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Sustained dialysis with misplaced peritoneal dialysis catheter outside peritoneum: A case report

Quan-Quan Shen, Tapas Ranjan Behera, Liang-Liang Chen, Doaa Attia, Fei Han

Abstract

BACKGROUND

In patients undergoing peritoneal dialysis (PD), catheter dysfunction is a common complication. A misplaced catheter is one of the reasons contributing to its disfunction. The present study aimed to describe the case of misplaced PD catheter with an unusual location of the catheter tip.

CASE SUMMARY

A 61-year-old man undergoing PD for four years was investigated for progressive nausea and fatigue of three months. Dialysis adequacy studies indicated inefficient dialysis. Imaging discovered that the PD catheter tip was mispositioned in the pelvic cavity with its tip outside peritoneal cavity. Despite the dialysate accumulating outside the peritoneal cavity, the patient had not developed perineal or scrotal edema. The patient had experienced a sustainable prolonged dialysis efficacy in this case until the renal function deteriorated further in view of the poor dialysis outcome and worsening health condition. The patient was subsequently transitioned to hemodialysis.

CONCLUSION

Proper placement of catheter in the peritoneal cavity should always be confirmed and re-checked when necessary in patients undergoing PD to ensure dialytic adequacy.

INTRODUCTION

Patients with renal disfunction require renal replacement therapy which may include hemodialysis and peritoneal dialysis. In peritoneal dialysis (PD), the dialysate is introduced to the peritoneal cavity through the PD catheter, the tip of which stays positioned within in the peritoneal cavity for introduction and evacuation of the dialysate fluid. Though PD is a relatively safe procedure, there could be complications associated its use. The complications of PD are commonly classified as infectious and noninfectious. Although infectious complications such as peritonitis leading to morbidity and mortality remain the main cause of PD failure^[1], non-infectious causes also result in patient morbidity which could be prevented by early recognition and management^[2]. The various non-infectious complications are due to erroneous PD catheter insertion technique, failure to retain the catheter in the peritoneal cavity, or dialysate induced rise in intra-abdominal pressure and the resulting metabolic effects. Here we report a case of a patient with end-stage renal disease undergoing PD without any incidence of significant deterioration over four years until he presented with inadequate small solute clearance as a complication of the misplaced extra-peritoneal catheter.

CASE PRESENTATION

Imaging examinations

Imaging studies were performed to evaluate anatomical etiology. The abdominal plain film showed the tip of peritoneal catheter positioned in the true pelvis (Figure 1). The abdominal computed tomography confirmed the PD catheter and the dialysis fluid to be outside the abdominal cavity (Figure 2).

Laboratory examinations

Laboratory assessment revealed severe anemia in the patient, with blood urea nitrogen 19.66 mmol/L, serum creatinine 884 μ mol/L, uric acid 611 μ mol/L, albumin 21.2 g/L,

calcium 2.03 mmol/L, phosphate 2.10 mmol/L and a parathyroid hormone level of 204 pmol/L. Peritoneal equilibration test determined his 4-h equilibration between dialysate and plasma creatine to be 0.571; classifying him as a low-average transporter. The PD adequacy parameters measured 5 months prior to hospitalization as peritoneal kt/Vurea and dialysis creatinine clearance were 1.314 and 42.706 L/wk respectively; the renal kt/Vurea and creatinine clearance at that time were 0.22 and 8.741 L/wk respectively.

Physical examination

On admission, physical examination showed a tense distended abdomen without signs of edema in perineum or lower extremities (Figure 3).

Personal and family history

There was no family history of renal failure or any relevant nephropathy in the family.

History of past illness

Other than the uric acid nephropathy, the patient had chronic hypertension.

History of present illness

The patient had developed renal failure secondary to uric acid nephropathy who was implanted with straight catheter with double polyester cuff and was undergoing PD for 4 years. He had been undergoing continuous ambulatory PD with 3 exchanges per day; one with 1.5% solution and remaining two with 2.5% solution, thereby achieving around 500 mL of peritoneal ultrafiltrate.

Chief complaints

A 61-year-old man with end-stage renal disease undergoing PD was referred to our hospital with progressive nausea and fatigue for 3 months.

FINAL DIAGNOSIS

Misplaced PD catheter tip was identified to be the reason of his deteriorating dialysis efficacy leading to his presentation.

TREATMENT

In view of the worsening health condition due to poor dialysis outcome, the PD solution was drained and catheter was removed, transferring the patient to hemodialysis mode of renal replacement therapy.

OUTCOME AND FOLLOW-UP

The patient's laboratory parameters and symptoms improved after the hemodialysis. The patient was followed up for surgical creation of fistula for future hemodialysis which was continued at the local hospital.

DISCUSSION

Techniques¹ for PD catheter insertion include placement by percutaneous needle-guidewire with or without image guidance, open surgical dissection, peritoneoscopic and laparoscopic implantation^[3]. Irrespective of catheter insertion approach, the placement of catheter entry inside the peritoneal cavity must always be confirmed. The small pelvis below the pelvic brim is the ideal site for catheter tip location, positioning of tip outside of this is considered a malposition of PD catheter, which has been attributed to be contributing to catheter dysfunction. Several² techniques of catheter insertion have been investigated including catheter tip fixation, in order to prevent its migration^[4].

The catheter insertion in this patient was done by open dissection as evidenced by the surgical scar of the vertical paramedian incision (Figure 3). The catheter was located in the pelvis, however, the catheter tip was outside the peritoneal cavity. Despite the unintended location of the dialysis catheter over a period of 4 years of ongoing PD, the patient did not develop perineal or scrotal edema, nor did the dialysate enter into the

abdominal muscle. This could be possible if the catheter entered thorough posterior rectus sheath and transversalis fascia without passing through the peritoneum, thus the catheter tip getting located between the transversalis fascia and peritoneum. Another possible explanation of the position of the catheter tip could be catheter extrusion from its normal position.

PD relies on the use of peritoneum as a semipermeable membrane for the exchange of solutes and water. The host related factors, including peritoneal membrane surface area and peritoneal blood flow influence transcapillary movement of solute and water^[5]. In this case the patient remained sustainable through the PD for a prolonged period due to the residual renal reserves until the limited effective surface area of peritoneum could not support adequate dialysis. The low PD adequacy parameters along with the worsening health condition prompted imaging to detect PD catheter failure. In patients not achieving the minimal delivered clearance goal, it's reasonable to ensure that the PD catheter located within the peritoneal cavity.

CONCLUSION

This is the first case report describing a sustained PD for over four years with a misplaced extra-PD catheter in patient undergoing PD. The unique location of the catheter tip between the peritoneum and transversalis fascia prevented early complication of dialysate migration into the muscle causing edema while allowing filtration through the available peritoneal surface area. To prevent complications of PD it is important to confirm and re-check when necessary the placement of catheter tip inside the peritoneal cavity.

ORIGINALITY REPORT

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SIMILARITY INDEX

PRIMARY SOURCES

1

John H. Crabtree. "Who Should Place Peritoneal Dialysis Catheters?", Peritoneal Dialysis International: Journal of the International Society for Peritoneal Dialysis, 2020

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