CASE REPORT

Acute peritoneal dialysis in a Jehovah's Witness post laparotomy

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SUMMARY

A 56-year-old man who was a Jehovah's Witness with an advanced directive against autologous procedures developed acute kidney injury needing renal replacement therapy while he was intubated and ventilated on the intensive care unit. He was being treated for hyperosmolar hyperglycaemic state. He also had a healing laparotomy wound, having undergone a splenectomy less than a month ago following a road traffic accident. His hyperkalaemia and metabolic acidosis were refractory to medical treatment. As he became oligoanuric, decision was taken to carry out acute peritoneal dialysis (PD) by inserting a Tenckhoff catheter in his abdomen using peritoneoscopic technique. The patient was started on automated PD without any complications. His urine output gradually improved, and his renal function eventually recovered. On discharge from hospital, his renal function was within normal range, and he had no abdominal complications from the acute PD.

BACKGROUND

Acute peritoneal dialysis (PD) is an underutilised modality of renal replacement therapy (RRT) in the context of acute kidney injury (AKI) in the developed world.^{1 2} Currently, in most intensive care units (ICUs) in the developed world, continuous RRT or intermittent haemodialysis are the modalities of choice.³ Also, recent abdominal surgery is a contraindication to PD in most renal units.^{1 3} This case demonstrates that acute PD can be successfully performed in patients despite recent open laparotomy. It also shows that PD can be lifesaving for patients not suitable for or refusing haemodialysis.

CASE PRESENTATION

We present the case of a 56-year-old male Jehovah's Witness who presented to our hospital with a low Glasgow Coma Scale (GCS) and hypotension. On arrival of the paramedics at his house, he was unresponsive with a GCS of 3 and a blood pressure of 69/38 mm Hg. Soon after the arrival of the paramedics, he went into cardiac arrest, and after brief cardiopulmonary resuscitation (CPR), there was return of spontaneous circulation (ROSC). The patient had a background of type 2 diabetes mellitus for which he was on insulin and oral hypoglycaemic agents. His last HBA1C was 100 mmol/mol. He also had an advance directive against autologous procedures including haemodialysis, a copy of which was on him at the time of presentation. Twelve days prior to this admission, he had undergone a laparotomy in another hospital

after suffering a splenic laceration in a road traffic accident. On arrival to our Accident and Emergency Department, the patient was found to have a very high blood glucose level and a pH of 7.024 on an arterial blood gas. He was started on treatment for hyperosmolar hyperglycaemic state. He was also started on the antibiotic meropenem as his admission blood tests revealed a white cell count of $34.2 \times 10^9/L$ and a neutrophil count of $31.8 \times 10^9/L$. His C reactive protein was 63 mg/L. However, no source of infection was found on admission or later during the course of his stay in hospital. His GCS improved to 10, but his blood pressure remained low despite intravenous fluid. He was transferred to our High Dependency Unit for inotropic support. His systolic blood pressure remained low at 65 mm Hg. Later that night, he became bradycardic and suffered a further cardiac arrest. He had three cycles of CPR before ROSC. He was intubated and ventilated on ICU. The cause of the second cardiac arrest remained unclear, and documented differential diagnoses at that stage were possible myocardial event and sepsis. Eventual investigations did not support a cardiac event. On admission, he had Stage 3 AKI with a creatinine of $393 \mu\text{mol/L}$. His baseline creatinine was $64 \mu\text{mol/L}$. On Day 3, he had a creatinine of $476 \mu\text{mol/L}$ and a worsening hyperkalaemia and metabolic acidosis despite medical treatment. There were no documented ECG changes on ICU cardiac monitors. The cause of his worsening renal function was thought to be multifactorial including renal hypoperfusion from the hypotension and bradycardia. On Day 5, he was now oligoanuric with a creatinine of $537 \mu\text{mol/L}$ and a potassium of 6.1 mmol/L . The renal team was asked to review, and decision was taken to perform acute PD for his ongoing biochemical abnormalities. Despite his recent laparotomy, PD was considered his only option for RRT in view of his advance directive against autologous procedures. On examination, his abdomen was soft, and his laparotomy wound was healing. A Tenckhoff catheter was inserted on ICU using the peritoneoscopic method without any complications. He initially had 8 hours of automated peritoneal dialysis (APD) using 1 L fills of 1.36% Dianeal solution and 1 hour dwells. The patient tolerated the PD well, and haemodynamic parameters were stable. His APD was increased to 16 hours per day with 1 L dwells of 1 hour duration each. His urine output gradually improved. His urine output was 80–150 mL per hour on Day 11, which was when he had his last session of PD. The Tenckhoff catheter was removed on Day 12

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when his creatinine was 157 $\mu\text{mol/L}$ and potassium was 4.8 mmol/L. His laparotomy scar had fully healed, and there was no evidence of any abdominal complications from the PD. He eventually made a full recovery, and on discharge from hospital, a month later his creatinine was 56 $\mu\text{mol/L}$.

OUTCOME AND FOLLOW-UP

The patient's renal function recovered fully. On discharge from hospital, his creatinine level was within normal range. He has since moved to a different country.

DISCUSSION

AKI is very common in critical illness and therefore highly prevalent in the ICU setting. The prospective multinational study carried out by Uchino *et al*⁴ revealed that 5–6% of AKI on ICU required RRT, and this figure was consistent across the 23 participating countries. In the developed world, extracorporeal modes of dialysis, namely continuous RRT and intermittent haemodialysis, are the most commonly used forms of RRT in AKI, while acute PD is often overlooked.^{2,3} On the other hand, in the developing world, use of acute PD is more widespread.^{5,6} This is mainly due to its ease of administration, lower cost and technical simplicity. These are important factors in resource-poor areas where reliable power sources, access to clean water and water treatment plants might not be widely available.⁷ PD also carries a low bleeding risk and may be more suitable for some patients in terms of cardiovascular stability.³ Another advantage of PD is the absence of an extracorporeal circuit, which for our case was a key factor in view of our patient's religious beliefs. A survey carried out by Gaiao *et al*² in 2009 at three dialysis conferences in Italy, Canada and Hong Kong provided fascinating insight into the use of PD for AKI in these three continents. Of the responders, 36% considered PD to be appropriate for most cases of AKI on ICU, but interestingly only 16% actually used PD in these situations, with practitioners from Asia being more likely to use this modality of RRT. This discrepancy between opinion and practice is likely to be multifactorial. Causes include limited data on the appropriate dosage of PD and concerns that PD might not be adequate for the hypercatabolic causes of AKI more commonly seen in developed countries.^{8,9} A study by Chitalia *et al*¹⁰ showed that PD does provide adequate solute removal for mild-to-moderate hypercatabolic AKI. Another issue is a lack of exposure to PD, which has led to loss of physicians' familiarity with the technique and decline in the required knowledge to manage the potential complications including access issues.³ It has also been postulated that PD can lead to diaphragmatic splinting leading to higher ventilator pressures in the mechanically ventilated patient.⁷ For our patient, diaphragmatic splinting was not a problem. In addition, our case also confirms the work of Palomar *et al*¹¹ and shows that recent abdominal surgery is not a contraindication for successful acute PD.

Despite the above concerns, there has been a recent renewed interest in acute PD due to encouraging data from some studies. George *et al*¹² demonstrated comparable corrections of hyperkalaemia and haemodynamic disturbance between PD and continuous veno-venous haemodiafiltration for critically ill patients with AKI. A randomised study by Gabriel *et al*¹³ showed similar mortality rates between high-volume PD and intermittent haemodialysis. It also showed that PD was associated with shorter time to renal function recovery. This superior outcome may be partly due to PD causing less inflammation compared to

extracorporeal dialysis modalities as there is no contact between blood and synthetic membranes.^{9,14} However, more data are required to support this theory. In our case, the patient made a full biochemical recovery after 7 days on PD, and he did not suffer any complications from this mode of RRT. Acute PD was a lifesaving procedure for our patient in view of his advance directive against autologous procedure including dialysis.

Learning points

- ▶ The underutilised peritoneal dialysis still has a role in the management of acute kidney injury in our intensive care units where nowadays continuous renal replacement therapy and intermittent haemodialysis are more commonly used.
- ▶ Previous or recent abdominal surgery is a contraindication for peritoneal dialysis in many renal units, but our case shows that this mode of dialysis can still be successful in that context.
- ▶ For patients like Jehovah's Witnesses who can often decline autologous procedures,¹⁵ peritoneal dialysis can be a lifesaving procedure when treating acute kidney injury.

Contributors UDA managed the above patient as a Renal Registrar. The Consultant Renal Physician was HA. HA made the decision to publish the case. UDA wrote the case up, did the literature search and will be the guarantor.

Competing interests None declared.

Patient consent Obtained.

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