

Subcutaneous granulomatous reaction with eosinophil infiltration to a silicone continuous ambulatory peritoneal dialysis Tenckhoff catheter

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KEYWORDS: case report, continuous ambulatory peritoneal dialysis, granulomatous reaction, silicone, Tenckhoff catheter

A few reports have described cutaneous allergic reactions to peritoneal dialysis catheters during continuous ambulatory peritoneal dialysis (CAPD).^{1,2} Here, we report a rare case of subcutaneous granulomatous reaction with eosinophil infiltration caused by a peritoneal dialysis catheter, and confirmed by skin tests.

CASE REPORT

A 48-year-old Japanese woman was referred to our dermatology clinic with multiple cutaneous and subcutaneous nodules around a Tenckhoff CAPD catheter with double Dacron cuffs (Medi-Tech corporation, Tokyo, Japan). Because of end-stage immunoglobulin A nephropathy, she started CAPD 2 years before and noticed a painful burning sensation and skin lesions around the catheter exit and the subcutaneous tube tunnel 3 months after CAPD initiation. Her nephrologist suspected catheter-related infection and prescribed several antibiotics for oral administration and topical application over the lesions. The catheter tube was then removed above cuff at the peritoneum, and a new catheter was inserted through a new catheter exit and subcutaneous tunnel. One month later, she showed similar skin lesions around the new catheter exit and the tube. The oral and topical antibiotics again proved ineffective, and the catheter was removed again. After she developed similar lesions by the third insertion of a

catheter tube, she was referred to our clinic. She had no other history of skin troubles or allergic diseases.

Physical examination revealed erythematous soft nodules on the right abdomen around the exit and the subcutaneous tube tunnel of the catheter (Figure 1A). No eruptions were evident on the skin surface where the catheter tube was fixed onto the skin by tape. Histopathological examination revealed mixed cell granuloma accompanied by lymphohistiocytic infiltration with neutrophils and eosinophils in the dermis (Figure 1B). We performed scratch-patch tests with occlusive application of chopped catheters on skin where the epidermis was scarified by fine needles for 48 hours. Positive skin reactions were observed to three peritoneal catheters available in Japan, but not to any other substances involved in catheter use (Table S1). The scratch-patch tests on a healthy volunteer did not show any skin reaction. Histopathology at the site of the positive scratch-patch test reaction for the Tenckhoff catheter (Medi-Tech) showed dermatitis with eosinophil infiltration (Figure 1C). The skin problems quickly resolved after catheter removal and never recurred after switching to hemodialysis.

DISCUSSION

Medical silicone resin is widely used in clinical applications.^{3,4} Two types of medical silicone resin are in use: vinyl specific and non-vinyl

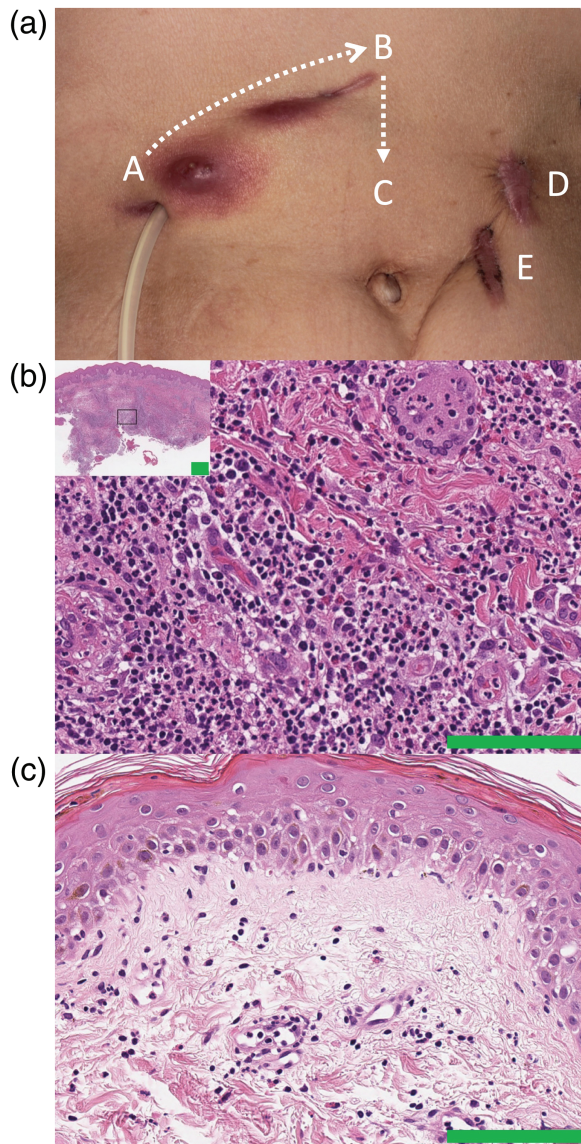


FIGURE 1 (A) Site “A” indicates a tender erythematous nodule near the exit site of peritoneal catheter from which skin biopsy was performed. The peritoneal catheter located in the dermis from site “A” to “B” and was palpable. From site “B,” the peritoneal catheter located deeper in the subcutis toward the entry to the peritoneal cavity at site “C.” The catheter was not palpable between sites “B” and “C.” Dotted arrows indicate the rout of the continuous ambulatory peritoneal dialysis catheter. Sites “D” and “E” indicate the hypertrophic scar after removing the previous catheter at the exit site of skin (D) and at the site where the catheter inserted into peritoneal cavity through the peritoneal wall (“E”). (B) Hematoxylin and eosin staining of the nodule at site “A” shows mixed cell granuloma with multi-nucleated giant cells, neutrophils, and eosinophils. (C) The cutaneous histology at a site of positive patch-test reaction to the Tenckhoff catheter (Medi-Tech) shows spongiotic dermatitis with eosinophil infiltration. Scale bars = 100 μ m

specific. Chemical modifications applied to vinyl-specific silicone resin add flexibility at low temperatures, high-temperature stability, and radiation stability. Among those chemicals, 2-methyl-3-butyn-2-ol and methyl vinyl ketone have been reported to cause allergic reactions.⁵

We speculate that the patient developed a granulomatous reaction to a common component of vinyl-specific silicone resin such as 2-methyl-3-butyn-2-ol or methyl vinyl ketone as she showed positive skin reactions to three different Tenckhoff catheters, although we could not obtain detailed information on components from the manufacturers owing to trade secrets.

Although numerous silicone granulomas after breast implants had been documented,⁶ reports of skin granuloma by indwelling catheters are rare.^{4,7} A few hypotheses concerning the pathogenesis of silicone granuloma are proposed, such as a foreign body-type reaction⁸ and immunogenic effect of silicone.⁹ A unique point of our case was that eosinophil infiltration was histologically observed in granulomas around the CAPD catheter as well as in the skin reaction to the scratch-patch test. Because CAPD catheter-associated eosinophilic peritonitis is frequently described,¹⁰ the presence of the eosinophil in skin reaction suggested that cutaneous T-helper cell 2-type reactions were involved in our case at least partially.

To the best of our knowledge, no similar case of subcutaneous granulomatous reaction with eosinophil infiltration caused by a peritoneal dialysis catheter has been reported, which was histologically confirmed by eosinophilic infiltration in skin tests. One case each of contact dermatitis and systemic allergic dermatitis was diagnosed by skin patch tests for peritoneal catheters, but histological information about skin patch test reactions was not provided.^{1,2} Our case presented with a subcutaneous granulomatous reaction with eosinophil infiltration, but with no epidermal spongiosis observed typically in contact dermatitis. We therefore diagnosed our case as possible allergic granulomatous reaction to the Tenckhoff catheter. Because a catheter infection clinically resembles a subcutaneous allergic reaction, it is important to suspect CAPD catheter-related reactions if patients do not respond to antibiotics.

ACKNOWLEDGEMENTS

The authors thank Ms Yumiko Ito for her technical assistance, and Ms Momo Miura and Ms Yuko Yanagawa-Ohisa for their secretarial support.

CONFLICTS OF INTEREST

None to disclose.

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REFERENCES

1. Kurihara S, Tani Y, Tateishi K, et al. Allergic eosinophilic dermatitis due to silicone rubber: a rare but troublesome complication of the Tenckhoff catheter. *Perit Dial Bull.* 1985;5:65-67.

2. Patel UO, Fox SR, Moy JN, Korbet SM. Pruritic rash and eosinophilia in a patient receiving peritoneal dialysis. *Semin Dial*. 2011;24:338-340.
3. Fonacier L, Bernstein DI, Pacheco K, et al. Contact dermatitis: a practice parameter-update 2015. *J Allergy Clin Immunol Pract*. 2015;3(suppl):S1-S39.
4. Alvis-Miranda H, Alcalá-Cerra G, Castellar-Leones SM, Escorcía HF, Moscote-Salazar LR. Latex and silicon allergy related to cerebrospinal shunt hardware: a review. *Rom Neurosurg*. 2013;20:106-115.
5. Goldmann P. [Occupational skin diseases in the chemical industry]. *Z Haut Geschlechtskr*. 1963;34:355-68 contd.
6. Potter EH, Rohrich RJ, Bolden KM. The role of silicone granulomas in recurrent capsular contracture: a review of the literature and an approach to management. *Plast Reconstr Surg*. 2013;131:888e-895e.
7. Kenmochi A, Satoh T, Igawa K, Yokozeki H. Silica granuloma induced by indwelling catheter. *J Am Acad Dermatol*. 2007;57(suppl):S54-S55.
8. Epstein WL, Skahan JR, Krasnobrod H. The organized epithelioid cell granuloma: differentiation of allergic (zirconium) from colloidal (silica) types. *Am J Pathol*. 1963;43:391-405.
9. Rank BK, Hicks JD, Lovie M. Pseudotuberculoma granulosum silicoticum. *Br J Plast Surg*. 1972;25:42-48.
10. Spinowitz BS, Golden RA, Rascoff JH, Charytan C. Eosinophilic peritonitis. *Clin Exp Dial Apheresis*. 1982;6:187-191.

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

How to cite this article: Hatchome N, Shido K, Kikuchi K, et al. Subcutaneous granulomatous reaction with eosinophil infiltration to a silicone continuous ambulatory peritoneal dialysis Tenckhoff catheter. *Contact Dermatitis*. 2020;82:114–116. <https://doi.org/10.1111/cod.13399>

Supplementary Data

Supplementary Table. Materials and results of scratch-patch testing

Materials	Concentration	Skin reaction (ICDRG*)		
		Day 2	Day 3	Day 7
Tenckhoff catheter (Medi-Tech corporation)	“as is”	+	+	–
Tenckhoff catheter (Hayashidera corporation)	“as is”	+	+	–
Tenckhoff catheter (Fuji systems corporation)	“as is”	+	+	–
Titanium adapter	“as is”	–	–	–
Latex	“as is”	–	–	–
1% Lidocaine solution	“as is”	–	–	–
Gauze (sterilized by ethylene oxide)	“as is”	–	–	–
Petroleum jelly (as a control)	“as is”	–	–	–

*Readings were performed according to International Contact Dermatitis Research Group (ICDRG) guidelines on Day (D) 2, D3 and on D7.