Is Neisseria meningitidis a New Cause of Sexually Transmitted Disease?

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Introduction

Neisseria meningitidis, also known as the meningococcus, is a strict human pathogen, and most infected patients have not been in contact with other infected individuals. Infection is believed to result from an endogenous source in asymptomatic carriers. During periods of highest seasonal disease occurrence (winter and early spring), about 10% of the general population harbor N. meningitidis strains in their nasopharynges (1). Human infections with N. meningitidis and Neisseria gonorrhoeae (the gonococcus) have traditionally been distinguished by their clinical manifestations of disease and anatomic site of isolation. Through evolutionary pressure, it is thought that the meningococcus has adapted to the nasopharynx and the gonococcus to the genital mucosa. N. meningitidis can cause sepsis and/or meningitis, whereas N. gonorrhoeae usually infects the anogenital mucous membranes. As sexual habits change, the anatomic niches for the two species and the infections they cause may occasionally overlap (2-10). N. meningitidis can colonize the anogenital tract in men and women, causing urethritis, proctitis, and cervicitis (3-10), whereas N. gonorrhoeae has been reported to cause meningitis and pharyngitis (2). We report two cases of anogenital infection caused by N. meningitidis: one case involves a homosexual male with proctitis, and the second case involves a patient with urethritis.

Case Reports

Case 1

A 29-year-old homosexual male presented at the gastroenterology clinic with complaints of perianal pain and painful defecation. These symptoms developed after he had homosexual receptive intercourse 3 days before. There was no blood loss or urinary abnormalities, and the patient was afebrile. Rectoscopic examination revealed an edematous inflammatory aspect of the rectal mucosa compatible with proctitis and a concomitant mucopurulent exudate that was collected for Gram-stained smear examination and bacterial culture. The Gram-stained smear of the exudate showed numerous leukocytes with intracellular and extracellular gram-negative diplococci. Oxidase-positive, gram-negative diplococci were isolated on selective VCAT agar (Becton Dickinson Microbiology Systems, Cockeysville, MD), from which a presumptive diagnosis of gonococcal infection was made. Against all expectations, biochemical confirmation (API NH; bioMérieux, Marcy l’Étoile, France) of the presumed gonococcal pathogen established the identity of the isolate as N. meningitidis (API code 5003; ID % 98.7; T value, 0.97), which was confirmed by 16S rRNA gene sequencing. The isolate was penicillin and cefotaxime susceptible. Serogrouping of the isolate showed that it was N. meningitidis serogroup C. The same rectal swab specimen also grew Streptococcus pyogenes, and a PCR test on the specimen was positive for Chlamydia trachomatis. Serologic tests for syphilis and HIV were negative. The patient was treated with a single dose of intravenous ceftriaxone, along with the oral administration of 200 mg of doxycycline/day for 7 days.

Case 2

A 48-year-old Caucasian heterosexual male presented to the emergency room with a history of lower abdominal discomfort and apparent urethritis that produced a purulent discharge. The patient reported a previous history of gonococcal urethritis. The patient’s remaining medical history was unremarkable. Gram-stained smear examination of the patient’s urethral discharge showed numerous leukocytes with intracellular and extracellular gram-negative diplococci. Growth of bacterial colonies was detected on a selective VCAT medium incubated in a CO2-enriched environment at 35°C. The isolate was oxidase and catalase positive and fermented glucose and maltose, which confirmed its identity as N. meningitidis. Agglutination testing showed that the isolate was N. meningitidis serogroup B (subgroup P1.5). Identification of the microorganism was confirmed by using the MALDI-TOF MS (matrix-assisted laser desorption ionization–time of flight mass spectrometry) Biotype (Bruker, Billerica, MA), which was performed courtesy of Jan Verhaegen, KU Leuven, Belgium. The meningococcal isolate was penicillin and cefotaxime susceptible. The patient’s specimen was negative for the presence of C. trachomatis. He was treated with a single dose of intravenous ceftriaxone. N. meningitidis was the only microorganism isolated from the patient’s urethral specimen.

Discussion

N. meningitidis has been isolated previously from anogenital sites and has been documented as a cause of anogenital infection in many publications (3-10). The first report of genital meningococcal infection was published in 1942, when Carpenter and Charles (3) described the recovery of 7 isolates of N. meningitidis among 103 urogenital isolates of Neisseria species from patients with clinical symptoms of gonococcal infection. Since then, meningococci have
been reported with increasing frequency as a presumed causative agent of urethritis and proctitis (4-6,9,10). Anal infections with N. meningitidis are reported to be more prevalent in homosexual than heterosexual men, probably as a consequence of the organism’s preference for the rectal mucosa and of sexual behaviors that may be practiced more commonly in the homosexual population (5). McKenna et al. (7) reported that N. meningitidis was isolated from 79 (0.14%) of 57,170 men who presented with urethritis caused by gram-negative diplococci. In heterosexual individuals, such as our second patient, most cases of genital infection occur via orogenital transmission, with the nasopharynx as the major reservoir in healthy carriers (8). Clinicians should be aware of the possibility of isolating meningococci from anogenital sites, particularly in the homosexual population and when a history of orogenital contact is provided or suspected.

Considering the increasing prevalence of meningococcal anogenital infections, it might be interesting to examine the bigger picture. These two case reports emphasize the importance of realizing that environmental circumstances, sociocultural attitudes, and sexual practices can have a huge impact on evaluating the clinical significance of microbial isolates from unusual sites by the clinical microbiologist. Assuming that some diseases do not occur in certain anatomic sites can lead to misdiagnosis and mistreatment. Factors such as new sexual practices, social behavior, travel, and geoeccological circumstances can lead to a new anatomic spectrum for microorganisms that cause infectious diseases. When determining the clinical significance of a microbial isolate, a comprehensive medical history is needed for the proper interpretation of a laboratory result. Therefore, it is crucial that the microbiologist become a clinical microbiologist who communicates effectively with his or her physician colleagues (11).

Data from the Belgian National Survey

In a Belgian national quality control survey that was held in October 2011, the N. meningitidis isolate from the second case report was sent to 165 laboratories, together with the following clinical information: male patient presenting with urethritis-like symptoms; microscopic Gram-stained smear examination of the first portion of a voided urine specimen showed “3+ leukocytes.” Of the 165 laboratories, 17.6% misidentified the N. meningitidis strain. In addition, 9.7% reported it as the genus Neisseria, but with an incorrect species. Two laboratories (0.8%) correctly identified the isolate as N. meningitidis but, considering the specimen source, regarded the isolate as nonpathogenic. These national epidemiologic findings confirm that almost one in five laboratories in Belgium provide an incorrect identification or assessment in such cases.

Conclusion

N. meningitidis might be the causative agent in patients with gonococcal-like urethritis and proctitis, with an incidence that is probably underestimated. A thorough medical history may provide crucial information for evaluating the clinical significance of a bacterial isolate. Good communication between clinicians and the microbiology laboratory is, as always, essential for good patient care.

References