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## CLINICAL VIGNETTE

# Spontaneous Bacterial Peritonitis Caused by *Neisseria sicca*: A Case Report and Literature Review

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### Background

The genus *Neisseria* encompasses the well-recognized pathogens *N. meningitidis* and *N. gonorrhoeae* as well as a number of commensal species found in the human nasal and oral pharynx. These organisms include *N. sicca*, a gram-negative diplococcus first described by von Lingelsheim in 1906.<sup>1</sup> Though often regarded as non-pathogenic, *N. sicca* has been implicated as a causative agent in a range of infections including: endocarditis, pneumonia, meningitis, arthritis, bursitis, osteomyelitis, discitis, conjunctivitis, sinusitis and abscesses of the liver and Bartholin's gland.<sup>2-13</sup> In addition, there are three documented cases of peritoneal dialysis (PD)-associated peritonitis attributed to infection with *N. sicca*.<sup>14-16</sup>

We report a case of *N. sicca* spontaneous bacterial peritonitis (SBP) occurring in a non-cirrhotic patient with protein-losing enteropathy and multiple splanchnic vein thromboses previously treated with a transjugular intrahepatic portosystemic shunt (TIPS).

### Case Report

The patient is a 44-year-old male with history of non-cirrhotic portal hypertension with ascites, hypoalbuminemia, protein-losing enteropathy of unknown etiology and splanchnic venous thromboses. Prior TIPS placement required multiple revisions for recurrent thrombosis despite anticoagulation therapy. He initially presented to the hospital for anasarca and worsening ascites. He denied recent fevers, nausea or vomiting, but reported mild, chronic abdominal pain due to abdominal distention. Pertinent home medications included bumetanide, spironolactone and warfarin. Social history was negative for alcohol or other substance use.

The patient was admitted to the hospital for titration of diuretics. On admission, he was afebrile and other vital signs were within normal limits. His physical exam was notable for soft but distended abdomen with mild lower abdominal tenderness to palpation and significant pitting edema in the lower extremities. His initial labs included: white blood cell (WBC) count 4.4 K/cumm, platelet count 183 K/cumm, sodium 127 mmol/L, creatinine 0.89 mg/dL, albumin <1 g/dL, total protein 4.4 g/dL, alkaline phosphatase (ALP) 462 U/L, aspartate transaminase (AST) 59 U/L, alanine transaminase (ALT) 47 U/L and total bilirubin 0.6 mg/dL. A paracentesis was performed on admis-

sion with removal of 4 liters of ascites fluid. Ascites fluid analyses showed WBC count 27/cumm with a differential of 8% neutrophils. Gram stain and culture of the ascitic fluid remained negative through the hospitalization. Blood cultures obtained on admission also remained negative for the duration of his stay. A contrast-enhanced computerized tomographic (CT) scan of the abdomen showed large volume of ascites and non-opacified TIPS, similar to a CT scan from 2 months prior.

On hospital day 7, while undergoing diuresis and awaiting interventional radiology evaluation of his occluded TIPS, the patient developed worsening abdominal pain. Repeat paracentesis and ascites fluid analysis revealed WBC count 1770/cumm with 92% neutrophils and intracellular cocci on cytology. The patient was assigned a diagnosis of SBP and started intravenous (IV) ceftriaxone 2 gram every 24 hours. Culture of the ascites fluid later grew *N. sicca*. Antibiotic susceptibility testing was not performed per lab protocol. He completed a 7-day course of IV ceftriaxone in the hospital and was discharged after symptoms improved, with plan for follow-up at a quaternary center for continued evaluation of his TIPS and other chronic conditions.

### Discussion

SBP, also referred to as primary peritonitis, is defined as a peritoneal infection without a direct relationship to other intra-abdominal abnormalities. In adult patients, SBP is typically observed in the setting of cirrhosis with ascites, though it has also been identified in cases of acute and chronic viral hepatitis, congestive heart failure, metastatic malignancy, systemic lupus erythematosus and in patients without underlying disease.<sup>17</sup>

SBP is presumed to result from the translocation of bacteria from the gut lumen into the systemic circulation and ascitic fluid. As such, enteric organisms are the most frequently encountered pathogens, accounting for 69% of cases.<sup>17</sup> In order of prevalence, these include: *Escherichia coli*, *Klebsiella* species., *Proteus* species, *Enterococcus faecalis* and *Pseudomonas* species.<sup>18</sup>

*Neisseria* species have infrequently been identified as pathogens in cases of peritonitis, including SBP. Three reports of SBP due to *N. gonorrhoeae* have been documented. These cases

were all observed in women and were associated with a pre-existing diagnosis of cirrhosis in two of three instances.<sup>19</sup> *N. meningitidis* has also been implicated in cases of peritonitis. In 2004, Kelly and Robertson reported a total of 18 recorded cases of *N. meningitidis* peritonitis. These included two cases of PD-associated peritonitis and six cases occurring in patients with cirrhosis and ascites.<sup>20</sup> Following this report, two additional cases of SBP due to *N. meningitidis* have been published, one in a previously healthy 27-year-old male and the other in a 72 year-old woman with known cirrhosis.<sup>21,22</sup>

In addition to *N. gonorrhoeae* and *N. meningitidis*, commensal *Neisseria* species including *N. cinerea*, *N. elongata*, *N. macacae*, *N. mucosa* and *N. subflava* have been implicated in cases of peritonitis.<sup>23-27</sup> These organisms, however, have been identified as pathogens exclusively in the setting of PD-associated peritonitis. Prior to this report, only one instance of SBP due to a commensal *Neisseria* species has been documented. This occurred in a 66-year-old female with cirrhosis. *N. perflava* was isolated from blood and ascites fluid culture.<sup>27</sup>

*N. sicca* has been implicated in infections involving a number of organ systems including three cases of PD-associated peritonitis. The first of these cases was observed in a 5-year-old boy previously treated for *Staphylococcus aureus* peritonitis, and the second occurred in a 46-year-old man without a prior history of peritonitis.<sup>14-15</sup> Both of these patients were receiving immunosuppressive agents following renal transplant with subsequent graft failure. By contrast, Zhang, et al. have recently reported a case of *N. sicca* PD-associated peritonitis occurring

in an immunocompetent 36-year-old man with a history notable only for diabetes and hypertension.<sup>16</sup>

**Table 1** summarizes the known cases of peritonitis attributed to commensal *Neisseria* species.

To our knowledge, this report represents the first documented instance of SBP associated with *N. sicca* as well as the second case of SBP due to a commensal *Neisseria* species. As blood cultures remained negative throughout his hospital course, it is unclear how this patient's ascites fluid was inoculated with *N. sicca*. However, the diagnosis of SBP is strongly supported by the development of abdominal pain during the patient's hospital course, the presence of a neutrophil predominant pleocytosis in his ascites fluid and the absence of other intra-abdominal pathology accounting for his peritonitis on CT imaging. The identification of *N. sicca* as the causative organism in this case is supported by its isolation from ascites fluid culture and further corroborated by the observation of intracellular cocci in cytology.

## Conclusions

*N. sicca* is one of several commensal *Neisseria* species found in the nasal and oral pharynx.<sup>1</sup> While typically regarded as non-pathogenic, *N. sicca* has been implicated as the causative organism in a range of infections, including PD-associated peritonitis.<sup>14,15</sup> Following its isolation from this patient's ascites fluid, *N. sicca* may now be regarded as a potential pathogen in cases of SBP.

Table 1. Cases of peritonitis caused by commensal species of *Neisseria*

Reference	Patient information	Comorbidities	Organism	SBP, secondary, or PD-associated
Haqqie George* <sup>28,29</sup>	31 yo M	ESRD, lupus nephritis	<i>N. cinerea</i>	PD
Taegtmeier <sup>23</sup>	38 yo M	ESRD, insulin-dependent diabetes, ischemic heart disease	<i>N. cinerea</i>	PD
Garcha <sup>30</sup>	37 yo F	ESRD, tuberous sclerosis, hypothyroidism, prior episodes of PD-associated peritonitis with <i>Staphylococcus spp</i>	<i>N. cinerea</i>	PD
Lin <sup>31</sup>	60 yo M	ESRD, hypertension	<i>N. elongata</i>	PD
Alsayed <sup>24</sup>	29 yo M	ESRD, chronic hepatitis C	<i>N. elongata</i>	PD
Iyama <sup>25</sup>	56 yo F	ESRD	<i>N. macacae</i>	PD
Macia <sup>32</sup>	30 yo F	ESRD, 2 failed renal transplants	<i>N. mucosa</i>	PD
Shetty <sup>33</sup>	17 yo M	ESRD	<i>N. mucosa</i>	PD
Awdisho <sup>34</sup>	28 yo M	ESRD, failed renal transplant, hypertension	<i>N. mucosa</i>	PD

Khan <sup>35</sup>	30 yo F	ESRD, migrated IUD	N. mucosa	PD
Ren <sup>26</sup>	55 yo F	ESRD, hypertension	N. mucosa	PD
McCue <sup>27</sup>	66 yo F	Postnecrotic cirrhosis	N. perflava	SBP
Vermeij <sup>36</sup>	45 yo F	ESRD	N. perflava	PD
Chen <sup>37</sup>	74 yo M	ESRD	N. subflava	PD
Neu <sup>15</sup>	5 yo M	ESRD, failed renal transplant (on low-dose prednisone only), recently treated <i>S. aureus</i> PD-associated peritonitis	N. sicca	PD
Konner <sup>14</sup>	46 yo M	ESRD, failed renal transplant (on low-dose cyclosporine and prednisone)	N. sicca	PD
Zhang <sup>16</sup>	36 yo M	ESRD, diabetes, hypertension	N. sicca	PD
<b>Our case</b>	<b>44 yo M</b>	<b>Non-cirrhotic portal hypertension, protein-losing enteropathy, splanchnic venous thromboses</b>	<b>N. sicca</b>	<b>SBP</b>

\*same patient; determined to be re-infection with a different strain rather than relapse of infection with original strain

## REFERENCES

1. **Liu G, Tang CM, Exley RM.** Non-pathogenic *Neisseria*: members of an abundant, multi-habitat, diverse genus. *Microbiology (Reading)*. 2015 Jul;161(7):1297-1312. doi: 10.1099/mic.0.000086. Epub 2015 Mar 26. PMID: 25814039.
2. **Locke M, Smith A, Epstein LM, Niknam N, Boparai R.** Pacemaker lead-related endocarditis with *Neisseria sicca*. *BMJ Case Rep*. 2022 Jul 12;15(7):e249795. doi: 10.1136/bcr-2022-249795. PMID: 35820734; PMCID: PMC9277366.
3. **Szendrey JA, Asghar A, Mokraoui N, Walker D.** A case of native tricuspid valve *Neisseria mucosa/sicca* species infective endocarditis complicated by septic pulmonary emboli. *IDCases*. 2023 Jul 22;33:e01850. doi: 10.1016/j.idcr.2023.e01850. PMID: 37577047; PMCID: PMC10413054.
4. **Gris P, Vincke G, Delmez JP, Dierckx JP.** *Neisseria sicca* pneumonia and bronchiectasis. *Eur Respir J*. 1989 Jul;2(7):685-7. PMID: 2776875.
5. **Carter JE, Mizell KN, Evans TN.** *Neisseria sicca* meningitis following intracranial hemorrhage and ventriculostomy tube placement. *Clin Neurol Neurosurg*. 2007 Dec;109(10):918-21. doi: 10.1016/j.clineuro.2007.08.003. Epub 2007 Sep 27. PMID: 17904282.
6. **Geisler WM, Markovitz DM.** Septic arthritis caused by *Neisseria sicca*. *J Rheumatol*. 1998 Apr;25(4):826-8. PMID: 9558202.
7. **Halla JT.** Septic olecranon bursitis caused by *Neisseria sicca*. *J Rheumatol*. 1990 Sep;17(9):1240-1. PMID: 2290170.
8. **Doern GV, Blacklow NR, Gantz NM, Aucoin P, Fischer RA, Parker DS.** *Neisseria sicca* osteomyelitis. *J Clin Microbiol*. 1982 Sep;16(3):595-7. doi: 10.1128/jcm.16.3.595-597.1982. PMID: 7130376; PMCID: PMC272424.
9. **Olivier V, Brière M, Bouillot P, Sotto A, Lechiche C.** Spondylodiscite avec endocardite à *Neisseria sicca* [Spondylodiscitis associated to *Neisseria sicca* endocarditis]. *Med Mal Infect*. 2013 Mar;43(3):132-3. French. doi: 10.1016/j.medmal.2013.01.009. Epub 2013 Feb 13. PMID: 23414682.
10. **Kozlova A, Palazzolo L, Michael A.** *Neisseria sicca*: A Rare Cause of Bacterial Conjunctivitis. *Am J Case Rep*. 2020 Jun 15;21:e923135. doi: 10.12659/AJCR.923135. PMID: 32536685; PMCID: PMC7319073.
11. **Moon T, Lin RY, Jahn AF.** Fatal frontal sinusitis due to *Neisseria sicca* and *Eubacterium lentum*. *J Otolaryngol*. 1986 Jun;15(3):193-5. PMID: 2873255.
12. **Chung HC, Teng LJ, Hsueh PR.** Liver abscess due to *Neisseria sicca* after repeated transcatheter arterial embolization. *J Med Microbiol*. 2007 Nov;56(Pt 11):1561-1562. doi: 10.1099/jmm.0.47192-0. PMID: 17965360.
13. **Berger SA, Gorea A, Peyser MR, Edberg SC.** Bartholin's gland abscess caused by *Neisseria sicca*. *J Clin Microbiol*. 1988 Aug;26(8):1589. doi: 10.1128/jcm.26.8.1589-1988. PMID: 3170716; PMCID: PMC266668.
14. **Konner P, Watschinger B, Apfalter P, Hörl WH, Vychytil A.** A case of continuous ambulatory peritoneal dialysis peritonitis with an uncommon organism and an atypical clinical course. *Am J Kidney Dis*. 2001 Jan;37(1):E10. doi: 10.1016/s0272-6386(01)90007-1. PMID: 11136199.
15. **Neu AM, Case B, Lederman HM, Fivush BA.** *Neisseria sicca* peritonitis in a patient maintained on chronic peritoneal dialysis. *Pediatr Nephrol*. 1994 Oct;8(5):601-2. doi: 10.1007/BF00858142. PMID: 7819012.

16. **Zhang M, Zhang X, Yin X, Li G, Yang T, Xie D, Chen C.** Peritoneal dialysis-associated peritonitis caused by *Neisseria sicca*: A case report and literature review. *Indian J Med Microbiol.* 2024 Mar-Apr;48:100566. doi: 10.1016/j.ijmmb.2024.100566. Epub 2024 Apr 4. PMID: 38522747.
17. **Bennett JE, Dolin R, Blaser MJ.** *Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases.* Elsevier Inc; 2014. 3697 p. 938.
18. **Koulaouzidis A, Bhat S, Karagiannidis A, Tan WC, Linaker BD.** Spontaneous bacterial peritonitis. *Postgrad Med J.* 2007 Jun;83(980):379-83. doi: 10.1136/pgmj.2006.056168. PMID: 17551068; PMCID: PMC2600063.
19. **Mwandia G, Simon RQ, Polenakovik H, Booher KJ.** *Neisseria Gonorrhoeae* Spontaneous Bacterial Peritonitis. *Case Rep Infect Dis.* 2021 Mar 12;2021:8865339. doi: 10.1155/2021/8865339. PMID: 33777466; PMCID: PMC7979297.
20. **Kelly SJ, Robertson RW.** *Neisseria meningitidis* peritonitis. *ANZ J Surg.* 2004 Mar;74(3):182-3. doi: 10.1046/j.1445-1433.2003.02850.x. PMID: 14996179.
21. **Gentile JK, Franciss MY, Brasil HR.** NEISSERIA MENINGITIDIS PERITONITIS SEROTYPE C: CASE REPORT. *Arq Bras Cir Dig.* 2016 Mar;29(1):67. doi: 10.1590/0102-6720201600010019. PMID: 27120747; PMCID: PMC4851158.
22. **Xia X, Lyu J, Cai X, Hu YL, He F, Li GM, Yang HM.** Case Report of Acute Peritonitis with Blood Infection of *Neisseria meningitidis*. *Biomed Environ Sci.* 2022 Feb 20;35(2):151-154. doi: 10.3967/bes2022.021. PMID: 35197181.
23. **Taegtmeyer M, Saxena R, Corkill JE, Anijeet H, Parry CM.** Ciprofloxacin treatment of bacterial peritonitis associated with chronic ambulatory peritoneal dialysis caused by *Neisseria cinerea*. *J Clin Microbiol.* 2006 Aug;44(8):3040-1. doi: 10.1128/JCM.00917-06. PMID: 16891538; PMCID: PMC1594607.
24. **Alsayed A, Abdalla EM, Ali B, Hatem A, Albsheer K, Elhadi M, Makawi A.** *Neisseria elongata*-mediated peritonitis in an end-stage renal disease patient on automated peritoneal dialysis: a case report and literature review. *Ann Med Surg (Lond).* 2023 Feb 7;85(2):175-177. doi: 10.1097/MS9.000000000000018. PMID: 36845771; PMCID: PMC9949864.
25. **Iyama T, Hamada S, Takata T, Hoi S, Fukuda S, Isomoto H.** Refractory Peritoneal Dialysis Peritonitis Due to *Neisseria macacae*: A Case Report and Review of the Literature. *Intern Med.* 2020 Sep 15;59(18):2287-2290. doi: 10.2169/internalmedicine.4832-20. Epub 2020 Jun 9. PMID: 32522927; PMCID: PMC7578614.
26. **Ren JM, Zhang XY, Liu SY.** *Neisseria mucosa* - A rare cause of peritoneal dialysis-related peritonitis: A case report. *World J Clin Cases.* 2023 May 16;11(14):3311-3316. doi: 10.12998/wjcc.v11.i14.3311. PMID: 37274037; PMCID: PMC10237119.
27. **McCue JD.** Spontaneous bacterial peritonitis caused by a viridans *Streptococcus* or *Neisseria perflava*. *JAMA.* 1983 Dec 23-30;250(24):3319-21. PMID: 6645030.
28. **Haqqie SS, Chiu C, Bailie GR.** Successful treatment of CAPD peritonitis caused by *Neisseria cinerea*. *Perit Dial Int.* 1994;14(2):193-4. PMID: 8043684.
29. **George MJ, DeBin JA, Preston KE, Chiu C, Haqqie SS.** Recurrent bacterial peritonitis caused by *Neisseria cinerea* in a chronic ambulatory peritoneal dialysis (CAPD) patient. *Diagn Microbiol Infect Dis.* 1996 Oct;26(2):91-3. doi: 10.1016/s0732-8893(96)00184-8. PMID: 8985662.
30. **Garcha A, Roy S, Ayala R, Balla M, Adapa S.** *Neisseria cinerea*-Mediated Peritonitis in an End-Stage Renal Disease Patient on Continuous Ambulatory Peritoneal Dialysis. *Cureus.* 2021 Dec 24;13(12):e20661. doi: 10.7759/cureus.20661. PMID: 35103212; PMCID: PMC8784009.
31. **Lin M, Yang GK, Gao MZ, Hong FY.** Peritoneal dialysis-related peritonitis caused by *Neisseria elongata* subsp. *nitroreducens*, the first report. *Perit Dial Int.* 2014 Nov-Dec;34(7):816-7. doi: 10.3747/pdi.2013.00114. PMID: 25520493; PMCID: PMC4269515.
32. **Macia M, Vega N, Elcuaz R, Aterido T, Palop L.** *Neisseria mucosa* peritonitis in CAPD: another case of the "nonpathogenic" *Neisseriae* infection. *Perit Dial Int.* 1993;13(1):72-3. PMID: 8443288.
33. **Shetty AK, Nagaraj SK, Lorentz WB, Bitzan M.** Peritonitis due to *Neisseria mucosa* in an adolescent receiving peritoneal dialysis. *Infection.* 2005 Oct;33(5-6):390-2. doi: 10.1007/s15010-005-5074-4. PMID: 16258875.
34. **Awdisho A, Bermudez M.** A Case Report of *Neisseria Mucosa* Peritonitis in a Chronic Ambulatory Peritoneal Dialysis Patient. *Infect Dis Rep.* 2016 Dec 31;8(4):6950. doi: 10.4081/idr.2016.6950. PMID: 28191300; PMCID: PMC5226042.
35. **Khan KN, Saxena R, Choti M, Ariyamuthu VK.** *Neisseria mucosa* Peritonitis in the Setting of a Migrated Intrauterine Device. *Adv Perit Dial.* 2018 Nov;34(2018):47-49. PMID: 30480537.
36. **Vermeij CG, van Dam DW, Oosterkamp HM, Verburgh CA.** *Neisseria subflava* biovar *perflava* peritonitis in a continuous cyclic peritoneal dialysis patient. *Nephrol Dial Transplant.* 1999 Jun;14(6):1608. doi: 10.1093/ndt/14.6.1608. PMID: 10383043.
37. **Chen C, Chiu PF, Lin JS.** NEISSERIA SUBFLAVA PERITONITIS: CASE REPORT. *Arq Bras Cir Dig.* 2017 Apr-Jun;30(2):161. doi: 10.1590/0102-6720201700020018. PMID: 29257856; PMCID: PMC5543799.