

Pneumococcal Sepsis, Peritonitis, and Cellulitis at the First Episode of Nephrotic Syndrome

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Bacterial infections are common in patients with nephrotic syndrome, including peritonitis, sepsis, meningitis, urinary tract infection, and cellulitis. An 8-year-old boy presented with colicky abdominal pain, vomiting, swollen and painful erythematous lesions around the umbilicus and in anterior surface of left thigh (cellulitis), mild generalized edema, and ascites. The microorganism isolated from peritoneal fluid and blood cultures was *Pneumococcus*. Association of pneumococcal sepsis, peritonitis, and cellulitis has been rarely reported in nephrotic syndrome.

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INTRODUCTION

Infectious complications are common in nephrotic syndrome (NS), especially primary peritonitis which has been reported in 1.5% to 16% of patients.¹⁻⁶ Spontaneous bacterial peritonitis usually occurs within the first 2 years of a diagnosis of NS.⁷ Urinary loss of small molecular proteins such as immunoglobulin G fractions, factor I, and factor B may alter opsonization, phagocytosis, and killing of bacteria and result in defective humoral and nonspecific immunity. Steroid use may aggravate infectious complications.⁸⁻¹⁰ More severe hypoalbuminemia and low serum total protein levels are known to predispose the patient to serious infections.⁷

The majority of peritonitis cases are caused by encapsulated gram-positive organisms, particularly *Streptococcus pneumoniae*, but may also be caused by gram-negative organisms.¹¹ Although chemoprophylaxis with penicillin is shown to reduce the incidence of pneumococcal infection, there are no controlled trials on the use of penicillin prophylaxis in NS.¹² Advisory Committee on Immunization Practices recommended pneumococcal vaccination for all children 2 to 5 years of age with particular comorbidities, including nephrotic syndrome.¹³

Pneumococcal peritonitis has been reported following immunization against *S pneumoniae*.^{14,15} It

seems that although administration of polyvalent pneumococcal vaccine might reduce the incidence and severity of pneumococcal infections, it cannot be relied upon to provide absolute protection.¹⁵ We report a case of pneumococcal sepsis, peritonitis, and cellulitis at the first episode of nephrotic syndrome.

CASE REPORT

An 8-year old boy was admitted to hospital with colicky abdominal pain and vomiting. He had been admitted to a Department of Pediatric Nephrology 1 week earlier with generalized edema, proteinuria, hypoalbuminemia (serum albumin level < 2.5 g/dL) and nephrotic-range proteinuria (urinary protein excretion rate > 1g/m²/d). The final diagnosis was NS and the patient had been discharged with prednisolone, 60 mg/d, in divided doses.

On admission, physical examination revealed normal blood pressure (90/60 mm Hg), the temperature was 36.5°C, and there was mild generalized edema and ascites, generalized tenderness in abdominal palpation, a circular erythematous lesion around the umbilicus (Figure 1), and an ill-defined swollen painful erythematous lesion in the anterior surface of the left thigh (Figure 2).

Urine analysis showed 3+ proteinuria and mild



Figure 1. Circular erythematous lesion around the umbilicus (periumbilical cellulitis).



Figure 2. Ill-defined swollen and painful erythematous lesion in the anterior surface of the left thigh (cellulitis).

pyuria (leukocyte, 6 to 8 per high-power field). Urine culture was negative for microorganisms. Serum albumin, blood urea nitrogen, and serum creatinine levels were 2.3 mg/dL, 55 mg/dL, and 1.2 mg/dL, respectively. Abdominal ultrasonography showed fluid accumulation in the pelvic cavity. Peritoneal fluid aspiration was performed under ultrasonography guide and the specimen was sent for biochemical analysis and culture. Blood culture was obtained and empirical antibiotic therapy was started. As the patient had evidence of peritonitis and infectious skin lesions (cellulitis), a combination of 3rd-generation cephalosporin (ceftriaxone, 1 g, twice per day) and clindamycin (40 mg/kg/d) was started to cover *S pneumoniae*, *S pyrogenous*, and gram-negative organisms. In addition, furosemide was used to reduce the edema and the dosage of prednisolone was changed to stress dose (15 mg/m²/d).

The Table shows results of peritoneal fluid analysis and culture, blood culture, and antibiograms. Peritoneal fluid and blood cultures confirmed pneumococcal sepsis with different foci of seeding of microorganism in the peritoneal cavity (primary spontaneous peritonitis) and cutaneous tissue (cellulitis lesions around the umbilicus and in lower extremity). Forty-eight hours after starting treatment, abdominal pain resolved, but the patient complained about nausea and vomiting. Therefore, antibiotics were changed into vancomycin, 10 mg/kg every 6 hours. The patient received the drug for 10 days and was discharged from hospital with

Results of peritoneal fluid analysis and culture, blood culture and antibiograms

Laboratory Test	Laboratory Finding
Peritoneal fluid analysis	
Appearance	semi clear
Sugar, mg/dL	151
Protein, mg/dL	94
Leukocyte, cell/mm ³	7600
Erythrocyte, cell/mm ³	10
Lymphocyte, %	10
Neutrophil cell, %	90
Peritoneal fluid culture	
Microorganism	Pneumococcus
Resistance	Norofloxacin and oxacillin
Sensitivity	Ampicillin, ciprofloxacin, penicillin, vancomycin, and erythromycin
Blood culture	
Microorganism	Pneumococcus
Resistance	Norofloxacin, oxacillin, and erythromycin
Sensitivity	Ampicillin, ciprofloxacin, penicillin, vancomycin, and tetracycline

a low dose of prednisolone (15 mg/m²/d) and prophylactic antibiotic (oral penicillin, 250 mg/d).

DISCUSSION

Uncu and coworkers reported 8 episodes of primary peritonitis in 7 patients with NS during 5 years.¹¹ All attacks of peritonitis occurred in the relapse period. The causing microorganisms were identified in 3 patients (*S hemolyticus*, *S pneumoniae*, and α -hemolytic *Streptococcus*). Tain and colleagues reported 10 episodes of sepsis

and 8 episodes of peritonitis during the follow-up of 231 nephrotic children⁵; *S pneumoniae* was isolated in 4 patients. Gorenssek and colleagues³ found a definite microbiologic agent in 31 of 62 peritonitis episodes; pneumococcal disease was present in 24 patients (38%), while Tapaneya-Olarn and Tapaneya-Olarn⁶ isolated microorganisms in half of the 35 bacterial peritonitis episodes in a 20-year study. Both gram-negative and gram-positive bacterial infections were found equally in the early years of the study, whereas during the past 4 years of the study, the preponderant microorganisms were found to be gram negative.⁶

Sepsis, meningitis, urinary tract infection, and cellulitis are other infections that can occur in children with NS.^{1,16-19} This case report presents a combination of pneumococcal sepsis, peritonitis, and cellulitis in a nephrotic child at the first episode of the disease. Association of sepsis, peritonitis, and cellulitis has rarely been reported in nephrotic syndrome.

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CONFLICT OF INTEREST

None declared.

REFERENCES

1. Alwadh RK, Mathew JL, Rath B. Clinical profile of children with nephrotic syndrome not on glucocorticoid therapy, but presenting with infection. *J Paediatr Child Health*. 2004;40:28-32.
2. Feinstein EI, Chesney RW, Zelikovic I. Peritonitis in childhood renal disease. *Am J Nephrol*. 1988;8:147-65.
3. Gorenssek MJ, Lebel MH, Nelson JD. Peritonitis in children with nephrotic syndrome. *Pediatrics*. 1988;81:849-56.
4. Gulati S, Kher V, Gupta A, Arora P, Rai PK, Sharma RK. Spectrum of infections in Indian children with nephrotic syndrome. *Pediatr Nephrol*. 1995;9:431-4.
5. Tain YL, Lin G, Cher TW. Microbiological spectrum of septicemia and peritonitis in nephrotic children. *Pediatr Nephrol*. 1999;13:835-7.

6. Tapaneya-Olarn C, Tapaneya-Olarn W. Primary peritonitis in childhood nephrotic syndrome: a changing trend in causative organisms. *J Med Assoc Thai*. 1991;74:502-6.
7. Hingorani SR, Weiss NS, Watkins SL. Predictors of peritonitis in children with nephrotic syndrome. *Pediatr Nephrol*. 2002;17:678-82.
8. Matsell DG, Wyatt RJ. The role of I and B in peritonitis associated with the nephrotic syndrome of childhood. *Pediatr Res*. 1993;34:84-8.
9. Spika JS, Halsey NA, Fish AJ, et al. Serum antibody response to pneumococcal vaccine in children with nephrotic syndrome. *Pediatrics*. 1982;69:219-23.
10. Yetgin S, Gur A, Saatci U. Non-specific immunity in nephrotic syndrome. *Acta Paediatr Scand*. 1980;69:21-4.
11. Uncu N, Bulbul M, Yildiz N, et al. Primary peritonitis in children with nephrotic syndrome: results of a 5-year multicenter study. *Eur J Pediatr*. 2010;169:73-6.
12. Patoroglu T, Melikoglu A, Dusunsel R. Serum levels of C3 and factors I and B in minimal change disease. *Acta Paediatr Jpn*. 1998;40:333-6.
13. Advisory Committee on Immunization Practices. Preventing pneumococcal disease among infants and young children. Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Recomm Rep*. 2000;49:1-35.
14. Adhikari M, Coovadia HM. Abdominal complications in black and Indian children with nephrotic syndrome. *S Afr Med J*. 1993;83:253-6.
15. Ilyas M, Roy S, III, Abbasi S, Leggiadro RJ, English BK, Wyatt RJ. Serious infections due to penicillin-resistant *Streptococcus pneumoniae* in two children with nephrotic syndrome. *Pediatr Nephrol*. 1996;10:639-41.
16. Wang SJ, Tsau YK, Lu FL, Chen CH. Hypovolemia and hypovolemic shock in children with nephrotic syndrome. *Acta Paediatr Taiwan*. 2000;41:179-83.
17. Wilfert CM, Katz SL. Etiology of bacterial sepsis in nephrotic children 1963-1967. *Pediatrics*. 1968;42:840-3.
18. Sleiman JN, D'Angelo A, Hammerschlag MR. Spontaneous *Escherichia coli* cellulitis in a child with nephrotic syndrome. *Pediatr Infect Dis J*. 2007;26:266-7.
19. Gulati S, Kher V, Arora P, Gupta S, Kale S. Urinary tract infection in nephrotic syndrome. *Pediatr Infect Dis J*. 1996;15:237-40.

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