CASE REPORT

Transection versus infection: acute appendicitis in a peritoneal dialysis patient presenting as catheter dysfunction and discontinuity on X-ray

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SUMMARY

Acute appendicitis in peritoneal dialysis patients generally presents as abdominal pain and cloudy dialysate. We report a case of acute appendicitis in a peritoneal dialysis patient that presented as poor dialysate fluid drainage and an abnormal abdominal X-ray showing breakage in the continuity of the catheter. Catheter dysfunction in this case was caused by acute appendicitis leading to the formation of adhesions with peritoneal dialysis catheter trapped in it. This resulted in radiological appearance of catheter breakage, although catheter itself was intact. Clinicians should be aware of this rare presentation of acute appendicitis—poor drain alarm and radiological appearance of catheter discontinuity.

BACKGROUND

According to 2016 US Renal Data System annual report, peritoneal dialysis (PD) is employed by 9.4% of patients with end-stage renal disease (ESRD) as renal replacement therapy.¹ The complications of PD are broadly divided into two categories—infectious and non-infectious complications. Among the non-infectious complications, mechanical issues, especially peritoneal catheter dysfunction, are increasing in importance as a cause of technique failure and account for close to 20% of transfers to haemodialysis.^{2–3} PD catheter malfunction is generally caused by constipation, fibrin occlusion, tissue encasement and catheter migration or kinking.² Appendicitis in PD patients is an uncommon diagnosis and published literature consistent of case reports.^{4–11} The clinical presentation varies considerably but most patients present with diffuse abdominal pain, tenderness and cloudy PD effluent, while others with anorexia, vomiting and diarrhoea and rarely fever.^{5–10} Hereby, we present an unusual case of acute appendicitis in a PD patient that presented as poor PD fluid drainage and abdominal X-ray showing breakage in the continuity of the catheter.

CASE PRESENTATION

A 67-year-old man with ESRD due to atheroembolic disease, on automated PD for 3 years, presented with 1-day history of poor drain alarm while on PD cycler. The patient denied abdominal pain, fever, fibrin or cloudy dialysate and constipation. On manual exchange, there was slow peritoneal dialysate inflow but no fluid outflow, therefore, PD fluid cell count

could not be performed. The other comorbid conditions included hypertension, coronary artery disease status post coronary artery stent placement, peripheral vascular disease, dyslipidaemia, benign prostatic hyperplasia, obstructive sleep apnoea and secondary hyperparathyroidism. The patient had a 60 pack-years history of smoking. The medications at the time of presentation included amlodipine, aspirin, clopidogrel, sevelamer carbonate, paricalcitol, losartan, atorvastatin, multivitamin and topical gentamicin cream.

On physical examination, pulse 77/min regular, blood pressure 159/97 mm Hg, temperature 36.8°C. Cardiovascular and pulmonary examinations were unremarkable. There was no tenderness on abdominal examination and PD catheter exit site was without any new erythema or drainage. There was no peripheral oedema.

INVESTIGATIONS

Laboratory data showed white cell count $11.1 \times 10^9/L$, haemoglobin 13.8 g/dL, platelets $250 \times 10^9/L$. Electrolytes were within normal range and serum creatinine 4.5 mg/dL.

An abdominal X-ray was done to assess the position of the catheter to evaluate catheter migration as the cause of catheter malfunction. An abdominal X-ray (figure 1) showed PD catheter in right lower quadrant with new discontinuity of the distal aspect of the catheter approximately 2.5 cm from the tip when compared with previous X-ray (figure 2). Abdominal CT was not done since acute appendicitis was not suspected as a cause of catheter malfunction at the time of presentation.

TREATMENT

The patient underwent diagnostic laparoscopy due to concern of catheter breakage and to replace the catheter. However, on laparoscopic examination, the PD catheter was found to be entrapped within the adhesions in right lower quadrant and it appeared intact. The tip of appendix was inflamed with a fibrinopurulent exudate that was caught up against the catheter in the area of apparent discontinuity. The patient underwent appendectomy and same PD catheter was repositioned in the pelvis.

OUTCOME AND FOLLOW-UP

Subsequently, catheter flushed easily and PD was resumed in the immediate postoperative period with low volume. Patient performed low volume

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Figure 1 Abdominal X-ray: peritoneal dialysis catheter in right lower quadrant, apparent discontinuity of the radio-opaque stripe in the distal catheter approximately 2.5 cm from the tip.

exchanges every night for 2 weeks using following PD prescription—1 L dialysate volume per exchange while supine using cyclor at night, total of seven exchanges over 9 hours with dry peritoneal cavity during the rest of the 24 hours to avoid PD leak. After 2 weeks, dialysate volume was gradually increased over subsequent 1 week to presurgery prescription of 2 L dialysate volume per exchange, five exchanges over 9 hours using cyclor at night.

Figure 2 Abdominal X-ray: peritoneal dialysis catheter without the discontinuity in the same patient done 1 year prior to this presentation.

The histopathology of the appendix showed focal organising intravascular thrombus in mesoappendix with adjacent reactive changes. The serosal surface was tan and focally haemorrhagic. On transection, the mucosa was tan and the lumen had brown material.

DISCUSSION

Our patient had no typical signs or symptoms of peritonitis or appendicitis. Dysfunction in the peritoneal catheter with slow inflow and no outflow was the only clinical complaint and due to that PD fluid cell count was not performed, consequently no formal diagnosis of peritonitis could be made.

The diagnosis of surgical abdomen such as appendicitis in PD patients is difficult and often delayed.² The attenuated symptomatology in PD patients with appendicitis is thought to be due to constant peritoneal washing from the multiple PD exchanges and intraperitoneal antibiotics that are administered to treat peritonitis.^{4,7} Persistent abdominal pain or infection in spite of appropriate antibiotic therapy for 48 hours and multiple bacteria and/or anaerobes may be the only clue to the diagnosis of appendicitis.^{2,11} There is, however, a report of clear dialysate effluent with normal cell count in a PD patient with phlegmonous appendicitis.¹² In most cases, the abdominal CT is non-yielding or inconclusive and the diagnosis of appendicitis is only made through exploratory laparotomy.^{4,10} Delays in deciding to perform exploratory laparotomy in patients suspected of having endogenous peritonitis may lead to increased morbidity and mortality.^{5,11}

In our patient, catheter dysfunction was likely caused by acute appendicitis leading to the formation of adhesions with PD catheter trapped in it. It is possible that peritoneal dialysate outflow in our patient was obstructed by the entrapment of the inflamed appendix within the lumen of the PD catheter similar to a previously reported case of PD catheter obstruction resulting from right fallopian tube entrapment in a child on PD.¹³ The tip of the inflamed appendix was in the area of the PD catheter and may have caused the radiological appearance of catheter breakage although catheter itself was intact. To our knowledge, this clinical presentation of radiological appearance of breakage in the continuity of intact catheter has not been previously reported. The probability of resuming PD after exploratory laparotomy for the surgical abdomen is low.^{5,7,9} Our patient underwent laparoscopic appendectomy and catheter was repositioned and low volume PD was resumed in the postoperative period. This case emphasises the fact that appendicitis in patients undergoing PD might be clinically asymptomatic and that high level of awareness is crucial. In addition, this case highlights the importance of early laparoscopic surgical intervention for both diagnostic and therapeutic purpose in cases of PD catheter dysfunction.

Learning points

- ▶ Acute appendicitis in peritoneal dialysis patients is an uncommon diagnosis with variable clinical presentations.
- ▶ Abdominal pain, tenderness, and cloudy peritoneal dialysate are most frequent clinical symptoms of acute appendicitis in peritoneal dialysis patients.
- ▶ Peritoneal catheter malfunction with poor dialysate drainage and X-ray findings of breakage of catheter is a newly described presentation of acute appendicitis.
- ▶ Prompt evaluation and early laparoscopic surgical intervention for both diagnostic and therapeutic purpose may reduce PD technique failure in patients with acute appendicitis.

CONCLUSION

Clinicians should be aware of this unusual presentation of acute appendicitis—poor drain alarm with dysfunction of the catheter and radiological appearance of catheter discontinuity.

Prompt evaluation and decision to perform laparoscopy may reduce PD technique failure, morbidity and mortality.

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REFERENCES

- 1 United States Renal Data System. 2016 USRDS annual data report: epidemiology of kidney disease in the United States. Bethesda, MD: National institute of health, national institute of diabetes and digestive and kidney disease, 2016.
- 2 Diaz-Buxo JA. Complications of peritoneal dialysis catheters: early and late. *Int J Artif Organs* 2006;29:50–8.
- 3 McCormick BB, Bargman JM. Noninfectious complications of peritoneal dialysis: implications for patient and technique survival. *J Am Soc Nephrol* 2007;18:3023–5.
- 4 Carmeci C, Muldowney W, Mazbar SA, et al. Emergency laparotomy in patients on continuous ambulatory peritoneal dialysis. *Am Surg* 2001;67:615–8.
- 5 Ekart R, Horvat M, Koželj M, et al. Gangrenous appendicitis presenting as acute abdominal pain in a patient on automated peritoneal dialysis: a case report. *J Med Case Rep* 2012;6:309.
- 6 Mihout F, Lessoré de Sainte Foy C, Vrigneaud L, et al. An uncommon case of peritonitis: appendicitis should not be overlooked. *Perit Dial Int* 2007;27:309–10.
- 7 Miller GV, Bhandari S, Brownjohn AM, et al. 'Surgical' peritonitis in the CAPD patient. *Ann R Coll Surg Engl* 1998;80:36–9.
- 8 Mizuno M, Suzuki Y, Nonaka K, et al. Perforative peritonitis caused by appendicitis in a patient on peritoneal dialysis. *Intern Med* 2013;52:1177–81.
- 9 Pessegueiro P, Amoedo M, Barros S, et al. Aseptic peritonitis in a peritoneal dialysis patient. *Nefrologia* 2006;26:493–6.
- 10 Shrestha BM, Brown P, Wilkie M. Surgical peritonitis in patients on peritoneal dialysis. *Perit Dial Int* 2008;28:331–4.
- 11 Yang CY, Chuang CL, Shen SH, et al. Appendicitis in a CAPD patient: a diagnostic challenge. *Perit Dial Int* 2007;27:591–3.
- 12 Horuz F, Sleeboom C, Bouts AH, et al. Clear peritoneal effluent in a child on CCPD with a phlegmonous appendicitis. *Pediatr Nephrol* 2005;20:1504–5.
- 13 Borghol M, Alrabeeah A. Entrapment of the appendix and the fallopian tube in peritoneal dialysis catheters in two children. *J Pediatr Surg* 1996;31:427–9.

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