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Fusobacterium nucleatum: A Rare Presentation of Hepatic Abscesses

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Fusobacterium nucleatum: A Rare Presentation of Hepatic Abscesses, Empyema, and Extensive Thrombosis

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Abstract

Introduction: *Fusobacterium nucleatum* is a facultative anaerobic gram-negative bacillus found in the oral cavity, gastrointestinal tract, and genitourinary tract. We describe a case of *Fusobacterium* liver abscess and empyema, resulting in extensive thrombophlebitis in the intraabdominal and extremity veins.

Case presentation: A 78-year-old female with past medical history significant for bicytopenia and tooth repair eight months prior to presentation presented with mild diarrhea and weakness. Imaging revealed multiple >10cm hepatic abscesses, a small right pleural effusion, and a segmental pulmonary embolism, along with extensive intraabdominal and extremity DVTs. She underwent IR drainage of three abscesses as well as chest tube drainage of pleural effusion. Blood, abscesses, and pleural effusion culture grew *Fusobacterium nucleatum*. Plural effusion also grew *Lactobacillus rhamnosus*. She initially received metronidazole and was eventually switched to ampicillin/sulbactam. Malignancy work up was negative and source was unclear.

Conclusion: The common sources of *Fusobacterium nucleatum* hepatic abscesses are periodontal flora, cryptogenic, and gastrointestinal tract. Treatment includes source control and antibiotics, ranging from 2 weeks to 6 months. This case illustrates the rare disease process of *Fusobacterium* hepatic abscess formation and the bacteria's thrombogenic characteristics.

Introduction

- *Fusobacteriae* are anaerobic gram-negative bacilli[1] found primarily in the oropharyngeal region[2] but has also been found in the gastrointestinal and genitourinary tract[1,3,4].
- The bacteria are known classically for causing Lemierre's disease, which is described in young, immunocompetent, healthy individuals as an acute infection in the oropharynx, leading to thrombophlebitis of the internal jugular vein and subsequent septic emboli, typically to the pulmonary vasculature[5].
- In rare cases, *Fusobacterium* can cause bacteremia[6,7,8] with thromboembolism, such as to the liver, in older, immunocompromised individuals[9].
- We present an uncommon case of *Fusobacterium nucleatum* causing bacteremia, without the classical presentation of Lemierre's disease, leading to multi-loculated hepatic abscesses, empyema, and extensive thromboembolisms resulting in renal and pulmonary infarct in an older individual.

Case Presentation

- A 78-year-old female with past medical history of asthma, hypertension, bicytopenia (thrombocytopenic and leukopenia) of unknown cause and osteoarthritis presented with generalized weakness and watery diarrhea
- Dental history: Eight months prior to presentation she had a broken tooth repaired
- Social history: She is a widowed homemaker who has a 20 pack-year smoking history and quit 20 years prior to presentation. She does not use illicit substances.
- Vitals: hypotensive, tachycardic, febrile. Physical exam: Mild epigastric tenderness and bilateral lower extremity edema
- Labs: Sodium 129, BUN 61, GFR 28, creatinine 2.2 (baseline 0.9), WBC 9.6, hemoglobin 9.9, AST 329, ALT 318, Tbili 2.0, CRP >200. C.diff and HIV negative. Fecal occult blood was negative.
- CT abdomen revealed multiple >10cm hepatic abscesses and right pleural effusion. Echo demonstrated EF >70%, G1DD, mild TR, trace AR, PA pressure 44 mmhg. Chest x-ray demonstrated large right sided pleural effusion.
- IR drainage of three abscesses. Blood and abscess culture grew *Fusobacterium nucleatum*. Pleural fluid demonstrated empyema positive for *Lactobacillus rhamnosus* and *Fusobacterium nucleatum* and negative for malignant cells. Chest tube was placed.
- CT chest, abdomen, and pelvis demonstrated left lower lobe segmental pulmonary embolism along with left renal vein thrombosis, left common femoral and external iliac vein thrombosis. Lower extremity dopplers were positive for thrombosis from right popliteal to posterior tibial veins and left common femoral to posterior tibial veins. The left profunda vein was also thrombosed. Upper extremity dopplers showed acute thrombosis of right basilic, left mid cephalic, and left median cubital vein. Patient was started on lovenox.
- Malignancy/Source workup: Colonoscopy showed mild diverticulosis with no masses. Panorex was not obtained due to fall risk. CT sinus negative for thrombosis of internal jugular veins. Repeat echo showed no vegetations and decreased PA pressure to 26 mmhg.
- CT abdomen and pelvis showed an interval decrease in size of the abscesses. See Table 1.
- Patient was not a surgical candidate. She received 23 days of IV metronidazole and 6 days of ampicillin/sulbactam upon transfer to our facility. She was discharged on ampicillin/sulbactam for a total of 6 weeks of antibiotics with the plan to reimage prior to completion of therapy. She was discharged to subacute rehab (SAR) and lost to follow up.

DAY 1

Figure 1a

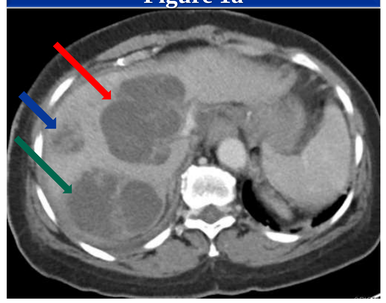
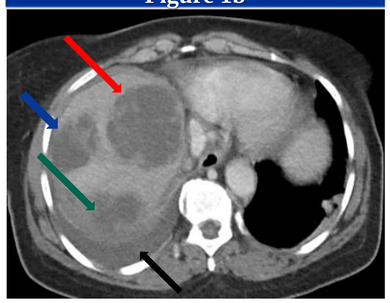


Figure 1b



- Figure 1a and 1b are cuts from the CT scan performed on day of presentation. As demonstrated in the images there are three loculated abscesses located in the right hepatic lobe. Additionally, a right pleural effusion can be appreciated (black arrow).

29 Days of Antibiotics

1 dose of fluconazole, micafungin, and vancomycin
3 days of Cefepime
23 days of IV Metronidazole
6 days of Ampicillin/Sulbactam

Discharged on Ampicillin/Sulbactam to complete a total of 6 weeks of antibiotics with planned imaging follow up

DAY 27

Figure 2a

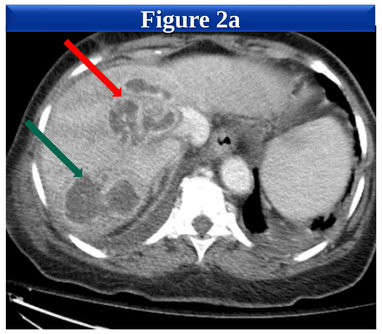
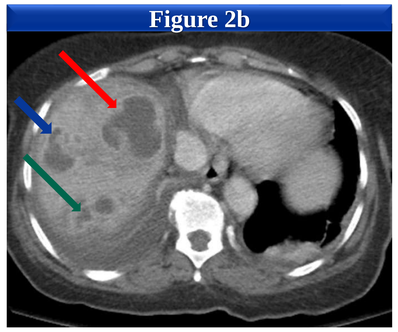


Figure 2b



- Figure 2a and 2b are cuts from the CT scan performed on day 27 of antibiotics. Significant decrease in size can be appreciated in each abscess. Additionally, septations are visible within each abscess.

Discussion

- *Fusobacterium* is the causative organism in less than 0.4-1% of all bacteremia and less than 10% of anaerobic bacteremias in adult individuals[10].
- *Fusobacterium* is the inciting organism in pyogenic liver abscesses in 3-4% of cases[11,12].
- The incidence of pyogenic liver abscesses ranges from 1.1- 3.6 out of 100,000 individuals[11,12,13] with a mortality rate of 6.3% [14].
- Source for *Fusobacterium* hepatic abscesses in descending frequency is periodontal disease[15] cryptogenic, and gastrointestinal[16].
- There is an increased incidence of cancer in patients who present with *Fusobacterium* infections[17].
- Risk factors for *Fusobacterium* pyogenic liver abscess are male, immunodeficiency, malignancy, smoking history, alcohol use disorder, cirrhosis, diabetes, and/or renal failure[15,18].
- Patients with hepatic abscesses will typically present with fever, nausea, vomiting, diarrhea, weight loss, and right upper quadrant abdominal pain[14,12]. Inflammatory markers are often elevated[14]. Patients may also have hypoalbuminemia[11]. Additionally, patients often experience elevated serum creatinine levels and liver enzymes in a non-specific pattern[14].
- The gold standard for diagnosing hepatic abscesses is CT or abdominal ultrasound[11,12,14].
- Treatment consists of antibiotics and radiological intervention, either drainage or aspiration[14]. However, these interventions may be insufficient if patients have abscesses larger than 5 cm and surgical intervention may be required[2,19].
- The most commonly used antimicrobial treatment regimens include metronidazole in combination with ceftriaxone, a quinolone, aminoglycoside, piperacillin/tazobactam, ampicillin/sulbactam, or amoxicillin/clauvanate[11,20], but ultimately depends on if additional organisms are involved. Antibiotics are typically given for several weeks and repeat imaging is typically required prior to cessation.
- Infection with *Fusobacterium* is associated with vascular thrombosis in close proximity to the infection site[21]. *Fusobacterium* can causes acceleration of coagulation by the lipopolysaccharides or lipid A found in cell wall that activates Hageman factor and the production of exotoxins that promotes platelet aggregation[22,23,24,25]. The decision to anti-coagulate is based on general clinical experience[26].
- Empyema can occur from parenchymal lung infection, trauma, contiguous spread from a hepatic abscess, or as a result of thromboembolic pulmonary embolism [4,27].

Conclusion

- *Fusobacterium* species bacteremia is a rare entity, but cases may be under-reported due to the limitations of isolation of the organism from anaerobic cultures and tissue samples.
- *Fusobacterium* is known to cause thrombosis and there are no clear recommendations on anticoagulation.
- Septic thromboembolisms can develop into hepatic abscesses and pulmonary embolisms, potentially leading to empyema
- A thorough workup for source control includes a Panorex, CT sinus, and colonoscopy.
- There is an increased incidence of underlying malignancy in individuals with *Fusobacterium* bacteremia; thus, a thorough cancer workup is required.
- Finally, with appropriate treatment for *Fusobacterium* pyogenic liver abscesses, with a combination of prolonged antimicrobials and source control with drainage, patients can have positive outcomes.

Bibliography

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