

An Unusual Case of Peritoneal Dialysis Twisted Catheter in a Child

**Cahyani Gita Ambarsari, Farhan Haidar Fazlur Rahman,
Evita Karianni Bermanshah, Agustina Kadaristiana**

*Department of Child Health, Faculty of Medicine Universitas Indonesia, Cipto Mangunkusumo Hospital,
Jakarta Pusat, Indonesia*

Abstract

Objective: Mechanical complications of peritoneal dialysis (PD) may occur because of surgical complications when inserting a Tenckhoff catheter or non-surgical complications during chronic care of a PD catheter. We aim to highlight the latter by presenting a case report of twisted external catheter.

Method: We report an 11-year-old Indonesian girl with end-stage renal disease on continuous ambulatory PD at Cipto Mangunkusumo Hospital who was hospitalized due to repeat peritonitis.

Result: Upon examination, the external catheter seemed twisted without inflow, outflow, or ultrafiltration problems. Her exit score was 4 with gaping. Both abdominal X-ray and ultrasound showed that the catheter and its cuffs were properly placed. The patient frequently pulled and manipulated her PD catheter. Additionally, the catheter-site care procedure was frequently done by untrained caregivers and catheter fixation was also not performed. A retraining program for all involved caregivers was carried out. Peritonitis resolved after 14-day-treatment using intraperitoneal gentamicin. We determined that the twisted catheter and repeat peritonitis were due to a combination of mechanical trauma, poor chronic catheter-site care, and suboptimal PD catheter training.

Conclusion: Maintaining compliance for chronic PD catheter exit-site care by well-trained caregivers and by patients themselves, as well as the external catheter fixation are important.

Key words: Renal replacement therapy, continuous ambulatory, malposition, chronic renal insufficiency.

Kasus Kateter Dialisis Peritoneal yang Terpuntir pada Seorang Anak

Cahyani Gita Ambarsari, Farhan Haidar Fazlur Rahman,
Evita Karianni Bermanshah, Agustina Kadaristiana

Departemen Ilmu Kesehatan Anak, Fakultas Kedokteran Universitas Indonesia,
Rumah Sakit Cipto Mangunkusumo, Jakarta Pusat, Indonesia

Abstrak

Tujuan: Komplikasi mekanik akibat dialisis peritoneal (DP) dapat terjadi karena komplikasi operasi insersi kateter Tenckhoff maupun komplikasi non-operatif, yaitu saat perawatan kateter dialisis jangka panjang. Laporan kasus ini bermaksud untuk menekankan komplikasi non-operasi pada DP dengan menyajikan laporan kasus terpuntirnya kateter eksternal.

Metode: Dilaporkan seorang anak perempuan berumur 11 tahun dengan gagal ginjal yang menjalani dialisis peritoneal mandiri berkesinambungan (DPMB) di Rumah Sakit Cipto Mangunkusumo dan mengalami peritonitis berulang.

Hasil: Kateter eksternal terpuntir tanpa masalah pada aliran masuk, aliran keluar, maupun ultrafiltrasi. Skor exit-site 4 dan terdapat gaping. Rontgen dan ultrasonografi abdomen menunjukkan kateter dan kedua cuff berada dalam posisi yang benar. Pasien sering menarik-narik dan memutar-mutar selang kateter dialisis peritoneal (DP). Selain itu, ibu pasien sering melibatkan pengasuh yang tidak terlatih untuk merawat kateter DP dan tidak memfiksasi kateter. Selama perawatan inap, pelatihan diberikan kembali kepada semua pengasuh yang terlibat dalam perawatan kateter harian. Peritonitis teratasi dengan gentamisin intraperitoneal selama 14 hari. Kami menyimpulkan bahwa kateter terpuntir dan peritonitis berulang diakibatkan oleh perpaduan trauma mekanik, perawatan kateter dan exit-site nya yang buruk, serta pelatihan perawatan kateter DP yang suboptimal.

Kesimpulan: Kepatuhan perawatan kronik kateter PD oleh pengasuh yang terlatih dengan melibatkan pasien, serta memfiksasi kateter eksternal penting untuk mencegah komplikasi non-operasi pada DP.

Kata Kunci: terapi pengganti ginjal, dialisis peritoneal mandiri berkesinambungan, malposisi, insufisiensi ginjal kronis

Introduction

Peritoneal dialysis (PD) has been preferred to hemodialysis (HD) because of its various advantages, such as less vascular access complications, ease of performance, and flexibility of diet.¹ In our center, new cases of end-stage renal disease referred from other centers coming as “crash-landers” will be initiated on HD, which then will be converted to PD within the following few weeks.² Despite the advantages, mechanical complication of PD may occur because of surgical complications when inserting a Tenckhoff catheter or non-surgical complications that arise during chronic care of a PD catheter.

Case Report

An 11-year-old Indonesian girl was hospitalized at Cipto Mangunkusumo Hospital with a diagnosis of repeated peritonitis. She had fever, vomiting, abdominal pain, and cloudy

PD effluent with ultrafiltration failure, which began 1 day before admission. She had been diagnosed with end-stage renal disease due to polycystic kidney disease at the age of 10 years and had undergone continuous ambulatory PD (CAPD) for 5 months; peritonitis occurred within 3 months after CAPD initiation due to *Acinetobacter baumannii* infection. The infection was resolved using intraperitoneal (IP) gentamicin. She had an exit score of 4 with gaping (Figure 1A) and chronic irritant contact dermatitis due to friction with the PD catheter (Figure 1B). Laboratory findings suggested PD-associated peritonitis (Table 1); peritoneal effluent was sent for culture. Intraperitoneal gentamicin was administered as empirical therapy, and flucinolone acetone was administered for treatment of irritant contact dermatitis. We cleaned the exit-site with 2% chlorhexidine, applied gentamicin cream, and kept the wound open by fixing an external catheter laterally with tape.

On the third day of hospitalization, the PD

external catheter was twisted; this became more obvious on the seventh day with the appearance of a granuloma (Figure 1C, D). There were no problems involving inflow and outflow, and ultrafiltration had returned to normal. Abdominal X-ray showed that the tip of the catheter was in the pelvic cavity (Figure 1E). Ultrasonography showed that the subcutaneous cuff was positioned 2.4 cm from the exit-site (Figure 1F), whereas the deep cuff was in the rectus muscle, and no tunnel infection was present.

When investigating the cause of repeat peritonitis, we found that the caregiver who performed daily exchange procedures for the patient was her elder sister, who had not received PD training; importantly, only the patient's mother and elder brother had

previously received training. Appropriate hand hygiene and mask usage were not implemented by caregivers during daily care; moreover, the patient frequently manipulated the external catheter by pulling.

A double-cuffed straight Tenckhoff catheter was used, which was inserted through laparoscopic omentopexy. The exit-site dressing was maintained for 1 week, followed by semi-occlusive dressing with daily dressing change. Three months later, because of irritant contact dermatitis caused by exposure to the semi-occlusive dressing, the caregivers applied a non-dressing protocol for exit-site care, as recommended by the PD nurse. The non-dressing protocol included daily exit-site cleansing, application of gentamicin cream, and external catheter immobilization with tape.

Table 1. Peritoneal Dialysis Fluid Analysis and Culture

Fluid characteristics μL)	Day 1 (cells/μL)	Day 5 (cells/μL)	Day 8 (cells/μL)	Day 14 (cells/
Cell count	17,620	643	110	42
Polymorphonuclear	16,265	433	17	2
Mononuclear	1,355	210	93	40
Culture result	<i>Acinetobacter baumannii</i>	No growth	Not available	Not available

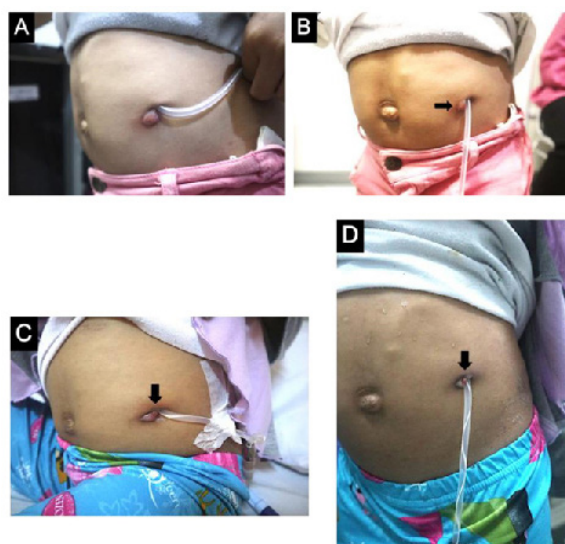


Figure 1. Twisted peritoneal dialysis catheter. A, Exit-site score was 4 (no swelling, crust < 0.5 cm, redness 1 cm, slight pain, no secretions) with gaping, on admission. B, Erythematous swelling (1.5 cm) indicating a chronic irritant contact dermatitis lesion due to the peritoneal dialysis catheter tube (black arrow). The friction occurred because the patient's caregiver did not perform daily catheter fixation with tape due to reports of discomfort to the patient. C, On the third day of hospitalization, the peritoneal dialysis external catheter was twisted. Granuloma was visible (black arrow). D, The twisted peritoneal dialysis catheter was more prominent on the seventh day of hospitalization. Granuloma remained visible (black arrow). E, Abdominal radiographs demonstrating catheter tip in the pelvic area while the patient was undergoing peritonitis treatment. F, Subcutaneous cuff located 2.4 cm from the exit-site G, Exit-site showing improvement after 2 weeks of treatment.

Peritoneal fluid culture revealed growth of gentamicin-sensitive *A. baumannii*, and a 14 day course of IP gentamicin was continued with recovery after 2 weeks of treatment (Table 1), including exit-site healing (Figure 1G). Repositioning of the Tenckhoff catheter was not performed, but retraining was implemented for all three caregivers, and the patient was instructed to closely monitor catheter-site care.

Discussion

To the best of our knowledge, repeated peritonitis and twisted catheter in chronic CAPD has not been reported. The recent publications from our center displayed non-surgical complications of PD in Indonesia, consist of fluid overload, hydrocele, omental wrapping, pleuroperitoneal fistula, malposition, and umbilical hernia; without any incidence of twisted PD catheter, suggesting its rarity.^{1,3} Twisted catheter is typically associated with surgical complications during catheter insertion.⁴ In our patient, the twisted catheter occurred during chronic catheter-site care. Ultrafiltration problems did not occur, and catheter malposition was ruled out by abdominal imaging.^{5,6}

The twisted catheter likely occurred because of mechanical stress and poor chronic catheter-site care. Standard wound care after catheter placement had been performed,⁷ followed by use of semi-occlusive dressings; the wound healed completely, and both cuffs were located properly. A biological airtight seal was formed around the catheter, causing immobilization that prevented disruption of the seal.⁸ Regular dressings are ideal for chronic exit-site care, as they maintain a clean exit-site, support the catheter, and protect it from injury;⁷ however, our patient exhibited irritant contact dermatitis. A non-dressing protocol was then recommended, which is reportedly effective for prevention of PD-related infection.⁹

Our patient showed formation of a granuloma, which indicated a proliferative reactive condition in response to severe chronic irritant contact dermatitis.¹⁰ It might have occurred because of chronic friction with the PD tube, as there was no fixation of the external catheter. Non-infectious exit-site lesions may contribute to exit-site secondary infection. Those conditions are best treated with removal of potential causes and application of topical steroids, zinc oxide cream, and barrier creams.^{10,11}

Our patient frequently manipulated the catheter, causing mechanical trauma; immobilization of a PD catheter is essential for injury prevention, as well as for epithelization and wound healing.^{7,12} In addition to the increasing risk of bacterial and other opportunistic infection,¹³ the area around the exit-site and subcutaneous tissue can become loose and cause a twisted catheter.

PD technique failure owing to peritonitis could be due to inadequate PD catheter training and absence of retraining.¹ In this case, poor compliance with PD guidelines suggested that our PD training program was suboptimal. In addition, exit-site infection can lead to PD discontinuation and peritonitis can occur as early as 6.6 months since PD initiation, therefore, a 6-monthly retraining program is recommended.¹ Training programs should be taught on an individual basis without concomitant training for two caregivers; a single trainer nurse must be present for an entire session to maintain consistency. Additionally, a home visit should be performed by PD nurses at least once per year.¹⁴

Conclusion

In conclusion, caution is needed to prevent twisted catheter during chronic PD care, particularly in patients with poor compliance regarding catheter-site care. This report has

emphasized the importance of a PD training program for caregivers and the importance of external catheter immobilization.

Consent For Publication

Written informed consent was obtained from the patient's guardian for publication of this case report and accompanying images. A copy of the written consent is available for review by the editor of this journal.

Availability of Data And Material

All data generated during this study are included in this published article.

Funding Source

None.

Acknowledgements

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. We would like to thank Elysabeth Muliawan, MD, for her editing service on the English version of this manuscript.

Conflict of Interests Disclosure

None to declare.

References

1. Ambarsari CG, Trihono PP, Kadaristiana A, Tambunan T, Mushahar L, Puspitasari HA, et al. Five-year experience of continuous ambulatory peritoneal dialysis in children: a single center experience in a developing country. *Medical Journal of Indonesia*. 2019 Dec 13;28(4):329-7.
2. Ambarsari CG, Cahyadi D, Sari L, Satria O, Sahli F, Darmadi TL, et al. Late diagnosis of Lesch-Nyhan disease complicated with end-stage renal disease and tophi burst: a case report. *Renal Failure*. 2020 Jan 1;42(1):113-21.
3. Ambarsari CG, Bermanshah EK, Putra MA, Rahman FHF, Pardede SO. Effective management of peritoneal dialysis-associated hydrothorax in a child: a case report. *Case Reports in Nephrology and Dialysis*. 2020 Feb;10:18-25.
4. Buffington M, Sequeira A, Sachdeva B, Abreo K. Peritoneal dialysis catheter placement techniques. *The Open Urology & Nephrology Journal*. 2012 Jun 1;5(1).
5. Crabtree JH, Shrestha BM, Chow KM, Figueiredo AE, Povlsen JV, Wilkie M, et al. Creating and maintaining optimal peritoneal dialysis access in the adult patient: 2019 Update. *Peritoneal Dialysis International*. 2019 Sep 1;39(5):414-36.
6. Hansson JH, Watnick S. Update on peritoneal dialysis:

- core curriculum 2016. American Journal of Kidney Diseases. 2016 Jan 1;67(1):151-64.
7. Szeto CC, Li PK, Johnson DW, Bernardini J, Dong J, Figueiredo AE, et al. ISPD catheter-related infection recommendations: 2017 update. *Peritoneal Dialysis International*. 2017 Mar 1;37(2):141-54.
 8. von Recum AF. Applications and failure modes of percutaneous devices: a review. *Journal of Biomedical Materials Research*. 1984 Apr;18(4):323-36.
 9. Mushahar L, Mei LW, Yusuf WS, Sivathanan S, Kamaruddin N, Idzham NJ. Exit-site dressing and infection in peritoneal dialysis: a randomized controlled pilot trial. *Peritoneal Dialysis International*. 2016 Mar 1;36(2):135-9.
 10. Siddiqui M, Bradford L, Kaley J, Johnson G, Kim KH, Addis K, et al. Noninfectious peritoneal dialysis exit site rash—an unusual case report and review of the literature. *Kidney International Reports*. 2018 Jan;3(1):11.
 11. Gosmanova EO, Ezumba I, Fisher KR, Cleveland KO. A case report of rash at peritoneal dialysis exit site. *Journal of Investigative Medicine High Impact Case Reports*. 2015 Nov 27;3(4):2324709615618222.
 12. Twardowski ZJ, Prowant BF. Exit-site healing post catheter implantation. *Peritoneal Dialysis International*. 1996 Jan 1;16(Suppl 3):S51-70.
 13. Turner K, Edgar D, Hair M, Uttley L, Stermland R, Hunt L, et al. Does catheter immobilization reduce exit-site infections in CAPD patients. *Adv Perit Dial*. 1992;8(265-268):444.
 14. Figueiredo AE, Bernardini J, Bowes E, Hiramatsu M, Price V, Su C, et al. A syllabus for teaching peritoneal dialysis to patients and caregivers. *Peritoneal Dialysis International*. 2016 Nov 1;36(6):592-605.

