

A Case Report of Pediatric Bacterial Meningitis due to the Rare Isolate, *Globicatella Sanguinis*

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Abstract**Case Report**

Bacterial meningitis is responsible for important global pediatric mortality. Empiric treatment initiated to reduce the fatal outcomes, are based on the common pathogens encountered and sensitivity pattern of those. But in the recent years emergence of rare bacterial pathogens is being witnessed, which may or may not be handled by the empiric treatment. *Globicatella sanguinis* is a rare cause of acute meningitis. We report this case to present its rare isolation in cerebrospinal fluid sample. Besides this, we also emphasize the fact that identification based on phenotypic methods alone can misidentify many bacteria which may affect specific antibiotic prescription.

Keywords: *Globicatella sanguinis*, meningitis, catalase-negative, gram-positive, mass spectrometry, MALDI-TOF MS.

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INTRODUCTION

Bacterial meningitis in children is a public health problem in many countries, especially in Africa, by their frequency and lethality. It is the medical emergency which warrants an early diagnosis and an aggressive therapy. Untreated, the mortality approaches 100%, and even with the current antibiotics and advanced pediatric intensive care, the mortality rate of disease is approximately 5% to 10% [1, 2]. *Globicatella sanguinis* is uncommon pathogenic coccus that has been sporadically reported as an unusual cause of human infections of the bloodstream, central nervous system (CNS) and urinary tract [3-6]. In this study, we review the literature and report a rare case of *Globicatella sanguinis* meningitis identified by Matrix-assisted laser desorption-ionization time of flight mass spectrometry (MALDI-TOF MS).

CASE REPORT

A five months old female, a known case suffering from a posterior fossa tumor, was hospitalized at the Neurosurgical Department of the University

hospital of Marrakech with the symptoms of fever, vomiting, seizures and refusal to feed. In her medical history, family reports vaccination according to the established national program. General clinical examination on admission objectified a febrile hypotonic and drowsy infant. The temperature was at 39.1 ° C, her heart rate was 168 beats/min, respiratory rate was 61 cycles/min, blood pressure was 77/38 mmHg. She had sunken eyes and her tongue appeared to be dry. Pupils were bilaterally equal and reacting to the light. Sepsis screen was positive with C-reactive protein value of 96,8 mg/L associated to an hyperleukocytosis 29,54 10³/uL, absolute neutrophil count of 19,67 10³/uL, and haemoglobin of 8,5 g/dL. A lumbar puncture was performed, after clinical and biological suspicion of meningitis, which yielded cloudy cerebrospinal fluid (CSF) containing 2400 white cells/mm³ with leukocyte clusters (70% neutrophils and 30% lymphocytes) and 14 red blood cells/mm³. The CSF biochemical parameters had shown a protein value of 0,67 g/L and sugar of 0,007 g/L (simultaneous random blood sugar value of 0,73 g/L). The CSF sample was processed for isolation of bacteria using

conventional method. Briefly, the CSF was centrifuged and used to prepare the Gram stain and to streak the primary culture media (blood agar, chocolate agar and Mac Conkey agar, Colombia CNA agar, Brain Heart infusion "BHI" broth) incubated in aerobic and anaerobic atmospheres. Gram stain of the deposit did not reveal any bacteria. The BioFire FilmArray® Meningitis/Encephalitis Panel did not detect DNA of 14 common pathogens in CSF. The patient was rehydrated and put on empirical biantibiotherapy based on 3rd generation cephalosporins (100mg / kg / day) and gentamicin 3mg / kg / day in awaiting the result of the culture and the antibiogram with strict monitoring of her neurological state. Isolate was grown overnight in BHI broth. After 48 hours of incubation, alpha haemolytic colonies appeared on blood agar incubated under aerobic condition at 37°C with 5% CO₂ (Figure 1). Similar colonies were also observed on Chocolate agar plate. It was catalase negative and showed no zone of inhibition around a 5µg disc of optochin. The agglutination test for *pneumococci* was negative. It was presumptively identified as *viridans streptococci*. For bacterial identification MALDI-TOF MS was performed which confirmed the identity of *Globicatella sanguinis*.

Blood culture was performed after obtaining a positive sepsis screen test and on clinical suspicion of meningitis and was processed using conventional method, inoculated into blood culture bottles and incubated in BD Bactec*(Biomérieux). It was negative after 5 days of incubation.

The antibiotic susceptibility test was done using disc diffusion according to the standards of the European Committee on Antimicrobial Susceptibility Testing (EUCAST) for *Streptococcus* spp. This strain had decreased sensitivity to penicillins and was resistant to 3rd generation cephalosporins. The antibiogram revealed resistance to penicillin G, ampicillin, cefotaxime and to ceftriaxone with elevated minimum inhibitory concentrations (MICs) to ceftriaxone (MICs = 0,75mg/l) and susceptibility to levofloxacin, moxifloxacin, vancomycin, teicoplanin, linezolid, erythromycin, clindamycin, gentamycin. The patient was transferred to pediatric intensive care for worsening of her clinical condition. Two days after her transfer, the evolution was marked by the death of the infant due to hemodynamic failure and arrest cardiorespiratory.

DISCUSSION

Globicatella genus comprises Gram-positive, facultatively anaerobic, alpha hemolytic and catalase negative cocci [7]. It closely resembles *Streptococci* or *Aerococci* genus on microscopic appearance and morphologically on blood agar, which can lead to misidentification of the pathogen and, consequently, the underestimation of *Globicatella* infections. However, they can be genotypically differentiated [8,9].

It was proposed as a new genus in 1992, initially with only one species, *Globicatella sanguinis* [10,11] which has been related to human septicemia, meningitis, endocarditis and urinary tract infection [3-6], while the second species, *G.sulfidifaciens*, was subsequently discovered in animals and has been described in pulmonary and articular exudates from various animal species, including bovine, swine and ovine [7].

The few reports of *Globicatella* species isolation from humans have concerned only cases of infection with *G. sanguinis* [5, 6, 8, 12]. Its role as a human pathogen was confirmed but remains only partially known because of the difficulties involved in identification and the small number of reports regarding *Globicatella*. Furthermore, it has been demonstrated that *Globicatella* spp. are commensal organisms in humans [3].

Identification of this bacterium with conventional tests is difficult. A literature review revealed that *G. sanguinis* closely resembles catalase negative Gram-positive cocci both microscopically and on gross appearance on blood agar. However, some differentiating characters do exist, such as cellular arrangement of the cells in the Gram stain, as *Globicatella* forms chains while the *aerococci* form tetrads and clusters [4]. Biochemical tests that can help in identification of this pathogen include negative leucine aminopeptidase reaction (LAP) and growth in the presence of 6.5% NaCl. The *viridans streptococci* are pyrrolylarylamidase (PYR) negative and LAP positive and do not grow in the presence of 6.5% NaCl. In fact there exist various descriptions of biochemical reactions for the same species [4, 9, 10]. Standardized systems like Rapid ID 32 STREP or API 20 STREP known to identify alpha haemolytic streptococci [9] but it was not available at our setting. The MALDI-TOF MS was performed in our patient to confirm the identity of *G. sanguinis*. The mass spectrometry has the potential of being an accurate tool for catalase negative gram positive cocci identification even for species with difficult diagnosis [13].

The isolate was resistant to cefotaxime, a common antibiotic used in pediatric sepsis/meningitis. Cefotaxime resistance was observed by other studies too. It was suggested that resistance to this antimicrobial could help in presumptive identification of this bacterium [3, 4].

This is the first case of isolation of *Globicatella sanguinis* in our context. In view of increasing emergence of drug resistant bacteria institution of proper antibiotic becomes an absolute necessity. This can be obtained through correct identification of clinical pathogens and treatment based on sensitivity pattern.

CONCLUSION

In summary, *G sanguinis* is rare and difficult to identify by commercial phenotypic methods, it may be misdiagnosed as viridans group streptococci, but it should be considered when assessing a catalase-negative, α -hemolytic Gram-positive coccus with elevated MICs to third-generation cephalosporins. We reviewed the literature and reported a case of *G. sanguinis* in five months old female infant that progressed to death. The bacterial identification was made by MALDI-TOF MS. The rapid realization of bacteriological samples remains essential to make an early diagnosis and to initiate adapted antibiotic therapy.

Conflicts of interest

Authors declared they have no conflicts of interest

REFERENCES

1. El Bashir, H., Laundy, M., & Booy, R. (2003). Diagnosis and treatment of bacterial meningitis. *Archives of disease in childhood*, 88(7), 615-620.
2. Tacon, C. L., & Flower, O. (2012). Diagnosis and management of bacterial meningitis in the paediatric population: a review. *Emergency medicine international*.
3. Héry-Arnaud, G., Doloy, A., Ansart, S., Le Lay, G., Le Flèche-Matéos, A., Seizeur, R., ... & Bouvet, A. (2010). *Globicatella sanguinis* meningitis associated with human carriage. *Journal of clinical microbiology*, 48(4), 1491-1493.
4. Shewmaker, P. L., Steigerwalt, A. G., Shealey, L., Weyant, R., & Facklam, R. R. (2001). DNA relatedness, phenotypic characteristics, and antimicrobial susceptibilities of *Globicatella sanguinis* strains. *Journal of clinical microbiology*, 39(11), 4052-4057.
5. Seegmuller, I., van der Linden, M., Heeg, C., & Reinert, R. R. (2007). *Globicatella sanguinis* is an etiological agent of ventriculoperitoneal shunt-associated meningitis. *Journal of clinical microbiology*, 45(2), 666-667.
6. Matusnami, M., Sogi, M., Kitazono, H., Hosokawa, N., Otsuka, Y., & Ohkusu, K. (2012). Urosepsis caused by *Globicatella sanguinis* and *Corynebacterium riegliei* in an adult: case report and literature review. *Journal of Infection and Chemotherapy*, 18(4), 552-554.
7. Vandamme, P., Hommez, J., Snauwaert, C., Hoste, B., Cleenwerck, I., Lefebvre, K., ... & Haesebrouck, F. (2001). *Globicatella sulfidifaciens* sp. nov., isolated from purulent infections in domestic animals. *International journal of systematic and evolutionary microbiology*, 51(5), 1745-1749.
8. Lau, S. K. P., Woo, P. C. Y., Li, N. K. H., Teng, J. L. L., Leung, K. W., Ng, K. H. L., ... & Yuen, K. Y. (2006). *Globicatella* bacteraemia identified by 16S ribosomal RNA gene sequencing. *Journal of clinical pathology*, 59(3), 303-307.
9. Héry-Arnaud, G., Doloy, A., Ansart, S., Le Lay, G., Le Flèche-Matéos, A., Seizeur, R., ... & Bouvet, A. (2010). *Globicatella sanguinis* meningitis associated with human carriage. *Journal of clinical microbiology*, 48(4), 1491-1493.
10. Collins, M. D., Aguirre, M., Facklam, R. R., Shallcross, J., & Williams, A. M. (1992). *Globicatella sanguis* gen. nov., sp. nov., a new gram-positive catalase-negative bacterium from human sources. *Journal of applied bacteriology*, 73(5), 433-437.
11. Trüper, H. G., & De'clari, L. (1997). Taxonomic note: necessary correction of specific epithets formed as substantives (nouns) "in apposition". *International Journal of Systematic and Evolutionary Microbiology*, 47(3), 908-909.
12. Abdul-Redha, R. J., Balslew, U., Jørgen Christensen, J., & Kemp, M. (2007). *Globicatella sanguinis* bacteraemia identified by partial 16S rRNA gene sequencing. *Scandinavian journal of infectious diseases*, 39(8), 745-748.
13. Almuzara, M., Barberis, C., Velázquez, V. R., Ramirez, M. S., Famiglietti, A., & Vay, C. (2016). Matrix-assisted Laser desorption ionization-time-of-flight mass spectrometry (MALDI-TOF MS) as a reliable tool to identify species of catalase-negative gram-positive cocci not belonging to the streptococcus genus. *The Open Microbiology Journal*, 10, 202.