

Septic shock from multiple intra-abdominal *Streptococcus constellatus* abscesses unamenable to percutaneous drainage

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ABSTRACT

Streptococcus constellatus are gram-positive cocci belonging to the *Streptococcus milleri* group that have a propensity to cause bacteremia and abscesses, especially in immunocompromised patients. Here, we report the case of a 39-year-old male who was initially admitted to the hospital for diabetic ketoacidosis. During the hospitalization, he developed sepsis and blood cultures grew *Streptococcus constellatus*. CT imaging revealed multiple hepatic abscesses. A periapical abscess of the left mandibular central incisor found on CT Scan of face was identified as the likely source of infection. IR-guided drainage was performed however the patient went on to develop septic shock despite attempted source control and IV antibiotic therapy. Repeat imaging showed persistent hepatic abscesses in addition to new intraperitoneal abscesses necessitating exploratory laparotomy, drainage and abdominal washout. Fluid cultures grew *Streptococcus constellatus* and common enteric flora. Our report highlights the need for high clinical suspicion in cases of *Streptococcus constellatus* bacteremia to obtain diagnostic imaging for any abscess formation. Prolonged antibiotic therapy is a must and imaging guided or surgical drainage may be needed.

KEYWORDS: bacteremia; streptococcus; liver abscesses; septic shock

INTRODUCTION

Streptococcus constellatus are a gram positive cocci belonging to the *Streptococcus milleri* group along with *Streptococcus intermedius* and *Streptococcus anginosus*. These bacteria are usually found in the mouth and upper respiratory, gastrointestinal, and urogenital tracts [1]. They are well known to cause bacteremia and abscesses in a wide variety of organ systems. We present a case wherein multiple intra-abdominal abscesses from this commensal organism were unamenable to percutaneous drainage resulting in a prolonged hospital course complicated by septic shock requiring exploratory laparotomy with abdominal washout.

CASE DESCRIPTION

A 39-year-old male with a past medical history of diverticulitis presented with worsening fatigue, pre syncope, thirst and polyuria for 2 days.

On admission, vital signs were temperature: 98.5°F, heart rate: 93 beats/minute, blood pressure: 95/66 mmHg, respiratory rate: 18 breaths/minute and oxygen saturation: 97% on room air. On general exam, the patient was morbidly

obese, awake, conversant and in no acute distress. Precordial and chest auscultation were normal. The abdomen was soft and non-tender with bowel sounds heard in all quadrants. Lower extremities showed no edema or wounds.

Initial laboratory tests demonstrated marked hyperglycemia of 796 mg/dL, sodium 123 mmol/L, potassium 5 mmol/L, bicarbonate 14 mmol/L, blood urea nitrogen (BUN) 38 mg/dL and creatinine of 1.36 mg/dL (baseline <1.0). Urinalysis was positive for greater than 1000 mg/dL glucose and 15 mg/dL ketones. Complete blood count showed elevated white blood cell (WBC) count of 26,550 cells/μL with bandemia and hemoglobin of 11.8 g/dL. Lactate was 2.30 mmol/L and HbA1c 12.0. Corrected anion gap was calculated to be 23.

With a diagnosis of Diabetic Ketoacidosis, the patient was admitted to ICU and started on aggressive crystalloid resuscitation, Insulin drip along with frequent glucose and lab monitoring as per protocol. Anion gap and hyperglycemia resolved promptly with IV Insulin and he was downgraded to medical floors within 24 hours.

Shortly after, the patient started spiking fevers with Tmax of 103°F and this coincided with routine blood cultures drawn from admission returning positive for *Streptococcus* along with hypotensive BP of 80/50 mmHg and tachycardic HR of 126 beats/minute. He was treated with aggressive IV fluids and Ceftriaxone 2g IV once daily based on sensitivities.

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Although Infective Endocarditis was suspected, this was ruled out on transesophageal echocardiogram. CT chest, abdomen and pelvis with IV contrast was ordered for further workup which returned positive for multiple hypoattenuating multiloculated fluid collections (largest 7.7 x 8.2 x 9.4 cm in left lobe) with rim enhancement containing internal foci of air consistent with hepatic abscesses. This new finding prompted further history taking and the patient revealed an extensive history of dental caries and noncompliance with dental follow up. He had a dislodged tooth implant recently which he was frequently manipulating with his hands during meal consumption. He denied any history of sexually transmitted diseases, IV drug use or recent hospitalizations. An oral exam at this time revealed generalized poor hygiene without any appreciable tooth, gum or jaw erythema, tenderness or swelling. However, CT scan of face and mandible showed periapical abscess involving the root of left mandibular central incisor. Other workups for infectious disease including urinalysis, chest x-ray and Human Immunodeficiency Virus (HIV) testing were negative.

Interventional Radiology placed a STAT ultrasound guided percutaneous catheter with drainage of 150cc purulent fluid from the largest hepatic abscess (Figure 1). Despite this intervention, the patient's shock worsened and he was therefore readmitted to ICU. IV fluids were continued

and antibiotic therapy was escalated to Piperacillin-Tazobactam 3.375g IV every 8 hrs.

During his ICU course, the patient developed severe abdominal pain and tenderness resulting in acute hypoxic respiratory failure from lung splinting requiring noninvasive ventilation.

Abscess fluid cultures grew *Streptococcus constellatus* sensitive to Piperacillin-Tazobactam. Although shock state resolved, sepsis continued with unimproved abdominal pain, febrile status (Tmax 100.9°F) and recurrent leukocytosis of 37,050 cells/μL. Repeat CT imaging approximately a week later revealed interval worsening of left lobe liver abscess despite catheter placement as well as scattered multiple new loculated intraperitoneal abscesses in the para-colic gutters, sub-phrenic spaces and pelvis. The largest measured 16.0 x 5.7 x 16.7 cm (Figure 2). These new abscesses were unamenable to IR drainage and patient was therefore taken urgently to the operating room and underwent exploratory laparotomy, drainage of intraabdominal abscesses, abdominal wash-out of over 3L purulent fluid consistent with peritonitis and placement of 4 Blake and 2 Jackson-Pratt drains.

Postoperatively, the patient remained on Norepinephrine and Vasopressin as well as prolonged mechanical ventilation. These were gradually weaned and the patient was extubated on postoperative day 3. Piperacillin-Tazobactam was continued for an additional 3 weeks via a peripherally inserted central catheter (PICC).

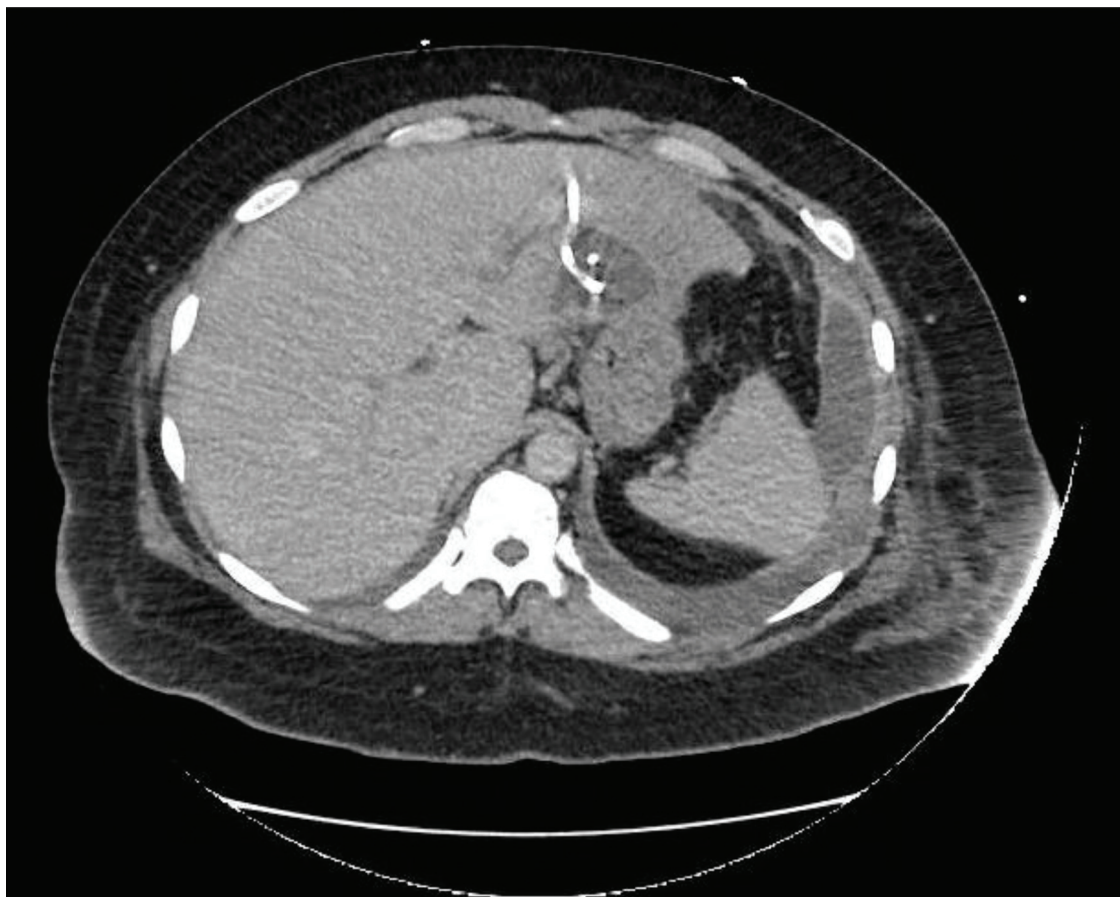


Fig. 1. Axial CT imaging demonstrating large left hepatic lobe abscess measuring 5.1 x 4.3 x 3.6 cm with pigtail drain in place. A left subphrenic fluid collection with rim enhancement is also visible.

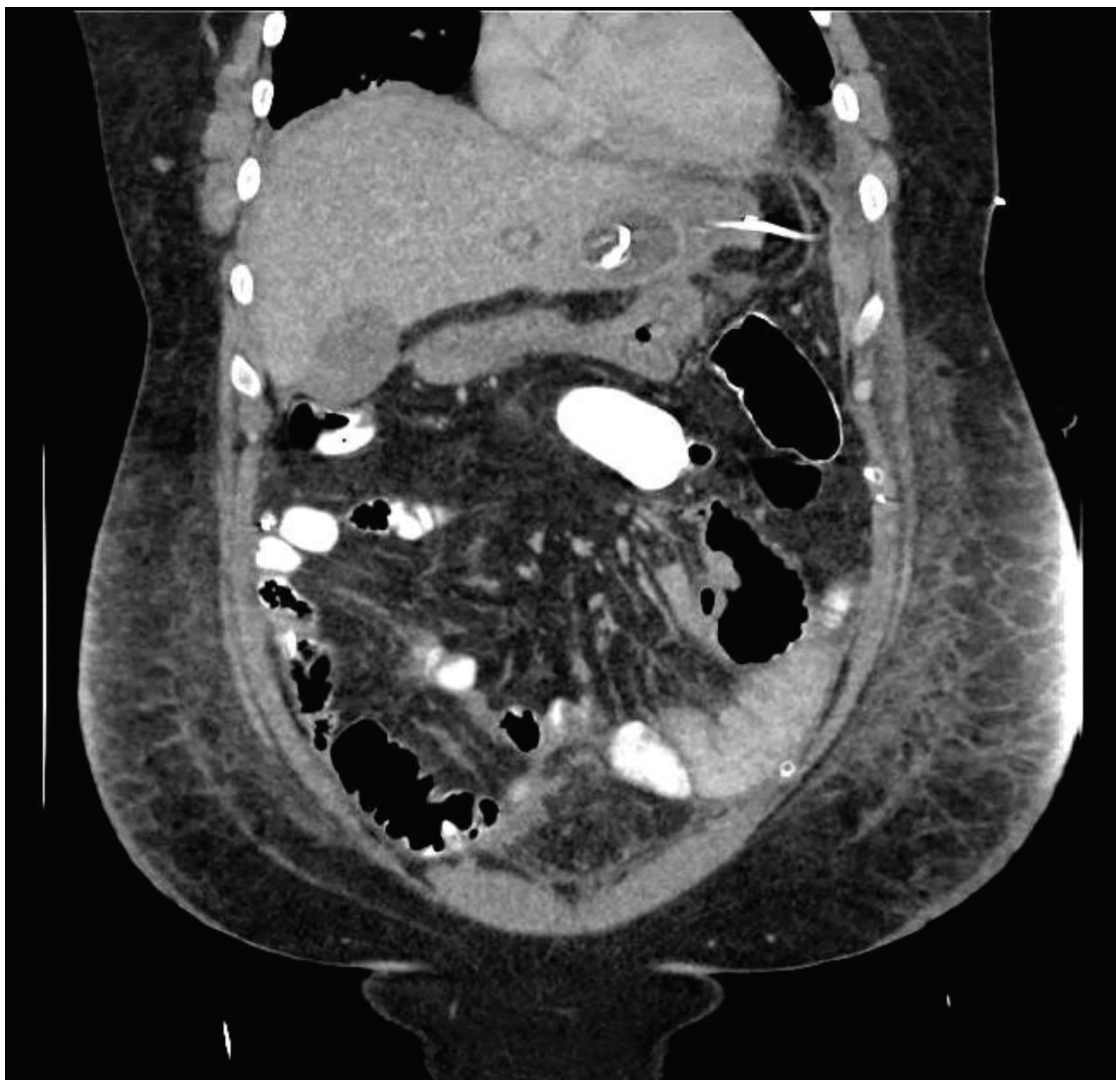


Fig. 2. Coronal CT imaging demonstrating multiple hypoattenuating multiloculated rim enhanced fluid collections; 1 in right infrahepatic region and 2 in left hepatic lobe with pigtail drain visible laterally.

■ DISCUSSION

We herein present a case in which *Streptococcus constellatus* caused liver abscesses secondary to a dental abscess. The pathogenic potential of commensal bacteria such as *Streptococcus constellatus* should not be underestimated specially in patients with immunosuppression, making an aggressive, possibly surgical, treatment necessary.

Streptococcus constellatus is a viridans streptococcus belonging to the *Streptococcus milleri* group. Other species of this group include *Streptococcus intermedius* and *Streptococcus anginosus* [2]. Like other Streptococci, they are gram-positive, catalase-negative, nonmotile facultative anaerobes and were first identified in dental abscesses [3].

A clearly evident etiological infectious source may not always be seen physically at bedside as was the case with our patient where no dental abscess was found on oral exam, however, CT scan face was positive [4]. Systemic infections of *Streptococcus constellatus* originating from a source in the head and neck are not uncommon [5].

This group of bacteria can cause a wide variety of infections; the most severe being bacteremia and distant focal infections or abscesses involving the central nervous, pulmonary and hepatic systems as well as soft tissues [4,7-9]. Our patient had multiple liver abscesses and although these are traditionally associated with *Escherichia coli* and *Klebsiella pneumoniae*, one case series in the USA found Streptococci to be the most common pathogen [10].

Immunosuppression is a very strong risk factor associated with *Streptococcus constellatus* infections and common conditions predisposing to it, some of which were seen in our patient as well, include dental manipulation, diabetes mellitus and obesity [11]. Proper management and prevention of these comorbid conditions is likely beneficial in combating this infection.

Mainstay of treatment for *Streptococcus constellatus* infections involves antimicrobial therapy and abscess drainage. CT imaging is recommended to evaluate for focal or multifocal abscesses as well as for planning approaches for drainage. Guidelines recommend Ceftriaxone as the

preferred antimicrobial agent [12]. However, Ceftriaxone has been associated with treatment failure in obese patients and this may be the reason for continued sepsis in our patient despite higher dosing of 2g IV daily [13]. Other commonly available antimicrobial options include Penicillin and Amoxicillin. Susceptibility to Clindamycin is reported to be variable [12]. Although dual therapy can be considered for severe and complicated infections, it has not necessarily shown an improved outcome in terms of mortality [14]. In a similar fashion, minimally invasive drainage has shown to have higher success rate and shorter length of stay instead of open surgery for hepatic abscesses [15]. With widespread availability of advanced imaging techniques, the latter is usually reserved for instances such as ours, when first line interventional radiology guided percutaneous drainage fails to adequately resolve the infectious process.

CONCLUSION

Presence of *Streptococcus constellatus* bacteremia should prompt workup for occult infection; in most cases an abscess of the oral cavity. Our patient with a prolonged ICU course highlights the need for high clinical suspicion so that diagnostic imaging can be obtained in a timely manner. Prolonged antibiotic therapy is a must and imaging guided or surgical drainage should be performed.

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Conflicts of interest

There are no conflicts of interest to report.

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