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Peptostreptococcus infective endocarditis and bacteremia. Analysis of cases at a tertiary medical center and review of the literature

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ABSTRACT

Peptostreptococcus infective endocarditis is rare but associated with high morbidity. We report two cases and evaluate all positive blood cultures for *Peptostreptococcus* at our institution, followed by a review of the literature. This organism causes a subacute presentation and cardiac valve pathology is a risk factor. Penicillin remains the treatment of choice.

1. Introduction

Anaerobic bacteria have been identified as the causative pathogen in up to 16% of patients with infective endocarditis (IE) over the past three decades [1,2]. Often overlooked as microbiological contaminants, anaerobic bacteria have been linked to severe complications of IE such as mycotic aneurysms, emboli to distant organs, aortic-ring abscesses, cardiogenic shock, dysrrhythmias, and septic shock [3]. These organisms are difficult to isolate and many times are not detected by conventional microbiological techniques [3]. The most common anaerobic bacteria isolated from patients with IE are *Bacteroides fragilis*, *Clostridium* species and *Propionibacterium acnes* [3,4]. *Peptostreptococcus* spp., on the other hand, is rarely the cause of infective endocarditis. It is considered part of the normal flora in the respiratory, gastrointestinal and genitourinary tracts [5]. *Peptostreptococcus* is a Gram-positive anaerobic streptococci that was first implicated in human disease in 1893 [6]. Since that time, only a handful of cases of IE have been reported in the literature. Here we report our experience with two cases of *Peptostreptococcus* IE and an evaluation of all positive blood cultures for *Peptostreptococcus* within our institution. Additionally, we review the literature to identify other cases of *Peptostreptococcus* IE previously reported.

As the taxonomic classification of the *Peptostreptococcus* genus underwent several changes over recent years, we included in this study species formerly classified as *Peptostreptococcus* species.

2. Methods

Two patients with confirmed *Peptostreptococcus* IE were treated at the University of Pittsburgh Medical Center (UPMC) during 2008. Their clinical course is reported in detail. Next, we retrospectively reviewed all positive blood cultures with *Peptostreptococcus* spp. at UPMC over a ten-year period, from January 1999 to December 2008. Positive blood cultures were identified from the microbiology laboratory computerized database. The electronic medical records were reviewed and demographic, microbiological and diagnostic data were recorded. The presence of IE was determined according to the modified Duke Criteria [7]. Finally, we identified all reported cases of *Peptostreptococcus* IE in the English and Spanish literature using the search terms "*Peptostreptococcus*", "*Peptococcus* AND endocarditis", and "*Peptostreptococcus* AND endocarditis" in two popular databases (PubMed and Ovid), and cross-referenced the reports cited in each. For completeness, we additionally complied with current taxonomic denominations for each of the 17 species of the genus *Peptostreptococcus* that underwent taxonomic modification and searched using these parameters (for example, "*Parvimonas micra* AND endocarditis" for *Peptostreptococcus micros*). The

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website compiled by Dr. J.P. Euzéby was used as reference, with permission (see Ref. [26]). This study was approved by the Institutional Review Board (IRB) at UPMC.

3. Case reports

3.1. Case 1

A 63 year-old female with remote bioprosthetic aortic valve and mechanical mitral valve replacement, and a previous episode of *Enterococcus* endocarditis two years prior to admission presented to an outside facility after a fall. To evaluate syncope as an etiology of her fall, a cardiac workup was initiated. Transesophageal echocardiogram showed a 1.2 × 0.7 cm mitral valve vegetation. In addition, she had a head computerized tomography (CT) scan done that showed a 2.9 cm left parietal lobe mass without mass effect. Subsequently, MRI was also done with T2 weighted images showing a ring-enhancing lesion in the left occipital lobe with surrounding edema. Two sets of blood cultures drawn four hours apart grew *P. micra*. She was started on ampicillin/sulbactam 3 g IV every 6 h. Based on the results of the blood cultures, this was changed to penicillin G 24 million units (MU) continuous intravenous infusion and one dose of gentamicin dosed 1 mg/kg IV was given. Subsequently, the patient was transferred to our facility for further evaluation. Upon presentation to our facility, she was afebrile and confused. She had an irregularly irregular heart rate with a grade III/VI systolic murmur at the left sternal border. She had no evidence of Osler's nodes, Janeway lesions, splinter hemorrhages or conjunctival hemorrhages. Laboratory evaluation revealed leukocytosis of 13 000 cells/mL with 91% neutrophils. She underwent craniotomy with the removal of a liquid cavernous malformation, which was confirmed by pathology. Her blood cultures had cleared when evaluated at our institution. Her course was complicated by gastrointestinal hemorrhage. In light of this and the clearance of her blood cultures, she was not felt to be an ideal candidate for cardiac valvular surgery. She was continued on penicillin G 24 MU continuous infusion for 6 weeks and gentamicin 1 mg/kg IV q8 h for the first 2 weeks. She was seen for follow up one week after the end of her antibiotic course and did not have clinical evidence of recurrence.

3.2. Case 2

A 48 year-old female without known prior comorbidities who developed left sided dental pain of two weeks duration presented to an outside hospital with acute onset rigors and fevers up to 39.4 °C. She was noted to be delirious on presentation and her white blood cell count at admission was 7 800 cells/mL with 89% neutrophils. Chest radiograph, CT of the head, and lumbar puncture were all unremarkable. She had two peripheral blood cultures drawn on admission revealing Gram-positive cocci in pairs and chains in the anaerobic bottles. Transthoracic echocardiogram was suspicious for a possible aortic valve mass. Given this abnormality, a transesophageal echocardiogram was obtained and revealed a 0.6 cm vegetation on the non-coronary cusp of the aortic valve. She received empiric vancomycin and ceftriaxone before transfer to our facility. Her clinical status improved markedly with resolution of her delirium, fevers, and rigors. One out of the two sets of peripheral blood cultures drawn on admission at the outside hospital grew *Peptostreptococcus anaerobius* on day five. Follow up blood cultures drawn 24 h after admission were clear. Her antibiotic regimen was changed to penicillin G 24 million units as a continuous infusion. She was evaluated by oral maxillofacial surgery and panoramic radiograph revealed no focal abscess. Several teeth needed to be extracted, and the source of her bacteremia was ultimately felt to be odontogenic. She continued to improve and was discharged on a 6-week course of intravenous penicillin for endocarditis. The patient was followed in her hometown and in a telephonic encounter she stated that she was doing well 2 weeks after discontinuation of the antibiotic.

4. Results

4.1. Literature review

Including our two cases, there have been 21 reports of IE caused by *Peptostreptococcus* spp. reported in the modern era (Table 1). No additional cases were found when using alternative taxonomic nomenclature.

4.1.1. Demographics and clinical characteristics

The average age was 48 years (range: 18–77 years) with a similar distribution of female (47%) and male patients. For 18 cases with available data, the vast majority involved the left side of the heart, with 9 cases involving the aortic valve (47.5%), 9 the mitral valve (47.5%), one with dual mitral and aortic involvement (5%), and only one case with tricuspid valve involvement (5%). Ten of the cases (47%) affected the native valve and the rest involved prosthetic valves of different types. All but one of the prosthetic valve endocarditis cases were in patients over 51 years of age. Additional risk factors were not widely reported, but included intravenous drug use ($n = 2$), previous congenital cardiac disease ($n = 3$), dental or nasal intervention ($n = 4$), recent valve replacement ($n = 1$) and gynecological infection ($n = 1$) as the possible source of infection.

Our independent review elicited several interesting characteristics that are not shown in Table 1. Where reported, fever was present in 13 of 17 cases (76%) and leukocytosis was found in only 4 of 14 (35%) patients. Duration of symptoms prior to diagnosis was available for 17 cases, with an average duration of 7 weeks (range 1–25 weeks; median 4 weeks), reflecting the subacute characteristics of this infection. The reported complications in 19 of the cases are striking, and include valvular dysfunction in 7 cases (37%), pulmonary embolization in 2 cases (10%), and 3 cases of embolization to the central nervous system (15%). There was one reported case of relapse with an isolate suspected to have become resistant to clindamycin during therapy [14]. Six cases (37%) had no major complications. As shown in Table 1, the findings in the echocardiogram varied in severity, including abscess, leakage and dehiscence.

4.1.2. Microbiology and antibacterial susceptibility

The organisms were identified to the species level in 16 of the cases, yielding *Finegoldia magna* ($n = 7$), *P. micra* ($n = 4$), *P. anaerobius* ($n = 3$), *Peptostreptococcus asacharolyticus* ($n = 1$) and *Peptostreptococcus intermedius* ($n = 1$). In the 11 cases with quantification of positive blood culture sets, the average number of positive sets was 4 (range 1–8). In 4 reports, the blood cultures were persistently negative and the organism was isolated from the cardiac valve culture only. Interestingly, all cases involving negative blood cultures were identified as *F. magna* and were cases of prosthetic valve endocarditis. It was concluded that false negative results occurred in the BACTEC 9240 system and in FA and FN bottles of the BacT/ALERT system. The organism finally grew in thioglycollate medium and anaerobically in *Brucella* blood agar, as well as on the SEPTI-CHEK BHI-S and ISOLATOR systems [13,20].

Antibiotic susceptibility was reported in 9 instances: penicillin susceptibility was the norm in all cases. Susceptibility to clindamycin was reported in 5 cases, but in one of them the minimal inhibitory concentration (MIC) had an abrupt increase during therapy, which correlated with clinical and microbiological failure [14]. Metronidazole resistance was documented in 2 out of 5 cases and gentamicin resistance in the only case where it was evaluated.