

# Anesthesia for Kidney and Pancreas Transplantation

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## KEYWORDS

- Anesthesia for organ transplant • Kidney transplantation • Pancreas transplantation
- Perioperative management of dialysis • Perioperative management of kidney failure
- Fluid management for organ transplant

## KEY POINTS

- There is a high prevalence of cardiovascular disease in the population of patients receiving kidney or pancreas transplants, mandating appropriate vigilance and perioperative screening to limit the risk of major adverse cardiac events during transplant.
- In general, routine dialysis is not necessary immediately before kidney transplant. However, patients with significant volume overload or electrolyte disturbances should be dialyzed before transplant to avoid perioperative complications.
- Graft perfusion is of critical importance during abdominal organ transplant. Particular attention should be paid to fluid management to ensure adequate cardiac output. In the case of renal transplant, balanced crystalloids are the preferred resuscitation fluid.
- Use of vasoactive drugs during transplant is associated with poor outcomes. However, the anesthesiologist must ensure adequate graft perfusion before withholding vasoactive agents.
- Simultaneous kidney and pancreas transplant procedures are associated with better outcomes than isolated kidney or isolated pancreas transplants. However, organ availability is low, thus alternative transplantation approaches are often performed.

## INTRODUCTION

Transplantation is often the most effective treatment of end-stage organ dysfunction. End-stage renal disease (ESRD) is relatively common and can be managed for many years with hemodialysis. Thus, a large number of patients are potentially eligible for transplant. Accordingly, kidney transplantation is the most commonly performed solid organ transplant and is occasionally performed simultaneously with pancreas

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transplantation due to shared underlying pathophysiology. Like other organs, the demand for kidney and pancreas transplants outpaces supply, and a complex process is necessary to ensure appropriate resource utilization. In the United States, this process is governed by the Organ Procurement Transplant Network (OPTN), which uses the nonprofit United Network for Organ Sharing (UNOS) to coordinate nationwide organ allocation. UNOS works closely with local organ procurement organizations to match donor organs with regionally appropriate recipients. Once a match is found, time becomes a constraining factor, which is an important consideration in perioperative management of the transplantation process. This article outlines the anesthetic approach to adult kidney and pancreas transplantation procedures with an emphasis on modern perioperative practice.

## **RENAL TRANSPLANTATION**

### ***Epidemiology***

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According to the OPTN, more than 400,000 kidney transplants have been performed in the United States following the first successful attempt in 1954, with just over 19,000 completed in 2016. Of these, approximately 70% came from deceased donors. There are currently approximately 100,000 patients on the United States waiting list; approximately 5000 patients die each year awaiting transplant. Although the overall number of patients listed has actually slowly decreased from 2005, the number of candidates who have completed work-up and are actively listed has continued to climb, as has the total waiting time, percentage of patients on dialysis, and percentage of elderly patients on the waitlist. Ultimately, these factors reflect a progressively worsening mismatch of supply and demand.<sup>1</sup>

### ***Eligibility for Transplant***

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For all patients with ESRD, transplantation is the treatment of choice. Diabetes, chronic glomerulonephritis, and polycystic kidney disease are the most common indications, though hypertensive nephrosclerosis is the most common in blacks. Additionally, retransplant following graft failure is an occasional reason for placing a patient on the transplant waiting list. Typically, the glomerular filtration rate must progressively deteriorate without expected improvement to less than 20 mL/min/1.73 m<sup>2</sup> until transplant is considered necessary.<sup>2,3</sup>

Absolute contraindications to transplant include active infection, active malignancy, active substance abuse, reversible renal failure, uncontrolled psychiatric disease and/or treatment nonadherence, and short life expectancy. Relative contraindications include systemic conditions associated with poor graft and patient survival, such as some autoimmune diseases (eg, systemic lupus erythematosus) and cardiac amyloidosis. To this end, patients are screened before transplant with age-appropriate oncologic screens, imaging examinations, laboratory studies to evaluate end-organ function, and laboratory analysis of potential viral infections. Particular attention is paid to human leukocyte antigen typing and reactive antibody assays to reduce risk of graft rejection. Typically, this work-up is performed well in advance of the perioperative period.<sup>4</sup>

### ***Preoperative Evaluation***

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Patients awaiting kidney transplant generally have a variety of comorbidities that warrant consideration perioperatively. Of particular importance to the anesthesiologist, there is a high prevalence of cardiovascular disease in the renal failure population; cardiac complications are the most frequent cause of death following kidney transplant.<sup>5</sup>

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