

Peritoneal Dialysis for Delayed Graft Function After Kidney Transplantation: To Do or Not to Do?



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In a follow-up to the recently published study, Gardezi *et al.*¹ provide insight on the immediate and long-term outcomes of kidney transplant recipients who were continued on peritoneal dialysis (PD) for delayed graft function (DGF) compared with those who were continued on hemodialysis (HD) or converted to HD from PD. The literature on this topic remains very scarce, as it derives primarily from pediatric transplant populations and other retrospective single-center small studies. Moreover, most of the available literature on this subject is from a different era of immunosuppression. Notably, there are no prospective randomized controlled trials to examine the feasibility of PD in kidney transplant recipients and evaluate renal allograft outcomes. The novelty of this study is that it did include not only immediate DGF outcomes such as the length of hospital stay and

the duration of DGF but also long-term allograft outcomes including the incidence of post-transplant infections and rejections. Clinical implications of the results include the reassurance to kidney transplant providers about the feasibility of PD posttransplantation for DGF. Avoiding the placement of a central venous catheter for HD and its related complications is the most relevant.

The incidence of DGF, defined as the need for renal replacement therapy within the first week posttransplantation, is increasingly common. Despite the heterogeneity of reported data based on the differences of practices and the threshold to dialyze the recipient posttransplantation among different transplant centers, the prevalence of DGF currently exceeds 25%.² DGF occurs predominantly in deceased donor kidney transplants due to the ischemic injury that occurs before and after organ procurement and reperfusion injury intraoperatively after vascular anastomosis and other relevant recipients' factors.³ The increasing shortage of organs led to

higher utilization of high expanded criteria of deceased donors or high Kidney Donor Profile Index kidneys associated with increased risk of DGF. A new change in the kidney allocation system to distribute kidneys first within a 250-nautical mile circle centered on the donor hospital will go into effect soon.³ This new allocation system is widely predicted to increase DGF rates by shipping more kidneys greater distances and thereby increasing cold ischemia time. Furthermore, it is predicted that the use of PD will continue to increase steadily in the United States due to increased incentives for nephrologists toward the use of home dialysis therapies in addition to the presidential executive order in 2019 recognizing home dialysis modalities (including PD) as well as kidney transplantation as the preferred modes of renal replacement therapy. For that reason, transplant specialists will be increasingly faced with decisions regarding how to manage PD patients who receive a kidney transplant. Moreover, those practitioners will also be faced with decisions regarding the timing of removal of the PD catheter and its care along with the feasibility of PD for DGF post kidney transplantation.

In the study of Gardezi *et al.*,¹ the conversion rate from PD to HD posttransplantation immediately for DGF was, as anticipated, very high at 68% (34 of 50 patients). The authors provided the most common reasons for that conversion: surgeons' preference and the removal of the PD catheter during surgery in 68% (23/34) of the cases. This study highlights the importance of a multidisciplinary team approach by involving the transplant nephrologist early in the peritransplant

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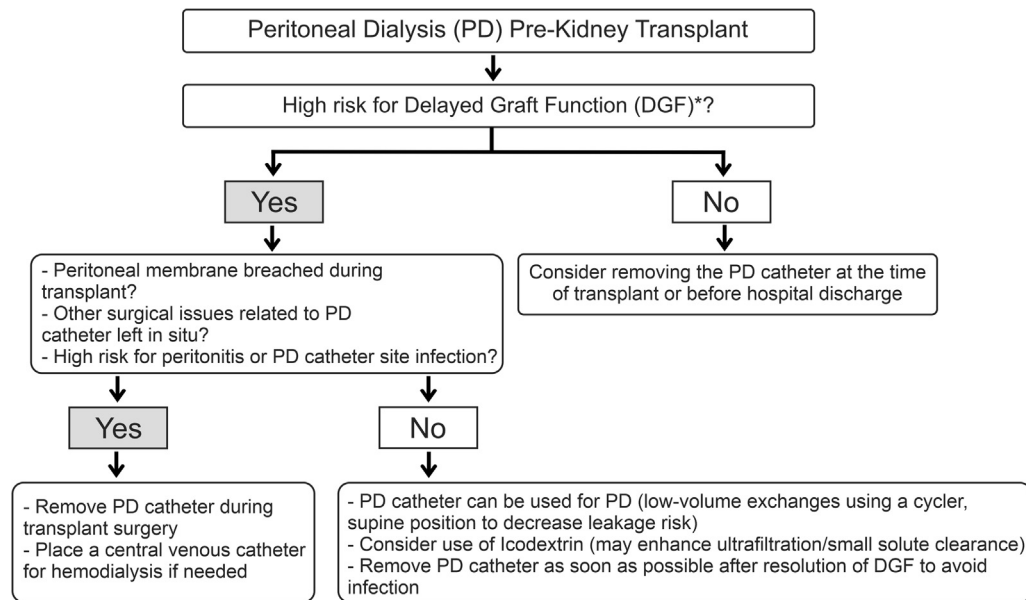


Figure 1. A proposed flowchart diagram for the management of peritoneal dialysis (PD) patients post kidney transplantation. The current study by Gardezi *et al.*¹ suggests, when carefully managed (e.g., low supine volumes, cycler use), PD can be performed in patients who experience delayed graft function post kidney transplantation with no significant difference in short- and long-term recipient and allograft outcomes compared with patients converted from PD to hemodialysis (HD) or those continued on HD. *High Kidney Donor Profile Index deceased donor \pm long cold ischemia time \pm recipients' factors (among others): obesity, diabetes mellitus, prior allo-sensitization, longer dialysis vintage, and prolonged waiting time.

period. The transplant nephrologist can help decide whether to remove the PD catheter and the feasibility of performing PD post-transplantation, especially if it is not just related to a technical or surgical cause. Indisputably, the decision to remove the PD catheter intraoperatively should be reserved in the first place to the transplant surgeon, especially if the peritoneal membrane was breached intraoperatively or if there was any surgical issue related to contamination with keeping the indwelling PD catheter in situ. Recognizing this issue of high conversion rates from PD to HD in the setting of DGF, the authors¹ further analyzed the cohort of patients on PD pretransplant and who were switched to HD and showed no difference in the duration of DGF along with no significant difference in death-censored graft survival.

The abundance of published data to date regarding the high incidence of posttransplant

infectious complications related to the retention of the PD catheter remains a significant concern. However, this is still a matter of controversy, as divergent conclusions have been drawn from previous studies regarding the increased risk of infection with performing PD post-transplantation.⁴ It is also important to note that those studies were primarily performed in a different era of immunosuppression that could also impact infection rates. Bakir *et al.*⁵ found that the incidence of posttransplant peritonitis was up to 13%. The authors⁵ found that the risk factors for peritonitis were more than 2 acute rejection episodes, previous history of peritonitis, and PD catheter exit site infections, technical issues during transplantation including accidental visceral injury or urinary leak, and primary renal allograft nonfunction. On the other hand, Andretta *et al.*⁶ and Yan *et al.*⁷ reported a relatively low risk of peritonitis with performing

PD posttransplantation. However, the current study by Gardezi *et al.*¹ is somehow at odds with those previously published studies reporting a lower rate of peritonitis of 6.25% during DGF. Regarding their finding of lower peritonitis rates, Gardezi *et al.*¹ make an important observation. They used strict patient selection for PD posttransplantation by avoiding performing it in patients with suspected surgical breach of the peritoneum. Moreover, they used low-volume supine exchanges not exceeding 1 liter, using a cycler and avoided continuous ambulatory PD. The latter may cause increase in intra-abdominal pressure with potential incision site leaks.

Gardezi *et al.*¹ offer a reassuring landscape to expand the use of PD in the right host for DGF post-transplantation. Although fill volumes may remain a limitation in the early surgical period post-transplantation, PD prescription can certainly be tweaked, and clearance may be enhanced with

icodextrin. Compared with dextrose-based peritoneal dialysates, icodextrin use may have some advantages. It does not only improve ultrafiltration and small solute clearance, but it can also help lower the risk for hyperglycemia, especially with the use of high-dose corticosteroids early posttransplantation. Undoubtedly, some patients will regardless need to be converted to HD (e.g., in case of life-threatening hyperkalemia). Increasing the utilization of PD for DGF posttransplantation helps avoid the placement of a central venous catheter and any complications thereof.

The high complication rates described in previously published studies about kidney transplant recipients requiring PD immediately posttransplant raise a critical concern.⁴ In those studies, long-term patient and allograft outcomes may have been compromised by the use of PD. Thomson *et al.*⁸ retrospectively found comparable outcomes of kidney function at 1, 6, and 12 months, allograft and recipient survival of 77 kidney transplant recipients who had DGF, including 14 patients on PD and 63 patients on HD. In another retrospective analysis, Marek *et al.*⁹ showed that longer time spent on dialysis, but not the dialysis modality per se, was predictive of lower creatinine clearance at 1-year posttransplant. As part of the study and unlike those previously published studies, Gardezi *et al.*¹ further examined longer-term outcomes (mean follow-up of 27.8 ± 15.4 months). In their analysis, they did not find a difference in acute rejection episodes at various periods posttransplantation, and graft function at last follow-up

along with death-censored graft failure. One must recognize the limitations of these data (retrospective, single center, and a low number of subjects) that the authors acknowledged. However, those findings may serve as a stimulus for the design of larger studies and clinical trials to address long-term graft and recipient outcomes with different dialysis modalities used posttransplantation for DGF.

In conclusion, and in a broader sense, the results of Gardezi *et al.*¹ emphasize the need for a more precise approach on how to manage patients on PD post kidney transplantation, specifically those patients who are predicted to experience DGF. There are currently no evidence-based guidelines for selecting appropriate candidates for the continuation of PD or PD catheter removal at the time of transplantation. Those decisions are governed by several considerations that are primarily surgically driven. One should also consider the risks of placing a central venous catheter for HD at the time of transplantation, especially in the setting of heavy immunosuppression and the infectious and bleeding risks inherent to the placement of such catheters. We propose leaving the PD catheter in situ when surgically feasible in patients who did not have the peritoneum cavity breached during transplant surgery and who are predicted to have DGF and performing low-volume supine PD using aycler if dialysis is deemed to be needed (Figure 1). Further prospective studies are warranted to better determine the optimal management of PD posttransplantation.

DISCLOSURE

The authors declared no competing interests.

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