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Research paper

Gemella bacteremia: an unlikely source of an unlikely culprit

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Abstract

Gemella is an anaerobic or microaerophlic gram positive coccus generally an inhabitant of the oral cavity and gastrointestinal flora which has been associated with poor dentition and infectious endocarditis in the past along with seldom cases of meningitis and liver abscess noted in literature. Oftentimes co-existing with other bacteria as a mixed infection, we highlight the case of a bacteremic individual with gemella as a single isolated organism from a source gemella is not commonly known to inhabit.

Keywords: *Gemella; Bacteremia; Ulcer; Culture.*

1. Releases

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2. Case

Our patient was a 58 year-old male with a past history including paraplegic state after a motor vehicle accident, previously treated methicillin resistant staphylococcus aureus (MRSA) osteomyelitis of the left now amputated lower extremity, chronic venous insufficiency, chronic urinary drainage catheter placement because for neurogenic bladder, a right deep vein thrombosis currently undergoing treatment with warfarin and a chronic decubitus stage four left ischial ulcer who was admitted after presenting with noted intermittent fevers of up to 102F for the past week and a half that is associated with general malaise, lethargy, dark foul smelling urine and increased drainage at the site of his chronic necrotic ischial ulcer with poor granulation tissue (Figure 1). Initial vital signs were significant for a temperature of 38.2C and tachycardia with heart rate of 106 beats/minute though blood pressure remained normotensive and oxygen saturation acceptable. Blood work was significant for leukocytosis of 13,000 cells/uL with neutrophil predominance of 93%, CRP level of 167.1 mg/L, and a subtherapeutic international normalized ratio (INR) of 1.55 s. Urinanalysis results were consistent with a urinary tract infection with readings of 3+ leukocyte esterase, positive nitrite, 5 WBCs and 2+ bacteria with cloudy color appreciated. Subsequently, a urine culture grew P. mirabilis including greater than 100,000 colonies/ml, wound culture grew 2+ P. aeruginosa amongst other pansensitive organisms, and blood cultures grew gemella species and prevotellabivia in both the anaerobic and aerobic broths. Initially started on broad spectrum antibiotic coverage with vancomycin and piperacilin/tazobactam, the vancomycin was later discontinued after infectious disease consulting service evaluation. With osteomyelitis being a concern, imaging with MRI of the pelvis described diffuse muscle atrophy and soft tissue ulceration though did not suggest osteomyelitis. Despite the ischial ulcer being deemed likely the source of the bacteremia, a transesophageal echocardiogram was performed as gemella species was noted to be associated with infective endocarditis though results did not appreciate any appendages suggestive of such. With piperacilin/tazobactem antibiotic coverage, diligent wound care, and management of the patient's other co-morbidities, his condition improved. Further blood cultures returned negative for subsequent growth and the patient was discharged without further reports of fever, in stable condition, intravenous antibiotics via a peripherally inserted central venous catheter to complete a two week course and close follow-up outpatient with the infectious disease service for continued improvement of his infection.

Fig. 1: Chronic Ischial Ulcer with Granulation Tissue.

3. Discussion

First described as N. hemolysans in 1938 before being reclassified in 1960, Gemella is a gram positive coccus which usually prefers capnophilic or microaerophilic environments that is a commensal flora of the gastrointestinal tract, oral cavity, respiratory and urogenital tracts though overt infections with this species as the etiological organism is a rarely described occurrence in medical literature (Nam et al. 2003, Ruoff 2011, Thjötta 1938).

Although to our knowledge no previous individual case reports highlight the significance of this species as the culprit of bacteremia, Garcia-Lechuz et al. did note gemella being the cause of localized soft-tissue abscesses, empyemas and bloodstream infections with the underlying condition in most individuals being intravenous drug use in their retrospective study Garcia-Lechuz et al. 2002). In the case of our patient, however, no such soft-tissue abscesses were identified despite increased drainage at the site of his ischial ulcer which would have more likely been a nidus for blood stream infection.

At present, six species of genus gemella have been identified though up until 1998 only G. haemolysans and G. morbillorum were known (Woo et al. 2003).Such infrequently encountered rare bacterial species are of particular importance in medical literature as, to date, little is known about their clinical spectrum of significance. As a result, identification of such organisms is paramount in the treatment of inflicted individuals especially when a particular treatment is ineffective and for resistance pattern considerations in present and future of the general community. Woo et al. propose the gemella species may in fact be underreported as the current standard for identification is unsatisfactory and instead 16s rRNA gene sequencing should be used as the choice method based on their study results (Thjötta&Boe 1938).

Although a very rare organism encountered, especially in the bloodstream, patients found to have gemella bacteremia in the past generally encompass certain characteristics in common including poor dentition or related recent dental manipulation and cardiac abnormalities in the form of aortic insufficiency, prosthetic valve replacement, or septal defects to name a few (Mosquera et al. 2000). As a part of the normal flora within the oral cavity (G. haemolysans) and the gastrointestional tract (G. morbillorum), gemella is an organism oftentimes recovered simultaneously with other anaerobic and aerobic bacteria as these infections are commonly synergistic but gemella may exist as a contaminant as well (Finegold 1977).This can explained by bacterial synergy as the multiple concurrence of the organisms may produce an enhanced environment conducive for sepsis, thus increasing overall morbidity and mortality for the at-risk population (Araki et al. 2004).Another related theory is the virility of mixed anaerobic gram-positive cocci and microaerophilic streptococci may produce capsular mechanistic defenses which enhance their ability to produce more difficult to treat infections (Brook & Walker 1984).In the case of our patient however, contamination appears less likely given the positive growth on both the anaerobic and aerobic blood culture broths.

In regards to pathogenicity, individuals with gemella isolated bacteremia typically recover well from infection provided adequate treatment is initiated. However in some instances acute fulminant infection with gemella has been complicated by septic shock as described in two patients suffering from infective endocarditis although in the pediatric population (Vasishtha 1996). Antibiotic tailoring for such an infection may be misleading initially as the

initial colonial morphology of the organism is at times mistaken for S. viridans which is not typically not well-associated with septic shock syndrome. As a result, care must be taken to consider penicillin and macrolide resistance patterns with gemella and include a beta-lactam and aminoglycoside or vancomycin for initial empiric coverage (Thjötta&Boe 1938, Vasishtha 1996).At present, the mechanism of resistance is not yet known as beta-lactamase production has not been suggested though one possibility can be linked to penicillin-binding protein alteration or overall tolerance to beta-lactam antibiotics (Vasishtha 1996).

4. Conclusion

Gemella is a gram positive cocci present as part of the normal oral and gut flora though has seldom been identified as the culprit for significant bloodstream infection, abscess or infection penetrating the blood brain barrier. What's more, it is especially rare to find the organism as a singular culprit and not as part of a mixed anaerobic and microaerophilic mixture causing enhanced virility. Our patient's presentation of bacteremia secondary to this single rare organism not common in soft tissue injury raises concern for increased awareness for gemella as a culprit for infection, enhanced methods for detection and antibiotic tailoring in consideration of bacterial resistance and tolerance patterns.

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