CASE REPORT

A Case of Polymicrobial Endocarditis due to Anaerobic Organisms in an Injection Drug User

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Endocarditis is a serious complication of injection drug use most commonly due to *Staphylococcus aureus*. We report a case of tricuspid valve polymicrobial bacterial endocarditis in an injection drug user from 3 oral anaerobes: *Actinomyces odontolytica*, *Veillonella* species, and *Prevotella melaninogenica*. The patient was believed to have acquired these organisms due to his habit of licking the needle in order to gauge the strength of the cocaine prior to injection. The patient was successfully treated with a 6-week course of penicillin G and metronidazole. This case demonstrates the importance of a detailed history in designing empiric therapy.

KEY WORDS: endocarditis; polymicrobial; injection drug user; anaerobes.

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Infective endocarditis (IE) is a severe complication of injection drug use.[1] The incidence of IE among injection drug users (IDUs) in the United States ranges from 1% to 5%.[2] Due to their high-risk behaviors, IDUs are subject to needle-borne infections by organisms that are ordinarily nonpathogenic. We report a case of tricuspid valve endocarditis in an IDU from anaerobes that normally reside in the human oral cavity.

CASE REPORT

A 33-year-old white male presented to our hospital with a 2-week history of subjective fevers, chills, and rigors. He also complained of a 20-to 30-lb weight loss, which he attributed to a decrease in appetite as well as to some nausea and vomiting. The patient had previously been seen at another hospital for these symptoms and was prescribed levofloxacin for possible pneumonia. He later returned to that hospital when his symptoms did not improve and a computed tomography (CT) scan of the thorax reportedly showed "spots on his lungs." The patient was given more unknown antibiotics and sent home. Additionally, the patient reported having a dental procedure 6 months previously. His past medical history included diabetes mellitus type 2, gastroesophageal reflux disease, and schizoaffective disorder. He had no history of endocarditis or valvular heart disease. The patient smoked 1.5 packs of cigarettes per day for the past 20 years, consumed alcohol occasionally, and had a history of injection drug use, particularly cocaine. He last used injection cocaine 5 weeks prior to admission.

On admission the patient had a temperature of 40.0 °C, a pulse of 80 beats per minute, a respiratory rate of 19 breaths per minute, and a blood pressure of 130/80 mmHg. On physical exam, there was no jugular venous distention and there was a II/VI holosystolic murmur at the lower left sternal border that became louder with inspiration. Lungs were clear to auscultation bilaterally. White blood cell count was 15.1K cells per mL with 90.8% granulocytes and an increase in bands. Cardiac enzymes were normal. Chest radiograph revealed only a slight increased opacity in the right upper lobe of the lung but CT of the thorax showed multiple cavitary lesions in both lungs. The largest lesion was in the left lower lobe and measured 3.2 cm. Transesophageal echocardiogram revealed an echodense mobile structure attached to the anterior leaflet of the tricuspid valve and moderate tricuspid regurgitation. The remainder of the valves was normal.

Initially, the patient was treated empirically for endocarditis with vancomycin and ceftriaxone to cover *Staphylococcus aureus* and *Streptococcus*. Blood cultures, however, returned positive for *Actinomyces odontolytica* and *Veillonella* species. Antimicrobial sensitivities were not identified. The therapy was then changed to penicillin G based on the usual sensitivities of these organisms.[8,12] Blood cultures sent for the HACEK (*Haemophilus* species, *Actinobacillus actinomycetemcomitans*, *Cardiobacterium hominis*, *Eikenella corrodens*, *Kingella* species) organisms were negative after 6 weeks of incubation. Although the patient remained febrile after several days of penicillin G therapy, blood cultures before discharge were negative and the white blood cell count had decreased to 7.5K cells per mL with 74.8% granulocytes. Because no other organisms had been identified, it was felt that this continued fever represented the deep-seated nature of his infection. In order to facilitate outpatient therapy, ceftriaxone was substituted for penicillin G due to its more convenient dosing regimen. The patient was then discharged with a central line for outpatient therapy. The patient continued to be febrile. After 6 days, the patient was readmitted to the hospital. The patient denied resumption of illegal injection drug use during his time at home. Blood cultures drawn at readmission again grew *Veillonella* species but additionally grew *Prevotella melaninogenica*. *Actinomyces* did not grow on blood cultures during this admission. The patient was then treated with penicillin G and metronidazole. This offered good coverage of all 3 organisms.[8,12,13] He became afebrile within 4 days and completed an uneventful 6-week in-patient course of therapy. Cardiothoracic surgery evaluation on admission and upon final discharge found no need for surgical intervention.

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Because of the unusual organisms grown in this patient's blood cultures, he was reinterviewed regarding his personal habits, particularly his injection drug use. The patient admitted to not only reusing needles, but he also admitted that he routinely licked the needle before inserting it into his arm. The numbing effect of the cocaine on his tongue allowed him to determine the quantity of cocaine that he would inject into his bloodstream for desired effects.

DISCUSSION

Endocarditis in injection drug users is usually right sided and most commonly involves the tricuspid valve.[1] Right-sided endocarditis presents with a syndrome of persistent fever and pulmonary symptoms due to septic emboli including cough, dyspnea, and hemoptysis. The peripheral stigmata of endocarditis caused by immunologic vascular events are not classically found in right-sided endocarditis.[3] The most common organism isolated is *Staphylococcus aureus*.[2,3]

The case presented here and a review of the literature, however, demonstrates that it is important to consider other more fastidious causes of infection in this population. IDUs may be exposed to a variety of microbes due to their drug injection practices. For example, IDUs are subject to infection from normal oropharyngeal flora from the habit of cleaning their needles with saliva and using saliva to dissolve the drug. A case of endocarditis from 1 oral microbe, *Neisseria sicca*, has been reported in an IDU who licked the blood off the needle of an unsuccessful "stick" before the next attempt.[4] Raucher et al.[5] reports cases of polymicrobial endocarditis with *Haemophilus parainfluenzae* and other organisms of the normal oral flora. In this case series, several patients admitted to blowing into or sucking on their needles before injection. Endocarditis from *Pseudomonas* species has been associated with washing needles in contaminated water.[6]

The bacteria implicated in this patient's endocarditis are *Actinomyces odontolytica*, *Veillonella* species, and *Prevotella melaninogenica*. They are all anaerobes predominantly found in the human oral cavity. They are all more commonly associated with other infections and abscesses but they can cause endocarditis in patients with predisposing conditions such as valvular heart valve disease and injection drug use.[7,8,9] As in other previously described cases, we believe that this patient was exposed to these organisms through his habit of licking the needle prior to injection. Interestingly, 1 study identifies our organisms, *Actinomyces odontolyticus*, *Veillonella parvula*, and *Prevotella melaninogenica*, as a part of a cluster of organisms that are particularly abundant in saliva and on the dorsal and lateral surfaces of the tongue.[10] This information, the patient's history, and the absence of other organisms on blood culture confirm that these bacteria are the likely cause of the polymicrobial endocarditis in our patient. In a similar case, Mah and Shafran reported about an IDU with polymicrobial endocarditis involving *Veillonella* species in which salivary contamination was suspected as the source of infection.[11] There are no reports, however, of polymicrobial endocarditis in IDUs with the other organisms in this discussion.

In this case, penicillin G and metronidazole were the chosen treatments to cover all 3 organisms. Initially, however, assumptions regarding the source of his infection delayed the initiation of appropriate therapy. Being unaware of the patient's particular drug use habits, we assumed that coverage for skin flora would be adequate. In fact, it was entirely inadequate. In response to similar situations, some authors propose empirically treating for polymicrobial infection in all IDUs with endocarditis.[11] They point out that in some instances valve vegetation cultures grow additional organisms beyond what is found on blood cultures.[11] We, however, do not advocate that all cases of endocarditis in IDUs be empirically treated for polymicrobial infection. Rather, we recommend that a detailed history of injection drug use be taken. This history should delve into the user's habits and reveal the exact actions of the user from acquisition to disposal of the needle and the drug. It is critical that the examiner approach the patient nonjudgementally so as to elicit an honest history. If the history reveals exposure to other microbes in addition to skin flora, the empiric therapy should be adjusted to cover these organisms. The question that remains is whether this coverage should be dropped if blood cultures do not support infection by a non-skin flora organism. But in the event that the patient does not rapidly recover during the usual empiric therapy, a good history of injection drug use habits may point the physician to another antimicrobial agent.

In summary, we present a case of IE from *Actinomyces odontolytica*, *Veillonella* species, and *Prevotella melaninogenica* in a patient with a history of injection drug use. His habit of licking the needle to gauge the strength of the injection exposed him to infection by these oral microbes. Clearly, contamination from non-skin flora and polymicrobial endocarditis should be considered in an IDU with nonsterile injection drug use practices. Thus, we emphasize the importance of obtaining a detailed history of the injection drug use habits of the patient. This may reveal a risk factor for more unusual infections and alter the empiric therapy of endocarditis.

REFERENCES

1. **Frontera JA, Gradon JD.** Right-side endocarditis in injection drug users: review of proposed mechanism of pathogenesis. Clini Infect Dis. 2000;30:374–9.
2. **Miro JM, del Rio A, Mestres CA.** Infective endocarditis in intravenous drug abusers and HIV-1 infected patients. Infect Dis Clin North Am. 1997;16:273–95.
3. **Moss Rob, Munt Brad.** Injection drug use and right sided endocarditis. Heart. 2003;89:577–81.
4. **Valenzuela GA, Davis TD, Pizzani E, McGroarty D.** Infective endocarditis due to *Neisseria sicca* and associated with intravenous drug abuse. South Med J. 1992;85:929.
5. **Raucher B, Dobkin J, Mandel L, Edberg S, Levi M, Miller M.** Occult polymicrobial endocarditis with *Haemophilus parainfluenzae* in intravenous drug abusers. Am J Med. 1989;86:169–72.
6. **DeWitt DE, Paauw DS.** Endocarditis in injection drug users. Am Fam Physician. 1996;53:2045–9.
7. **Westling K, Lidman C, Thalme A.** Tricuspid valve endocarditis caused by a new species of actinomyces: *Actinomyces funkei*. Scand J Infect Dis. 2002;34:206–7.
8. **Loughrey AC, Chew EW.** Endocarditis caused by *Veillonella dispar*. J Infect. 1990;21:319–21.
9. **Shah HN, Collins DM.** Prevotella, a new genus to include *Bacteroides melaninogenicus* and related species formerly classified in the genus *Bacteroides*. Int J Systematic Bacteriol. 1990;40:205–8.
10. **Mager DL, Ximenez-Fyvie LA, Haffajee AD, Socransky SS.** Distribution of selected bacterial species on intraoral surfaces. J Clin Periodontol. 2003;30:644–54.
11. **Mah MW, Shafran SD.** Polymicrobial endocarditis with eight pathogens in an intravenous drug abuser. Scand J Infect Dis. 1990;22:735–7.
12. **Mardis JS, Many WJ Jr.** Endocarditis due to *Actinomyces viscosus*. South Med J. 2001;94:240–3.
13. **Khemaleelakul S, Baumgartner JC, Pruksakorn S.** Identification of bacteria in acute endodontic infections and their antimicrobial susceptibility. Oral Surg, Oral Med, Oral Pathol, Oral Radiol Endod. 2002;94: 746–55.