Case Report

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Neisseria elongata–mediated peritonitis in an end-stage renal disease patient on automated peritoneal dialysis: a case report and literature review

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Introduction: Peritoneal dialysis (PD) can result in peritonitis, which frequently causes severe and near-fatal clinical implications if left untreated. Usually, gram-positive bacteria are the most common organisms involved. Uncommonly recognized as the cause of peritonitis in PD patients, *Neisseria elongata* is a gram-negative nasal and oropharyngeal normal flora organism.
Case presentation: We report a rare case of a 29-year-old man who had received automated PD for 6 years and had *N. elongata* peritonitis.
Discussion: Several case reports of *Neisseria*-related peritonitis may point to the potential pathogenicity of such organisms and suggest that many cases of culture-negative peritonitis may have been misdiagnosed. Poor nutrition and chronic kidney disease have been suggested as potential risk factors for *N. elongata* peritonitis, both of which are present in our patient. With appropriate antibiotic use, most of the cases respond well to empirical treatment.
Conclusion: Although rare, *N. elongata* can lead to PD catheter. peritonitis that, in some cases, require changing to hemodialysis.

Keywords: bacterial infection, *Neisseria elongata*, peritoneal dialysis–related peritonitis, rare presentation

Case introduction

One of the feared complications of PD is peritonitis, considered a life-threatening complication and a cause of significant morbidity and mortality. Most cases of PD peritonitis are encountered due to gram-positive organisms[1].

N. elongata is an organism from the *Neisseria* genus. It is a gram-negative rod-shaped, catalase-negative bacteria that differentiates it from the other *Neisseria* species, which are diplococci in shape and catalase-positive [2]. Based on biochemical characteristics, *N. elongata* has three subspecies, *elongate*, *glycolytic*, and *nitroreductase*[2].

N. elongata is a normal human flora isolated from the nasopharynx; despite this, there are reported cases of serious conditions, mainly endocarditis, bacteremia, and osteomyelitis[3]. Upon literature review, there is only one case report regarding *N. elongata* PD peritonitis published in 2014[4], so here we are willing to share our case of PD peritonitis caused by *N. elongata*, although still subspecies not defined.

HIGHLIGHTS

- *Neisseria elongata* can cause a wide range of infectious manifestations including peritonitis.
- Peritoneal dialysis (PD)-related peritonitis can be due to *Neisseria*.
- Chronic kidney disease and poor nutrition are important risk factors for *Neisseria*-related peritonitis.
- Most cases usually response well to appropriate antimicrobial therapy.

Case presentation

A 29-year-old Syrian male patient with a past medical history of end-stage renal disease requiring automated PD for the past 6 years, right inguinal hernia, hyperuricemia, and chronic hepatitis C virus infection presented to the emergency department for 1 week with subjective fever, abdominal discomfort, and dizziness. Abdominal discomfort was generalized and associated with nonbloody vomitus. Apart from that, he has no other complaints. He has no previous history of peritoneal catheter-related peritonitis. His vital signs were temperature of 100°F, blood pressure of 139/85 mmHg, respiratory rate was around 20 breaths/minute, pulse rate of 95 beats/minute, and oxygen saturation of 99% on room air. Physical examination was unremarkable except for generalized tenderness in the abdomen with no guarding, rigidity, erythema, or tenderness around the peritoneal catheter exit site. His initial laboratory blood works are shown in Table 1.

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Table 1

White blood cell	8.6
Red blood cell	3.0
Hemoglobin	9.5
Hematocrit	27.0
Mean corpuscle value	89.4
Mean corpuscle hemoglobin concentration	31.5
Platelets	126
Urea	19.1
Creatinine	1062
Sodium	135
Potassium	3.3
Chloride	96
Bicarbonate	22
C-reactive protein	58.6

Subsequently, peritoneal fluid analysis was sent, and results are shown in Table 2.

Based on the above, a diagnosis of PD-related peritonitis was made; therefore, he was started on intraperitoneal vancomycin and gentamicin, and peritoneal fluid culture was sent. The hospital course was unremarkable. The peritoneal fluid culture showed *N. elongata*, which was sensitive to ceftriaxone and ciprofloxacin and resistant to penicillin. He was discharged home on ceftazidime 1.5 g intraperitoneal daily for 3 weeks. On follow-up, he was asymptomatic with significant symptomatic improvement.

Discussion

Multiple case reports showed the implication of traditionally known nonpathogenic/benign (nongonococcal and nonmeningococcal) *Neisseria* species[5] in serious medical conditions, for example, *N. elongata* and *Neisseria mucosa* endocarditis[6,7]. Peritonitis was also reported in such species, including *N. elongata*[8], *N. mucosa*[5], *Neisseria cinerea*[5,9], *Neisseria macacae*[10], and *Neisseria subflava biovar perflava*[11].

This might indicate a possible virulence of such organisms and even possible miss diagnosis in many cases of culture-negative peritonitis, especially in the failure of first-line antibiotic therapy[9]. This should lead us to a conclusion that the terminology "nonpathogenic/benign" *Neisseria* species should be questioned[5]. Awareness of such serious medical sequelae of these organisms may help in early and prompt diagnosis and management.

Possible reported risk factors for *N. elongata* peritonitis are poor nutrition and chronic kidney disease[8], which implies our patient. Oral cellulitis was implicated as a likely source of *N. mucosa* peritonitis in one of the case reports[5].

Our patient organism was sensitive to ciprofloxacin and ceftriaxone. Ciprofloxacin (oral and intraperitoneal) showed effectiveness in treating nonpathogenic *Neisseria* peritonitis[5,9]. Ceftriaxone – along with gentamycin – was also found to be successful in treating *N. elongata* peritonitis[8]. Intraperitoneal ceftazidime (2–3 weeks) was a successful agent in our patient's treatment and another reported case of *Neisseria subflava biovar perflava* peritonitis[11], both of which had a penicillin-resistant organism.

Table 2

Body fluid type cell count	Peritoneal
Color body fluid	Colorless
Appearance body fluid	Turbid
White blood cell body fluid	3438
Red blood cell body fluid	Nil
Neutrophil body fluid	81.0
Lymphocyte body fluid	6.0
Monocyte body fluid	10.0
Eosinophil body fluid	1.0

The empiric treatment used in such cases included intraperitoneal cefazolin and amikacin[8], intraperitoneal vancomycin and cefepime[5], and intraperitoneal vancomycin and ceftazidime[9]. Failure of response was reported with empiric intraperitoneal cefazolin and amikacin in treating *N. elongata* peritonitis case report; however, the rest two mentioned above did not confirm failure or response to empiric therapy. None of the cases were complicated due to failure of empiric treatment, and all of them eventually responded to appropriate antibiotic treatment based on the culture sensitivity mentioned above[12].

Preservation of the dialysis catheter and absence of membrane failure was the primary outcome in most nonpathogenic *Neisseria* peritonitis, including our patient. However, this might not reflect the actual effect due to the few numbers of reported cases.

The work has been reported in line with the SCARE 2020 criteria[13].

Conclusion

This is a case of *N. elongata*-related peritonitis in non-immunocompromised adults, an uncommon peritonitis causative organism. After a literature review, we believe our case is the second published case of this microbe causing peritonitis. In addition to discussing possible management options for this situation, we aim to remind our colleagues that this organism can be one of the unusual causes of peritonitis.

Ethical approval

The case report was approved by Hamad Medical Corporation Medical Research Centre.

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Authors' contribution

Asiya aqeel thakur identified the case, reviewed the literature, and wrote the manuscript. ELMustafa Abdalla is the corresponding author who helped in manuscript writing, doing a review for literature. Leena Saeed, Yara Abouazab, and Sulafa K.Khalil, helped in identifying the case, reviewing the literature, and doing the final review and approval for the manuscript.

Conflicts of interest disclosure

The authors declare that they have no financial conflict of interest with regard to the content of this report.

Research registration unique identifying number (UIN)

Not applicable.

Guarantor

El Mustafa Abdalla.

Consent

Written informed consent was obtained from the patient for publication of this case report and the accompanying image. A copy of the written consent is available for review by the Editorin-Chief upon request.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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References

[1] Li PK-T, Szeto CC, Piraino B, *et al*. ISPD Peritonitis Recommendations: 2016 Update on Prevention and Treatment. Perit Dial Int 2016;36: 481–508.

[2] Getman T, Khiatah B, Robinson H, *et al*. Case report: infective endocarditis of mechanical aortic valve due to *Neisseria elongata* bacteremia. Am J Case Rep 2022;23:e933750.

[3] Wong JD, Janda JM. Association of an important *Neisseria* species, *Neisseria elongata* subsp. *nitroreducens*, with bacteremia, endocarditis, and osteomyelitis. J Clin Microbiol 1992;30:719–20.

[4] Lin M, Yang G, Gao M, Hong F. Peritoneal dialysis-related peritonitis caused by *Neisseria elongata* subsp. *Nitroreducens*, the first report. Perit Dial Int 2014;34:816–7.

[5] Awdisho A, Bermudez M. A case report of *Neisseria mucosa* peritonitis in a chronic ambulatory peritoneal dialysis patient. Infect Dis Rep 2016;8: 6950.

[6] Dominguez EA, Smith TL. Endocarditis due to *Neisseria elongata* subspecies *nitroreducens*: case report and review. Clin Infect Dis 1998;26: 1471–3.

[7] Altdorfer A, Pirotte BF, Gaspard L, *et al*. Infective endocarditis caused by *Neisseria mucosa* on a prosthetic pulmonary valve with false positive serology for *Coxiella burnetii*—the first described case. IDCases 2021;24: e01146.

[8] Lin M, Yang GK, Gao MZ, *et al*. Peritoneal dialysis-related peritonitis caused by *Neisseria elongata* subsp. *nitroreducens*, the first report. Perit Dial Int 2014;34:816–7.

[9] George MJ, DeBin JA, Preston KE, *et al*. Recurrent bacterial peritonitis caused by *Neisseria cinerea* in a chronic ambulatory peritoneal dialysis (CAPD) patient. Diagn Microbiol Infect Dis 1996;26: 91–3.

[10] Garcha A, Roy S, Ayala R, *et al*. *Neisseria cinerea*-mediated peritonitis in an end-stage renal disease patient on continuous ambulatory peritoneal dialysis. Cureus 2021;13:e20661.

[11] Iyama T, Hamada S, Takata T, *et al*. Refractory peritoneal dialysis peritonitis due to *Neisseria* macacae: a case report and review of the literature. Intern Med 2020;59:2287–90.

[12] Vermeij CG, van Dam DW, Oosterkamp HM, *et al*. *Neisseria subflava biovar perflava* peritonitis in a continuous cyclic peritoneal dialysis patient. Nephrol Dial Transplant 1999;14:1608.

[13] Agha RA, Franchi T, Sohrabi C, *et al*. for the SCARE Group. The SCARE 2020 guideline: updating consensus surgical CAse REport (SCARE) guidelines. Int J Surg 2020;84:226–30.