Foreign Body Reaction to Dialysis Chatheter and Peritoneal Fluid Eosinophilia in a Child on Continuous Ambulatory Peritoneal Dialysis

Nuran Cetin, Nadide Melike Sav, Evrim Ciftci, Bilal Yildiz

Department of Pediatric Nephrology, Faculty of Medicine, Eskisehir Osmangazi University, Eskisehir, Turkey

Keywords. foreign body reaction, peritoneal effluent eosinophilia, eosinophilic peritonitis, peritoneal dialysis, child

Foreign body reaction is a tissue response against implanted materials. We described for the first time the eosinophilic peritonitis and foreign body giant cell reaction to dialysis catheter in a nonatopic child on continuous ambulatory peritoneal dialysis. We found tenderness, redness, and swelling without purulent discharge around the peritoneal catheter; increased eosinophil count in cloudy dialysis fluid; and blood and hyperechoic granulomatous formation appearance surrounding the peritoneal catheter on ultrasonography and foreign body giant cell reaction to dialysis catheter in pathologic examination of granulomatous lesionin in our patient. The peritoneal dialysis catheter was removed due to resistance to antibiotic and antihistamine treatments for suspected peritonitis and tunnel infection. Foreign body reaction and eosinophilic peritonitis with eosinophilic cloudy dialysis effluent can exist simultaneously. Foreign body reaction should be considered in the differential diagnosis of exit site and/or tunnel infection. Ultrasonography helps distinguish between foreign body reaction and exit-site or tunnel infection.

IJKD 2017;11:319-21
www.ijkd.org

Case Report

INTRODUCTION

Foreign body reaction (FBR) is a rare condition that occurs when the tissue response is against the materials such as implanted or medical devices.[1] Foreign body reaction can prevent effective treatment by blocking the operation of materials. The cloudy dialysate with peritoneal fluid eosinophilia (PFE) is called as eosinophilic peritonitis (EP) that may lead to misdiagnosis of microbial peritonitis.[2,3] To the best of our knowledge, this is the first report describing the foreign body giant cell reaction to dialysis chatheter and EP in a child on continuous ambulatory peritoneal dialysis (CAPD).

CASE REPORT

A 17-year-old boy being treated with CAPD due to autosomal dominant polycystic kidney was hospitalized with erythemateus, tenderness, and swelling in an area (2 × 3 cm) on the catheter exit site without purulent discharge or cloudy dialysis fluid. He had no fever, vomiting, or abdominal pain. In his medical record, he had no atopy, negative skin tests for increased blood eosinophilia before CAPD program, PFE between 27.6% and 55.4% in peritoneal effluent after catheter insertion (Figure 1), and a peritonitis attack, which was succesfuly treated with vancomycin, 6 weeks after catheter insertion. There was increased PFE in peritoneal fluid during and after peritonitis attack (36.5% and 25.2%, retrospectively, Figure 1).

Laboratory studies showed blood eosinophilia and PFE (12.7% and 19.4% retrospectively, Figure 1), procalcitonin level of 0.5 ng/mL (range, zero to 0.5 ng/mL), immunoglobulin E level of 63.49 IU/mL (range, zero to 100 IU/mL), and a 10-mm hyperechoic granulomatous

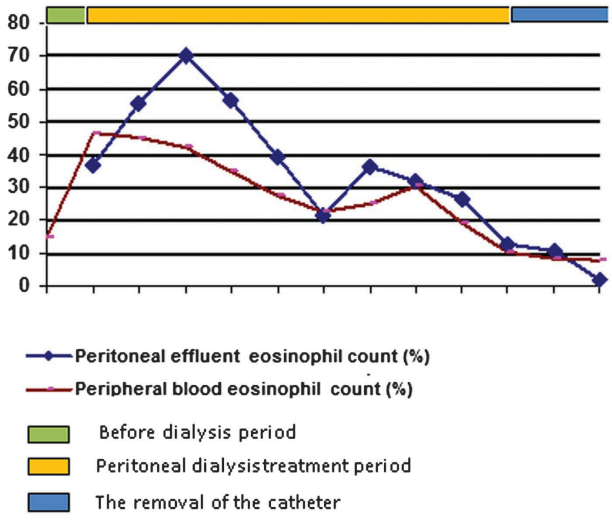

Figure 1. Peripheral blood and peritoneal effluent eosinophil count (%).

formation surrounding the peritoneal catheter on ultrasonography. Suspected peritonitis and tunnel infection was diagnosed. Despite the antibiotics and an antihistamine (hydroxyzine) treatment, there were increased swelling and redness area and intensive fibrin formation in peritoneal fluid. These findings suggested treatment-resistant exit-site and tunnel infection. Therefore, peritoneal dialysis catheter was removed. The pathologic examination of granulomatous tissue surrounding the catheter indicated foreign body giant cell reaction to peritoneal catheter and minimal chronic inflammation (Figure 2). Two weeks after removal of the dialysis catheter, eosinophil counts were decreased (1.8%, Figure 1).

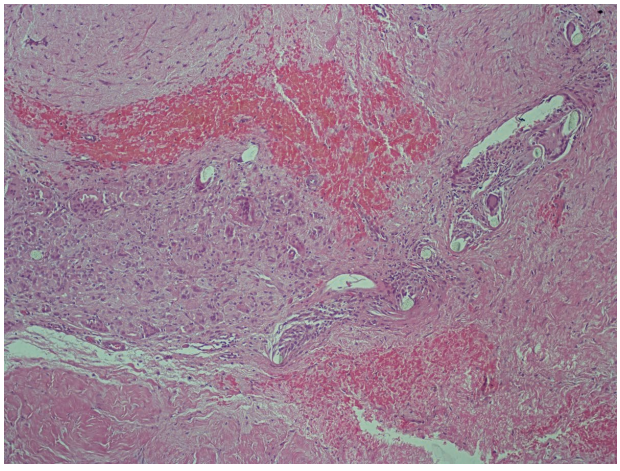

Figure 2. Foreign body giant cell reaction to peritoneal catheter and minimal chronic inflammation (hematoxylin-eosin, × 10).

DISCUSSION

Foreign body reaction is characterized by foreign body giant cell formation and fibrotic encapsulation.[4] Inflammatory cell layer formation on intraperitoneal foreign body involves deposition of protein, binding of macrophages, secretion of cytokines and chemokines, and mast cell activation.[5-7] We reported a patient on CAPD who had FBR, EP and PFE. The main characteristics of our patient were FBR, mimicking the exit-site and tunnel infection, and EP. As in our patient, clinical examination (swelling, crust, redness, and pain) and culture results from different samples such as exit-site may not be able to differentiate between FBR and exit-site and tunnel enfection. In fact, a positive culture is not a mandatory criterion for the diagnosis of exit site infection. In support of this notion, negative culture results were obtained in our patients. If granulomatous lesion was detected in patient with suspected exit-site and tunnel enfection on the ultrasonography, an FBR should be suspected. Besides, ultrasonographic examination revealed a 10-mm hyperechoic granulomatous formation surrounding the peritoneal catheter in our patient.

On the other hand, our patient had EP, which is a response of the peritoneum to foreign substances including a component of the dialysis system, icodextrin, and intraperitoneal medications. Eosinophilic peritonitis should be considered if there is a culture-negative peritonitis with cloudy dialysate. Our patient had cloudy peritoneal fluid with culture-negative peritonitis. It seems that EP could be responsible for chronicity due to its ability of the increasing inflammatory process rather than main cause of FBR in our patient. Flessner and colleagues have reported that dialysis catheter itself induces peritoneal inflammation independently.[8] Otherwise, EP has been claimed to be associated with atopic tendency and increased serum immunoglobulin E level induced by interleukin-4 and interleukin-13 from mast cells in patients with FBR.[1,9] We think that EP does not relate allergic events in our patient for the following reasons: he did not have a history of atopy, had negative allergic skin tests and blood eosinophilia before CAPD program, had normal serum immunoglobulin E levels during follow-up period, and experienced antihistaminic treatment failure.

We conclude that FBR should be considered

in children with exit site and tunnel infection. The hyperechoic granulomatous lesion on ultrasonography can help distinguish between FBR and exit-site and tunnel infection.

CONFLICT OF INTEREST

None declared.

REFERENCES

1. JM Anderson, Rodriguez A, Chang DT. Foreign body reaction to biomaterials, Semin. Immunol. 2008;20:86-100.
2. Fontan MP, Rodriguez-Carmona A, Galed I, Iglesias P, Villaverde P, Garcia-Ureta E. Incidence and significance of peritoneal eosinophilia during peritoneal dialysis-related peritonitis. Perit Dial Int. 2003;23:460-4.
3. Ejaz AA, Fitzpatrick PM, Durkin AJ, et al. Pathophysiology of peritoneal fluid eosinophilia in peritoneal dialysis patients. Nephron. 1999;81:125-30.
4. DM Higgins, Basaraba RJ, Hohnbaum AC, Lee EJ, Grainger DW, Gonzalez-Juarrero M. Localized immunosuppressive environment in the foreign body response to implanted biomaterials. Am J Pathol. 2009;175:161-70.
5. Min SY, Fu Y, Hutcheson J, et al. Peritoneal catheter implantation elicits IL-10-producing immune-suppressor macrophages through a MyD88-dependent pathway. Clin Immunol. 2012;143:59-72.
6. MacLauchlan S, Skokos EA, Meznarich N, et al. Macrophage fusion, giant cell formation, and the foreign body response require matrix metalloproteinase 9. J Leukoc Biol. 2009;85:617-26.
7. Tang L, Eaton JW. Natural responses to unnatural materials:a molecular mechanism for foreign body reactions. Mol Med. 1999;5:351-8.
8. Flessner MF, Credit K, Richardson K, et al. Peritoneal inflammation after twenty-eek exposure to dialysis solution: effect of solution versus catheter-foreign body reaction. Perit Dial Int. 2010;30:284-93.
9. Asghar R, Woodrow G, Turney JH. A case of eosinophilic peritonitis treated with oral corticosteroids. Perit Dial Int. 2000;20:579-80.

Correspondence to:
Bilal Yildiz, MD
Department of Pediatric Nephrology, Faculty of Medicine, Eskisehir Osmangazi University, TR-26480, Eskisehir, Turkey
Tel: +90 222 229 0064
Fax: +90 222 229 0064
E-mail: bilalyn@yahoo.com

Received June 2016
Revised November 2016
Accepted December 2016