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Exploring the option of peritoneal dialysis for patients with a left ventricular assistive device

By Anna Gozdzik

ABSTRACT

Nephrology nurses and healthcare professionals at urban and community hospitals are caring for patients suffering from more medically complex diseases. These patients may include patients on hemodialysis (HD) with a left ventricular assistive device (LVAD). This article will discuss a nursing experience with a patient scenario that has not previously been published, review the literature for LVADs and dialysis, and present peritoneal dialysis (PD) as a safe option for this group of patients. When nephrology nurses advocate for patients, it can be a gateway to stronger partnerships between nephrology and cardiovascular services to achieve improvement in quality of life (QOL) (MacIver & Ross, 2021), decreased costs associated with hospital stays (Guglielmi et al., 2014), and decreased travel time for dialysis (Moist et al., 2008). Furthermore, since PD is a home dialysis modality, a thorough nursing assessment is essential in order to determine if patients and their caregivers are able to cope with this modality of treatment. This article will be useful to nephrology nurses who are discussing dialysis options with patients with complex chronic kidney disease or on dialysis.

Heart failure is one of the top causes of death and hospitalization for the elderly (Dai et al., 2012) and it is often associated with renal dysfunction (Schaubroeck et al., 2020). Nephrology professionals need current evidence when providing care to this group of patients in order to be able to provide information about which modality options for renal replacement therapy are available to this group of patients. Furthermore, when patients present on HD with an LVAD implanted, nurses should be able to explore options such as PD, even if it has not been previously explored. Nurses are in a position to advocate for patients, especially when on daily HD, and when patients inquire about what their dialysis treatments options are.

AUTHOR NOTE

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In a tertiary care centre in Toronto, Ontario, an assessment for patients diagnosed with kidney failure is performed by a nurse, which includes a discussion about modality options for renal replacement therapy for all patients receiving dialysis, as well as nephrology patients preparing for discharge from the hospital. This paper will discuss PD as a safe renal replacement therapy for a 63-year-old patient with cardiorenal syndrome with a tunneled catheter for HD and an LVAD. The patient had an LVAD inserted and post-procedure developed sepsis, clostridium difficile diarrhea and gastro-intestinal bleed among others. The kidney function continued to decline and the patient was initiated on HD in the intensive care unit. Once the patient stabilized, the patient education nurse was consulted to discuss dialysis modality options and a plan for discharge. Due to the lack of experience with PD for patients with LVADs, a review of the literature ensued. The knowledge gained from the review, as well as the experience at an American dialysis centre with patients on dialysis with an LVAD can be used when discussing options with care teams and patients.

LITERATURE REVIEW

Congestive Heart Failure and Left Ventricular Assistive Devices

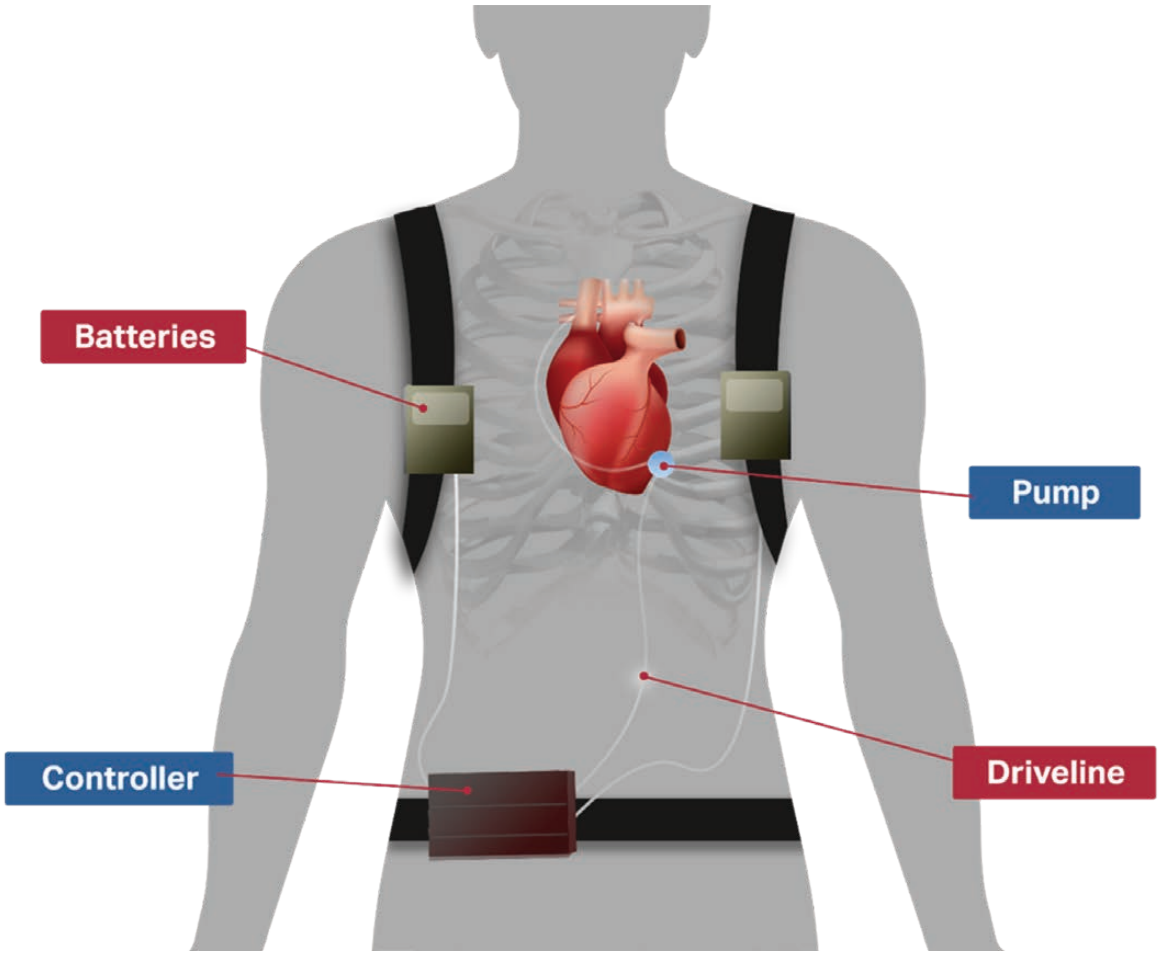
Congestive heart failure is defined as an "inadequate cardiac output when the heart is unable to pump enough blood to meet the metabolic requirements of body tissues" (Bousquet, 1990, p. 35). In some cases, ventricular assistive devices are used for patients who develop refractory heart failure or cardiogenic shock. The function of an LVAD (Figure 1) is to divert oxygenated blood from the left side of the heart from either the atrium or the ventricle to a pump and return it to or near the aorta. An LVAD is used when "mechanical support is needed when medical therapy fails to restore adequate blood pressure or organ perfusion" (Boehmer & Popjes, 2006, p. S269). Due to hypoperfusion, the kidneys are one of the organs at risk of dysfunction or failure and, therefore, are one of the most common reasons to explore mechanical ventricular device support (Boehmer & Popjes, 2006; Bousquet, 1990).

Heart Failure and Dialysis

A review by Shiba and Shimokawa (2011) concluded that heart failure is the leading cause of mortality in developed countries. In Canada, it is estimated that hospital admissions for heart failure cost the country $482 million in 2013 and are projected to increase to $720 million by 2030 (Tran, 2016). Furthermore, there is a prevalence of chronic kidney disease (CKD) in 35-70% of heart failure cases. The co-morbidity

Figure 1

Components of a Left Ventricular Assistive Device



Retrieved from: http://tedrogersheartfunction.ca/treatments/device-therapies/left-ventricular-assist-devices-lvads/

of CKD is associated with increased hospitalization due to worsening heart failure (Shiba & Shimokawa, 2011). There is strong evidence for using PD for patients with diuretic-resistant heart failure, as it provides gentle ultrafiltration. It also allows for draining of ascites secondary to right-sided heart failure. The use of PD has been found to reduce the number of hospitalizations by 55% and the duration of hospitalizations by 84% (Francois et al., 2015).

Dialysis and LVADs

Patients with an LVAD who require ongoing HD are burdened, along with their caregivers, with travel time to receive dialysis. Studies show that there is a negative association between travel time and quality of life for dialysis patients (Moist et al., 2008). Patients with heart failure present with vulnerable hemodynamics and may require daily HD for slower removal of water and solute to allow for adequate time for vascular refilling to avoid hypotension (Puttagunta & Holt, 2015). In order to facilitate a transition home for these patients, a partnership is needed between the LVAD team and HD units (Patel et al., 2013). There are delays with discharges home due to the discomfort of external HD centres to safely dialyze patients with an LVAD (Guglielmi et al., 2014; Patel, Rame, & Rudnick, 2014; Quader et al., 2014). An American study indicated that only 15 out of 281 (5.3%) HD sessions were interrupted or terminated for six patients with an LVAD. The most frequent reason was symptomatic hypotension and three of the episodes were due to sepsis secondary to dialysis catheter-related infection; the remainder resolved with discontinuation of HD, and no further intervention was required. Furthermore, a component of safely dialyzing this group of patients is the requirement for the nursing staff to undergo additional training for monitoring of blood pressure in pulseless patients (Quader et al., 2014).

Extensive literature search reveals that limited published data are available discussing PD for patients with an LVAD. The Canadian Cardiovascular Society (2017) discusses the use of HD for cardiorenal syndrome, but the use of peritoneal dialysis is not discussed. However, more recently, the newer LVADs allow the possibility of implantation in intrapercardial or pre-peritoneal areas, thus allowing PD to be a possible option (Patel et al., 2013). Since the 1980s, heart failure has

been managed with PD to remove fluid for patients who are resistant to diuretic therapy (Bousquet, 1990). It is essential to note that PD provides several advantages for patients with LVADs. Most importantly, there is a reduced risk of bacteremia due to PD catheters, as opposed to percutaneous and tunneled HD catheters (Guglielmi et al., 2014; Thomas et al., 2012). Furthermore, there is an option to insert a PD catheter with conscious sedation and local anesthetic without the need for general anesthesia, as may be required for many advanced laparoscopic PD catheter insertions. Other advantages of PD over HD include: gentle ultrafiltration, chance for renal recovery, preservation of residual renal function for a longer period of time, and the benefit of being able to perform home dialysis therapy for these patients (Thomas et al., 2012). Since patients with an LVAD already have the necessary support systems at home, the transition to PD is easier (Guglielmi et al., 2014). The nursing role is essential to explore the patient's social needs and other issues that allow them to be empowered in making the best decisions to meet their individual needs (Wright & Wilson, 2015). As part of the nursing assessment, exploring the patient's current and future living situation, available family, friends, or community supports, as well as income and access to various transportation options allows for a meaningful discussion about dialysis modality options.

Coping Quality of Life and LVAD Management

It has been previously noted that QOL can be adversely affected in some patients with LVADs. LVADs require a process of adapting to lifestyle changes for patients and designated caregivers (Adams & Wrightson, 2018). On the other hand, a Toronto study found that LVADs significantly improve QOL, but patients do continue to experience some level of emotional distress related to fear and anxiety among others (MacIver & Ross, 2012). In a qualitative study by Sandau et al. (2014) of patients with an LVAD, an improvement in heart failure symptoms was reported, but patients expressed that routine tasks now required planning. Participants were aware that they needed to modify their activities of daily living and move slowly while completing them.

COST AND RESOURCES

At our tertiary care centre in Toronto, Ontario, there is a history of providing care for patients who have an LVAD and are on HD. Discharges from inpatient care for this group of patients require collaboration among leadership teams from several specialties, and can be resource-intensive. There are additional discharge challenges for patients living outside of the urban setting. Discharge to home is often delayed because the most accepting regional dialysis centres and community hospital dialysis units are required to assemble and then send a team of key individuals to Toronto for training with the HD and LVAD nurse educators. These types of training sessions are at a cost to the accepting dialysis unit. There are usually delays in scheduling these education sessions and, as a result, the patient's hospital stay is extended (Guglielmi et al., 2014). This comes at an average cost of $1,492 CAD per day at a teaching hospital (Canadian Institute for Health Information, 2016).

An alternative to this resource-intensive discharge process is to convert these patients to PD while they are in hospital. This requires collaboration between the nephrology and cardiovascular service in terms of timelines and assessment for candidacy. Additionally, of importance, the cost of conventional outpatient HD is approximately $60,000 CAD per patient per year (The Kidney Foundation of Canada, 2012) or more recently in Manitoba found to have an annual maintenance cost of $64,214, whereas the cost of PD is approximately $38,658 (Beaudry et al., 2018). Furthermore, patients describe the LVAD post-discharge protocol that requires a 24-hour a day caregiver to be present for one month as an intrusion into their family dynamics and responsibilities (Guglielmi et al., 2014).

NURSING ASSESSMENT AND INTERVENTION

A comprehensive nursing assessment is an instrumental component for a patient successfully transitioning to a home-based modality, such as PD, by using a variety of techniques and methods. The shared decision-making model (Murray et al., 2013; RNAO, 2009) gives structure to a patient assessment. During the assessment, there is a need to set aside time to explore patients' lifestyle, goals, values, and experiences (Lecouf et al., 2013; Sondrup et al., 2011; Watson, 2008; Watson, 2013) and how the current situation is impacted by their medical treatments. Another strategy is to use motivational interviewing techniques, such as building rapport, conveying empathy, and determining the patient's readiness (Elwyn et al., 2014). Following the assessment, nurses can use a variety of strategies to educate patients about their dialysis modality options while providing continued support (Lecouf et al., 2013; Murphy & Byrne, 2010). These strategies allow patients to make an informed decision.

At our centre, a nurse with a patient education focus (previously published by Watson, 2013) explores dialysis options available to patients. The option of PD is desirable for this patient population as there is assistance of home care in Ontario and additional support to manage the PD (Oliver et al., 2007; Quinn et al., 2007) while patients are concurrently managing the LVAD. These services are essential for this group of patients and caregivers who are already burdened with managing an LVAD. At our centre in Toronto, Ontario, family members learn LVAD care and troubleshooting and need to be with the patient at all times for at least four weeks following discharge, after which some independence is given to patients if parameters such as exercise tolerance has improved and there are no LVAD alarms.

NURSING EXPERIENCE WITH CASE

A referral was received for a patient in his sixties with a history of ischemic cardiomyopathy, atrial fibrillation, and an anterior myocardial infarction. He has an LVAD implanted for progressive heart failure and during admission developed an acute kidney injury secondary to cardiogenic shock and was dialysis dependent. He lived in a remote part of the province

on his own and was retired. He had supportive children. His drive to the local hemodialysis unit would have been more than one hour.

The nurse used several sessions that included one-on-one education, peer support from The Kidney Foundation of Canada Kidney Connect program, and a tour of the PD unit for the patient under review in this paper. These strategies are all standard practice for patients who are newly started on dialysis at our tertiary care centre where patient was admitted. The patient was living independently prior to admission in rural Ontario and the plan following discharge was for patient to move in with one of his children for additional support. The challenges identified included the need for patient to travel to the local HD unit and to have family available to provide transportation. Following these education sessions, the patient expressed interest in switching to PD to allow flexibility in his lifestyle. The utilization of PD for the patient with an LVAD was supported by evidence presented at the 2016 Annual Dialysis Conference of other centres following this practice, as well the recommendation to have a PD champion for this particular patient (N. Colobong Smith, personal communication, March 25, 2016). This decision was also informed by published successful experiences with a patient with an LVAD by the teams at the University of Washington Medical Center in Seattle, Washington (Thomas et al., 2012) and Christ Medical Center in Oak Lawn, Illinois (Guglielmi et al., 2014).

Historically, the default for this group of patients would have been for the nephrology team to facilitate a discharge to a local HD centre. The option of PD would not have been a consideration. The nurse involved in the patient's case advocated on behalf of the patient to the nephrology team to explore the option of PD for this patient to meet his goals of care and values. In consultation with the cardiovascular surgical team, a collaborative decision was made to transition the patient to PD. The nurse facilitated the plan to proceed with a percutaneous PD catheter insertion by a nephrologist, as described by Abreu (2015). Once the PD catheter was ready for use, the patient underwent one-on-one training in order to facilitate discharge home on PD with home care support.

IMPLICATIONS FOR PRACTICE

Due to the lack of publications, this successful experience in a tertiary care centre in Toronto, Ontario, can provide the foundation for other nephrology programs in Canada to publish their experience with this group of patients to add to the body of knowledge. A special consideration should be given to all patients with LVADs who are on HD or need to start dialysis to offer them the option of PD modality if there are no contraindications. What enables this to happen is a strong collaboration between the cardiovascular and nephrology teams. The presence of a PD champion for LVAD has anecdotally been found to be important (N. Colobong Smith, personal communication, March 25, 2016). The nursing assessment and advocacy is crucial for this collaboration to be effective. A nursing role that can provide consistent coverage to consulting nephrology team is crucial as covering staff may change. This successful experience at our centre has provided further support in offering the option of PD to other patients with LVADs. Since this case, two more patients with LVADs have been successfully transitioned to PD. This experience has laid the foundation for developing further research to analyze outcomes for patient with LVADs and PD. Exploration of renal recovery, types of PD modality, peritonitis rates, as well as QOL scores, would add to the body of literature for this group of patients.

CONCLUSION

In conclusion, patients with heart failure or LVADs are at risk of hypoperfusion to their kidneys and, consequently, becoming dialysis-dependent. Traditionally, HD is initiated acutely for this group of patients, but as the above-mentioned experience has shown, PD is a safe alternative for this group of patients if there are no contraindications. Nurses are ideally positioned to advocate and collaborate with multiple teams when working with these complex patients to guide them in the decision-making process for choosing dialysis modality. The knowledge gained from this experience and literature review gives nurses the tools to assess patients for PD, provide education, and advocate on their behalf to the medical team to consider this is an alternative modality.

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