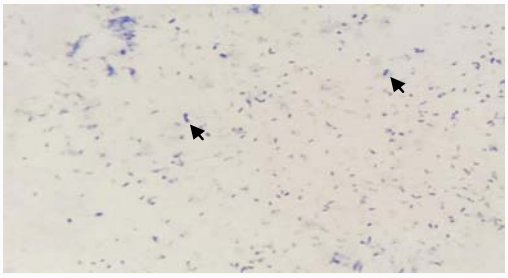

Figure 2: Gram stain of positive perihepatic collection fluid culture showing Gram-positive cocci in pairs (arrows).

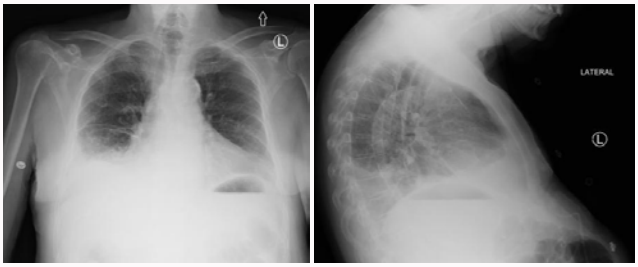

Figure 3: PA (top) and lateral (bottom) chest X-ray images noting pleural effusions.

was found to be 6.4 ng/mL, decreased from a maximum value of 155.2 ng/mL three months prior.

Despite hemodynamic stability, past medical history raised concern for progression of neoplastic disease as a cause of the abnormal laboratory findings. Computed Tomography (CT) imaging of the abdomen and pelvis with contrast (Figure 1) revealed a 7.6 cm by 5.3 cm perihepatic collection noted anterior to the prior hepatic metastasis resection site. The differential at this time included worsening malignant disease, post-radiation tumor necrosis, superinfection, abscess formation, or fistula formation. With an interval increase of WBC to 11.8/μL as well as the relatively low CEA level, the collection was suspected to be more likely associated with infection or possible fistula.

The patient was admitted to the hospital for management of the large perihepatic collection, with concerns for an abscess or possible fistula. His WBC count increased to 16.4/μL with 85% neutrophils. He continued to deny fevers, nausea, vomiting, and diarrhea; however, the patient reported sustained mild intermittent abdominal pain which was not associated with consuming food, body position, or specific time of day. In collaboration with infectious diseases consultation, empiric broad-spectrum antibiotic coverage was immediately initiated with intravenous meropenem (1g every 12 h) and daptomycin 6 mg/kg (400 mg every 24 h). Surgery and Interventional Radiology (IR) consult services both recommended IR-guided percutaneous drainage of the collection. A drainage catheter was placed, and samples of the seropurulent perihepatic fluid were sent to the laboratory for further evaluation and identification. The gram stain (Figure 2) revealed gram-positive cocci in pairs and subsequently, *Streptococcus gordonii* was speciated and susceptibilities were determined using the VITEK® 2, disc diffusion, and a D-test. According to the sensitivity report, the isolate was sensitive to penicillin, vancomycin, linezolid, cefepime, and levofloxacin; resistant to ceftriaxone, cefotaxime, clindamycin, erythromycin, and tetracycline.

Meropenem and daptomycin were discontinued on day 6 of hospitalization and switched to oral linezolid (600 mg every 12 h) according to the *S. gordonii* sensitivities. The rationale for choosing linezolid was the ease of oral administration, reported cephalexin allergy, as well as the patient's recent episode of Acute Kidney Injury (AKI). The patient's WBC count initially increased to 24/μL before decreasing to at 11/μL with the antibiotic adjustment. As the WBC did not return to baseline, oral metronidazole (500 mg every 8 h) was added to the regimen to address possible smaller abscesses, atelectasis, or other infectious processes. Repeated CT of the abdomen and pelvis with contrast demonstrated a "decrease in the right perihepatic complex fluid collection concerning for abscess."

Bilateral pleural effusions (Figure 3) caused further complications during the patient's hospitalization. A right loculated pleural effusion was drained by an IR-guided thoracentesis revealing exudative fluid. The resulting Gram stain and culture rendered negative after five days of incubation. Acute kidney injury, likely multifactorial in origin from antibiotics and/or intravenous contrast, was also noted during his hospitalization, which recovered with antibiotic adjustment and intravenous fluids. A transthoracic echocardiogram was performed and found a calcified mitral apparatus; however, no valvular vegetations were observed.

The patient's blood cultures resulted negative after five days and the catheter draining his abscess was removed prior to his discharge. His discharge medication included oral linezolid and metronidazole to complete at least six weeks of antibiotic treatment. Outpatient infectious diseases clinic follow ups occurred at week four of antibiotic treatment and again two weeks post treatment completion. At four weeks of treatment, WBC 12.3/μL was reported and a repeat CT abdomen and pelvis with contrast was performed noting "slight decrease in [the] right perihepatic abscess". After completing at least six weeks of antibiotic treatment, the patient's WBC was 7.1/μL. He was discharged from infectious diseases clinic to routine oncology and geriatric clinics for continued cancer and general health management.

Discussion

A hepatic abscess is defined as an encapsulated collection of suppurative material within the liver parenchyma [11]. The most common organisms associated with Pyogenic Liver Abscesses (PLA) are *Escherichia coli*, *Klebsiella pneumoniae*, and Streptococcus [12-15]. More specifically, the *Streptococcus Milleri* group (SMG), has demonstrated association with PLA, and is comprised of *Streptococcus intermedius*, *Streptococcus constellatus*, and *Streptococcus anginosus*, which was first reported in 1975 [14]. Although the actual incidence

Table 1: Clinical monitoring for associated adverse events and review of labs.

1A:

Date	9/18*	21-Sep	9/26**	9/27ʔ	28-Sep	29-Sep	30-Sep	1-Oct	10/2ł	3-Oct	4-Oct	5-Oct	6-Oct	7-Oct
WBC/µL (4.5-11.0)	7.9	11.8	16.4	13.6	16.5	21.1	24	15.5	15.3	11.2	11.3	13.4	15	13.7
PLT K/cmm (150-450)	404	392	295	249	279	271	315	273	304	287	332	361	406	436
Cr mg/dl (0.4-1.2)	1	1.1	1.1	0.8	1.3	1.3	1.8	1.6	1.2	0.9	0.8	0.9	0.9	0.9

1B:

Date	8-Oct	9-Oct	10/10€	16-Oct	10/29¥	11/26≠	12-Dec	20-Dec	7-Jan	11-Feb	13-Mar
WBC/µL (4.5-11.0)	14.6	10.9		12.3	9.7	7.1	9.3	9.2	8.8	10.6	8
PLT K/cmm (150-450)	417	367		367	344	295	210	221	223	268	201
Cr mg/dl (0.4-1.2)	0.8	0.8		1	0.9	0.8	0.9	1	0.8	0.9	0.8

*Initial Oncology and Geriatric clinic outpatient visit
**Presentation to ED, antibiotics started
ʔ Admitted to hospital
ł Linezolid initiated
€ Discharged from hospital
¥ Outpatient ID clinic visit (#1)
≠ Outpatient ID clinic visit (#2)

of PLA in the United States may not be clear, there has been a steady increase in cases along with increases in antibiotic resistance [15]. Treatment by abscess drainage and administration of appropriate antibiotics are key to improving outcomes and decreasing mortality.

Blood cultures may not always be positive in PLA and abscess cultures should be performed to help guide appropriate antibiotic therapy. In our case, the empiric antibiotics initiated were meropenem and daptomycin, to provide broad coverage until speciation. Daptomycin was our preferred anti-MRSA agent due to acutely elevated serum creatinine. The preliminary blood cultures were negative; however, on day 5 of hospital admission, the cultures from the perihepatic abscess aspirate grew gram positive cocci in pairs, later identified as *S. gordonii*. Based upon the susceptibility test results, meropenem and daptomycin were discontinued and linezolid was initiated. Although penicillin was reported as susceptible, there was concern for the resistance pattern reported. The third generation cephalosporins, ceftriaxone and cefotaxime, were reported as resistant and the fourth generation, cefepime, was sensitive. Cefepime was considered to be too broad rather than the concern for cross allergenicity with cephalexin. Consideration was also given to the fact that there was recent AKI. Levofloxacin was not considered due to its extended spectrum of activity and unnecessary adverse events.

Upon discharge (on hospital day 14, (Table 1)), the patient's WBC remained elevated, so metronidazole was added to provide empiric anaerobic coverage. Chronic leukocytosis was one of the medical conditions identified and the patient's WBC continued to fluctuate during the course of therapy. Factors which may have influenced chronic leukocytosis in this patient are underlining chronic infection due to immunocompromised state (cancer with chemotherapy and radiation), the original perihepatic abscess, smaller abscesses not detected on imagining, loculated pleural effusion, pneumonia, poor oral dentition, and stress and inflammation from interventional procedures.

Chest radiographs in patients with liver abscesses have been reported to reveal abnormalities in the right lower lung field, such as right-sided pulmonary infiltrates with pleural effusions [16,17]. It is not uncommon for multiple abscesses to be identified. Our case highlights exudative fluid that was drained by IR directly from the right lung base.

The optimal duration of treatment has not yet been established; however, current practices dictate clinical judgment and overall response to therapy. In PLA, the general range reported duration of therapy for targeted intravenous antibiotics as two to three weeks followed by oral antibiotics for one week to two months dependent on clinical response. Our case presented the opportunity to offer antibiotics with high bioavailability and step down from intravenous meropenem and daptomycin directly to oral linezolid and metronidazole. Medications were evaluated and screened for possible drug to drug interactions. Clinical monitoring for associated adverse events and review of labs (Table 1) occurred during therapy and twelve days after linezolid discontinuation. Thrombocytopenia was not observed in our case despite therapy with linezolid for greater than two weeks.

Subsequently, the patient was discharged after receiving two weeks of inpatient antimicrobial therapy. Follow-up from his infectious disease clinic appointments occurred at week four of treatment and again at week six (two weeks post antimicrobial treatment). All findings were consistent with complete resolution of infection without any associated complications and/or complaints.

Overall, *S. gordonii* colonizes within the oral cavity forming the development of biofilms, which results in dental plaque and possible bacterial adhesions [2]. As we understand today, *S. gordonii* may not directly be pathogenic within the oral cavity, yet the ability for the development of hematogenous spread by *S. gordonii* might emerge [5].

Although gram-positive organisms have been described, *S. gordonii* presented as an infrequent occurrence in this clinical scenario and in our patient. To our knowledge, *Streptococcus gordonii* has not been previously identified and reported as the cause of a perihepatic abscess.

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