

**Meningococemia without Meningitis Complicated by Purpura Fulminans and Hearing Impairment: A Rare Case Report and Review of Literature****Meningococemia sem Meningite Complicada por Purpura Fulminante e Deficiência Auditiva: Um Relato de Caso Raro e Revisão de Literatura**

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## ABSTRACT

Considered a rare disorder, meningococemia without meningitis can affect previously healthy individuals and cause serious clinical impact. We describe a case of a 24 years-old previously health male patient with life-threatening meningococemia presented as flu-like symptoms without meningeal irritation signs that was complicated by septic shock , purpura fulminans and sensorineural hearing impairment..The diagnosis was confirmed by gram-staining films from petechial lesions, skin biopsy and blood cultures that returned positive for gram-negative diplococci, later identified as *N. meningitidis* serogroup C. Due to its potential irreversible consequences, an early recognition and adequate treatment is fundamental. Vaccination is the most successful and cost-effective public health interventions to prevent the disease.

**Keywords:** Meningococemia, meningococemia complications, purpura fulminans, neisseria meningitidis, hearing impairment after meningitis.

## RESUMO

Considerada uma doença rara, a meningococemia sem meningite pode afetar indivíduos anteriormente saudáveis e causar sério impacto clínico. Descrevemos um caso de um paciente masculino de 24 anos de idade, anteriormente saudável, com meningococemia com risco de vida, apresentado como sintomas semelhantes aos da gripe sem sinais de irritação meníngea que se complicou com o choque séptico, púrpura fulminante e deficiência auditiva neurosensorial. O diagnóstico foi confirmado por filmes de coloração grama por lesões petequiais, biópsia de pele e hemoculturas que retornaram positivos para diplococos gram-negativos, posteriormente identificados como *N. meningitidis* serogrupo C. Devido a suas potenciais consequências irreversíveis, é fundamental um reconhecimento precoce e um tratamento adequado. A vacinação é a intervenção de saúde pública mais bem sucedida e econômica para prevenir a doença.

**Palavras-chave:** Meningococemia, complicações da meningococemia, purpura fulminante, neisseria meningitidis, deficiência auditiva após a meningite.

## 1 INTRODUCTION

Meningococemia without meningitis is a rare clinical form of infection caused by *Neisseria Meningitidis*. (1, 14) The disease may affect previously healthy individuals with devastating clinical consequences, which makes it a public health concern (7) In this article, we report a life-threatening case of meningococemia presenting as flu-like symptoms complicated by septic shock , purpura fulminans (PF) and permanent sensorineural hearing impairment.

## 2 CASE REPORT

A previously healthy 24 year-old caucasian male presented to the emergency department with one day of progressively worsening malaise, polyarthralgia, fever, and diffuse macular rash preceded

by odynophagia and abdominal pain. On examination, his blood pressure was 80/50 mmHg, temperature 38 °C, heart rate 135 bpm and respiratory rate 30 bpm. He was lethargic, had petechiae and purpura on his buccal mucosa and extremities. No signs of meningeal irritation were present.

Initial laboratory studies revealed the presence of renal failure (creatinine 2.20 mg/dL), leukocytosis with left shift (white blood cell count of 13,500/ $\mu$ L, 89% neutrophils, 22% blast, 3% metamyelocytes). Coagulation profiles were consistent with disseminated intravascular coagulopathy and progressed to purpura fulminans within 6 hours.

The patient received aggressive fluid resuscitation and was empirically treated with ceftriaxone. He was admitted to the intensive care unit and deteriorated further, requiring intubation and hemodynamic support with vasopressors and continuous renal replacement therapy.

Gram-staining of films from petechial lesions revealed gram-negative diplococci and skin biopsy showed endothelial necrosis with meningococci presented within the endothelium and thrombi. Blood cultures returned positive for gram-negative diplococci, later identified as *N. meningitidis* serogroup C. Upon confirming *Neisseria meningitidis* infection, a contact investigation was launched by the hospital epidemiology team to identify those requiring meningococcal prophylaxis.

Over the next several days, the patient gradually improved. No surgical debridement or amputation was needed. After a 2 month follow-up, the patient complained of bilateral hearing loss. Hearing assessment was performed using otoacoustic emissions and the test revealed moderate sensorineural hearing loss with a mild hearing loss in the low and high frequencies bilateral.

### 3 REVIEW

*Neisseria meningitidis* is a gram-negative diplococcus that can cause meningitis that may be associated with meningococemia and rarely meningococemia without meningitis, a disease with rapid progressive course and even death. (7)

There are 13 serogroups clinically significant that can be distinguished by their capsular polysaccharides, a bacterial resistance mechanism against host phagocytosis and complement-mediated lysis. Of the 13 serotypes, fatal disease can be caused by 6 of them: A, B, C, W135, X and Y (5,7)

In the United States, serotypes C and Y are the most prevalent in adolescence and serotype B the most prevalent in childhood. Infections caused by serogroup C are the most common between unvaccinated individuals worldwide. (10)

Risk factors for meningococcal disease include immunosuppression, poor socioeconomic status, previous history of close contact with infected individuals, crowding and absence of vaccination for *N. meningitidis*. In our case, the patient had no prior history of meningococcal vaccine, as he had been otherwise healthy with negative human immunodeficiency virus test. (3)

Meningococcal disease can occur within two weeks of exposure and meningitis is the most common clinical presentation (3,5). However, other manifestations include mild meningococemia, sepsis with meningitis and, rarely, meningococemia without meningitis. The first 4-6 hours of the disease mimic viral upper respiratory infections that can progress rapidly to disseminated intravascular coagulation and multiple organ failure. (9,10) Meningococemia is usually presented with disseminated petechial or purpuric rash that is mostly notable on extremities and can also affect mucous membranes. Adrenal hemorrhage can occur with the rash, a severe complication with high index of mortality called Waterhouse-Friderichsen Syndrome. (9)

*N. meningitidis* is one of the most feared etiologies of septic shock due to its ability to cause PF and multiple organ failure. (3) PF is a rapidly progressive disorder of acute onset characterized by cutaneous hemorrhage and necrosis due to vascular thrombosis of dermis, disseminated intravascular coagulopathy and vascular collapse. It presents as large ecchymotic areas and progresses to acral skin necrosis. (4) Although there are no definitive treatments for PF, authors have recommended that protein C concentrate, heparin and hemodiafiltration may improve clinical outcome and mortality in patients with acute meningococemia. (4)

If there's suspicion of meningococcal disease, a sample should be obtained immediately, either from blood inoculate, cerebral spinal fluid or skin biopsy. (3) Recent study suggests that microbiological investigation of skin biopsies may aid a rapid diagnosis in patients with suspected meningococcal infection and could be considered a component of the routine diagnostic work-up, even after the initiation of antimicrobial treatment. (11) Also, specific agglutination rapid diagnostic systems have been used in parts of the world in which the ability to obtain cultures is limited. Mortality rate has been reduced to 10-15% with early diagnosis and administration of antibiotics. The drug choice of empirical treatment is a third generation cephalosporin such as ceftriaxone. (7)

Sequelae associated with meningococcal disease occur in approximately 20% of survivors, characterized by physical and neurological disabilities including loss of digits or limbs, skin scarring, deafness or brain damage (7). One of the most common sequelae with high impact on general functioning is hearing loss, either unilateral or bilateral, that can vary from mild to profound. (12,13) The exact pathogenesis is unknown but it is thought to be through a direct insult to the cochlea and labyrinthine

system. The diagnosis is made with tympanometry and otoacoustic emissions followed by auditory brainstem reponse. (12)

Currently there are two quadrivalent vaccines for the prevention of meningococcal infection that protect against serogroups A, C,Y and W-135 (5,9). A newer vaccine for serogroup B is also available (9). The vaccines are recommended for those living in college dorms, military recruits, asplenic, immunocompromised individuals and travelers to endemic regions. Most of the programs worldwide only covers the serogroup C and the the national vaccination program for N. Meningitidis was only introduced in 2010 in Brazil for children. (2)

Effective chemoprophylaxis to control secondary cases of meningococcal infection is indicated for individuals who have been in prolonged (> 8 hours) close proximity (< 1 meter) with a patient or who have been directly exposed to the patient's oral secretions for at least 1 week before the onset of the patient's symptoms or until 24 hours after the initiation of appropriate antibiotic therapy. The Centers for Disease Control and Prevention recommend rapidly prophylactic antibiotic therapy with rifampin, ciprofloxacin or ceftriaxone. Furthermore, droplet precautions should be maintained for 24 hours after the administration of effective antibiotics. (5)

#### **4 CONCLUSION**

Meningococemia is a life threatening condition that requires prompt recognition and treatment. Despite advances in the diagnosis, early treatment with antibiotics, understanding and management of sepsis, the disease remains among the world's most feared infections. Vaccination remains one of the most successful and cost-effective public health interventions to eliminate the disease.

**REFERENCES**

- Poizeau, F., Cormerais, M., Darrieux, L., Ricordel, S., Garnier, G. and Safa, G., 2016. Meningococemia without meningitis: A report of two cases. *La Revue de medecine interne*, 37(3), pp.206-208.  
<https://doi.org/10.1016/j.revmed.2015.07.016>
- Medeiros, I., Melo, A.R., Baptista, V. and Ribeiro, A., 2018. Meningococemia: rare but life-threatening. *Case Reports*, 2018, pp.bcr-2018.  
<https://doi.org/10.1136/bcr-2018-226914>
- Watts, P.J., Fazel, N. and Scherbak, D., 2018. Meningococemia Masquerading as a Nonspecific Flu-Like Syndrome. *Case reports in critical care*, 2018.  
<https://doi.org/10.1155/2018/2097824>
- Pitukweerakul, S., Sinyagovskiy, P. and Aung, P.P., 2017. Purpura Fulminans in Acute Meningococemia. *Journal of general internal medicine*, 32(7), pp.848-849.  
<https://doi.org/10.1007/s11606-017-4017-y>
- Takada, S., Fujiwara, S., Inoue, T., Kataoka, Y., Hadano, Y., Matsumoto, K., Morino, K. and Shimizu, T., 2016. Meningococemia in adults: a review of the literature. *Internal Medicine*, 55(6), pp.567-572.  
<https://doi.org/10.2169/internalmedicine.55.3272>
- Wang, X., Shutt, K.A., Vuong, J.T., Cohn, A., MacNeil, J., Schmink, S., Plikaytis, B., Messonnier, N.E., Harrison, L.H., Clark, T.A. and Mayer, L.W., 2015. Changes in the population structure of invasive *Neisseria meningitidis* in the United States after quadrivalent meningococcal conjugate vaccine licensure. *The Journal of infectious diseases*, 211(12), pp.1887-1894.  
<https://doi.org/10.1093/infdis/jiu842>
- Vaz, L.E., 2017. Meningococcal Disease. *Pediatrics in review*, 38(4), pp.158-169.  
<https://doi.org/10.1542/pir.2016-0131>
- Batista RS, Gomes AP, Dutra Gazineo JL, Balbino Miguel PS, Santana LA, Oliveira L, Geller M. Meningococcal disease, a clinical and epidemiological review. *Asian Pac J Trop Med*. 2017 Nov;10(11):1019-1029
- Fidrocki, D., & Lutwick, L. (2017). Fulminant meningococemia. *IDCases*, 8, 17–18. doi:10.1016/j.idcr.2017.02.004
- Siddiqui, J.A. and Gulick, P.G., 2019. Meningococemia. In *StatPearls [Internet]*. StatPearls Publishing.
- Arend, S.M., Lavrijsen, A.P.M., Kuijken, I., Van der Plas, R.N. and Kuijper, E.J., 2006. Prospective controlled study of the diagnostic value of skin biopsy in patients with presumed meningococcal disease. *European Journal of Clinical Microbiology and Infectious Diseases*, 25(10), pp.643-649.  
<https://doi.org/10.1007/s10096-006-0199-7>

Rodenburg-Vlot, M.B., Ruytjens, L., Oostenbrink, R. and van der Schroeff, M.P., 2018. Repeated Audiometry After Bacterial Meningitis: Consequences for Future Management. *Otology & Neurotology*, 39(5), p.e301.

<https://doi.org/10.1097/MAO.0000000000001808>

Zeeshan, F., Bari, A., Dugal, M.N. and Saeed, F., 2018. Hearing impairment after acute bacterial meningitis in children. *Pakistan journal of medical sciences*, 34(3), p.655.

<https://doi.org/10.12669/pjms.343.14373>

de Andrade, C. H. D. S., Cabral, D. A. C., da Costa Sousa, E., Campos, F. M. S., do Vale Medeiros, J. P., Cabral, L. G. C., ... & da Costa Oliveira, T. I. (2020). Análise da incidência de Meningite Meningocócica em todas as faixas etárias antes e após a implantação da vacina meningocócica C (conjugada) no estado do Pará/Analysis of the incidence of Meningococcal Meningitis in all as age groups before and after an implementation of the meningococccic C (conjugated) vaccine in the state of Pará. *Brazilian Journal of Health Review*, 3(4), 8650-8662. <https://doi.org/10.34119/bjhrv3n4-113>