Peritoneal Dialysis: The Great Savior During Disasters

KEY WORDS: Renal replacement therapy, disaster medicine.

The choice of peritoneal dialysis (PD) as a renal replacement therapy (RRT) in developing countries is driven by resource and financial considerations. Natural disasters such as earthquakes, floods, tsunamis, and hurricanes cause widespread destruction of health care infrastructure and loss of medical personnel and impose tremendous stress on health care services. The Renal

Disaster Relief Task Force of the International Society of Nephrology and the European Renal Best Practice have made recommendations for the management of kidney injury in disaster situations, including guidelines for dialysis (1). The guidelines seem to favor the use of hemodialysis (HD).

Flash floods devastated Leh, India, in August 2010 (2). More than two hundred people died, and a large number were rendered homeless. The existing health care, telecommunications, and transport infrastructure were extensively damaged. The affected areas remained cut off from the rest of the world for 4 days, till the local airport could be made operational. We describe two patients who were able to be saved with PD while the flood-affected areas had lost contact with rest of the world, and we illustrate some advantages of PD.

CASE DESCRIPTIONS

Case 1: A 30-year-old man with end-stage renal disease had been on continuous ambulatory PD for 7 years. On the fateful night, he stayed up late doing his night exchange. Other members of the family were asleep. As he was finishing, he noticed a sudden gush of water into the room. He immediately woke the other family members and ran to safety with them. It was not until next morning that they realized that their home and everything in the vicinity had been reduced to rubble. Most people in the neighborhood who had been sleeping had perished.

Not only this patient's house, but also his dialysis supplies had been lost. Fortunately, he was able to find a patient on PD in another area who had escaped the catastrophe. He continued PD using borrowed supplies. Being on PD provided an easy RRT option in difficult and unfavorable circumstances. In 2011, this man received a deceased donor renal graft at our center, and he is currently doing well.

Case 2: A 29-year-old Indian Army soldier, whose unit was engaged in relief operations, developed acute gastroenteritis leading to profuse diarrhea. Within 12 hours, he became hypotensive and oliguric. Fluid resuscitation was given in a field hospital. The diarrhea gradually abated, but the oliguria persisted. Over the next 3 days, this man became acidotic and drowsy. Because no HD facilities were available, the treating physician started the soldier on PD using a rigid catheter on a stylet. The patient improved gradually over next 72 hours. Once an air link was established, he was evacuated to our center. On arrival, he was still oliguric, but otherwise stable. He was initiated on hemodialysis, and he made a gradual and complete recovery.

DISCUSSION

Our two cases illustrate the need to improvise in providing RRT during disasters and the important role of PD in settings that are resource-constrained and remote—needs that apply to those with acute kidney injury as well as to those on chronic dialysis. The choice of RRT in these situations is governed primarily by non-medical considerations. Currently, the only option is quick evacuation to an area with functioning HD services, which will overload those facilities. Lack of infrastructure and logistics demand a simple and efficient technique. Expert recommendations support the use of PD only when intermittent HD is not available, when the risk of bleeding is increased with anticoagulation, or when dialysis is required for small children (1).

The flexibility, transportability, and lack of dependence on specialized facilities support an increase in the use of PD in ESRD patients in hurricane-prone areas. In disaster situations, PD patients are at advantage as far as the availability of dialysis is concerned (3). Patients on cycler-assisted PD can shift to manual exchanges if electricity fails. An evaluation of personal disaster preparedness of dialysis patients showed that, compared with HD patients, PD patients were likely to be better prepared (4). Our first patient was able to manage everything on his own, with just a little help from another local patient, till he could be evacuated.

The argument that PD is not as efficacious as HD in managing metabolic abnormalities should not detract from the fact that timely institution of RRT is of utmost importance (5). Given the unpredictable scenarios in disasters, PD is likely to be more feasible until alternative mechanisms are restored or brought in. Sadly, the use of acute PD has declined, and many nephrology residents do not have any experience of the technique (6,7). Our second case highlights how acquisition of a basic skill such as catheter insertion—even by a doctor without formal training in nephrology—can save lives in unexpected and desperate circumstances. There is therefore a need to spread awareness of the role of PD in austere environments. We suggest that, in disasters, initial medical relief supplies should include acute PD catheters and PD fluid so that patients such as the ones described here can receive life-saving RRT.

DISCLOSURES

The authors have no financial conflicts of interest to declare.

Vivek Kumar
Raja Ramachandran
Manish Rathi
Harbir S. Kohli
Vinay Sakhuja
Vivekanand Jha*

Department of Nephrology
Postgraduate Institute of Medical Education and Research
Chandigarh, India

*email: vjha@pginephro.org

REFERENCES

1. Sever MS, Vanholder R on behalf of the RDRTF of ISN Work Group on Recommendations for the Management of Crush Victims in Mass Disasters. Recommendation for the management of crush victims in mass disasters. *Nephrol Dial Transplant* 2012; 27(Suppl 1):i1–67.
2. Ladakh Autonomous Hill Development Council, Leh (LAHDC Leh). *Disaster Management Plan: Leh District*. Leh, India: LAHDC Leh; 2011. [Available online at: http://Leh.nic.in/Disester%20Management%20Leh.pdf; accessed 29 May 2012]
3. Kleinpeter MA. End-stage renal disease use in hurricane-prone areas: should nephrologists increase the utilization of peritoneal dialysis? *Adv Chronic Kidney Dis* 2007; 14:100–4.
4. Foster M, Brice JH, Shofer F, Principe S, Dewalt D, Falk R, *et al*. Personal disaster preparedness of dialysis patients in North Carolina. *Clin J Am Soc Nephrol* 2011; 6:2478–84.
5. Yuan CM, Perkins RM. Renal replacement therapy in austere environments. *Int J Nephrol* 2011; 2011:748053.
6. Chionh CY, Ronco C, Finkelstein FO, Soni SS, Cruz DN. Acute peritoneal dialysis: what is the "adequate" dose for acute kidney injury? *Nephrol Dial Transplant* 2010; 25:3155–60.
7. Ricci Z, Ronco C, D'Amico G, De Felice R, Rossi S, Bolgan I, *et al*. Practice patterns in the management of acute renal failure in the critically ill patient: an international survey. *Nephrol Dial Transplant* 2006; 21:690–6.

doi:10.3747/pdi.2012.00156