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Anesthesia for renal transplantation in a 21-year-old patient with a 65-year-old maternal donor: Anesthetic management of renal size discrepancy

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Abstract

We report the case of a 21-year-old patient with end-stage chronic kidney disease on peritoneal dialysis since 2020 who underwent renal transplantation from a living donor, his 65-year-old mother. The patient had a prior surgery for posterior ureteral valve in 2006 and a history of hypertension; he was hemodynamically and respiratory stable preoperatively. The transplant utilized the mother's left kidney graft, with a cold ischemia time of 3 hours and 20 minutes, and vascular adjustments due to size mismatch between donor and recipient vessels. Anesthesia was conducted according to standard protocols with induction using fentanyl, propofol, and curare, and maintenance with sevoflurane. No major intraoperative incidents were noted. Postoperatively, the patient was extubated without complications and received effective multimodal analgesia. Clinical follow-up showed favorable evolution with optimal pain control and good recovery.

Keywords: Renal transplantation; Anesthesia; Living donor; Cold ischemia; Multimodal analgesia.

Introduction

Living donor renal transplantation is a preferred therapeutic option for patients with end-stage renal disease. However, it presents anesthetic challenges, particularly when significant anatomical differences exist between donor and recipient. This clinical case illustrates the anesthetic management of a young patient with chronic renal failure receiving a graft from his 65-year-old mother, highlighting the complexity related to renal and vascular size discrepancy during transplantation.

Methodology

This is a case report conducted in the central operating room of Ibn Rochd University Hospital Center in Casablanca in March 2025. It is based on detailed observation and analysis of the anesthetic and perioperative management of a 21-year-old patient undergoing renal transplantation from a living related do-

nor, his mother aged 65. Data were collected from the patient's medical records, including operative reports, intraoperative hemodynamic parameters, ventilation and analgesia modalities, and immediate postoperative course. Specific transplantation aspects such as graft characteristics, management of cold and warm ischemia times, and vascular anastomosis adjustments were analyzed. Postoperative monitoring and nephrology follow-up were also considered to evaluate patient recovery and pain management.

Results

The patient, a 21-year-old single economics student, had a history of end-stage chronic renal failure treated by peritoneal dialysis since 2020, and previous surgery for posterior ureteral valve in 2006. Preoperatively, he was hemodynamically stable with preserved diuresis. Preoperative investigations (ECG,

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echocardiography, chest X-ray) were normal. Laboratory tests showed: Hb 11 g/dL, Na⁺ 133 mmol/L, K⁺ 5 mmol/L, Ca²⁺ 96 mg/dL, Phosphorus 77 mg/dL, Albumin 42 g/L, and normal coagulation profile. Intraoperative monitoring included ECG, SpO₂, temperature, and invasive blood pressure. Anesthesia induction was performed with 300 mcg fentanyl, 200 mg propofol, and 50 mg curare, with maintenance by sevoflurane and boluses of fentanyl and curare as needed according to anesthetic depth. No significant bleeding or hemodynamic instability occurred. The graft originated from the patient's mother (65 years old), with semi-identical HLA matching. The organ was procured from the left kidney. The left renal artery bifurcated into two branches. Implantation was performed in the right iliac fossa, with arterial anastomosis to the external iliac artery and venous anastomosis to the external iliac vein. Cold ischemia time was 3 hours 20 minutes; arterial clamping began at 12:25, kidney removal also at 12:25, and graft preparation lasted one hour. The kidney was preserved in conservation solution at 13:30, removed at 15:18 for the first time, then surgery was delayed awaiting the cardiovascular surgeon until 15:45. Size discrepancy between donor and recipient vessels necessitated vascular adjustments, which had not been identified preoperatively. Warm ischemia time was 45 minutes. Venous and arterial anastomoses durations were 23 minutes and 18 minutes, respectively.

Postoperatively, the patient was extubated in the recovery room and transferred to nephrology for close monitoring. Analgesia was ensured via a parietal catheter with continuous bupivacaine infusion. The patient remained stable clinically, with well-controlled pain assessed by visual analogue scale (VAS). Surgical drains showed minimal blood output.

Discussion

Renal transplantation is a common yet complex procedure that presents significant challenges both surgically and anesthesiologically. Anesthesia for kidney transplantation requires thorough evaluation, particularly due to risks associated with ischemia management and anatomical differences between donor and recipient. In this particular case, the patient was hemody-

namically and respiratorily stable preoperatively, allowing for a standard anesthetic induction using fentanyl, propofol, and muscle relaxant. The induction proceeded smoothly, in accordance with current recommendations for this type of surgery [1,2]. A key aspect of this transplantation was the living donor—the patient's mother—whose anatomical characteristics, notably the kidney size and vascular discrepancies, necessitated specific adjustments during vascular anastomoses. Literature emphasizes that careful dissection of the donor renal arteries is essential, and vascular anomalies may prolong the warm ischemia time, as observed in this case [3,4]. The cold ischemia time of 3 hours and 20 minutes was within the acceptable range to preserve graft function; however, the prolonged warm ischemia time of 45 minutes represents a risk factor for renal injury. This risk was mitigated through meticulous anastomotic technique and close postoperative monitoring [5]. Pain management was also a central element of anesthetic care. Multimodal analgesia, including the use of continuous parietal bupivacaine infusion via catheter, provided effective postoperative pain control, reducing opioid consumption and improving recovery [6,7]. This approach is supported by the literature as optimal for postoperative recovery in renal transplant patients, minimizing opioid-related side effects [8]. Regarding immunosuppressive management, the patient received a standard regimen including Solu-Medrol, Simulect, Prograf, and other agents. Current immunosuppression protocols after kidney transplantation are well established, and strict monitoring is necessary to prevent rejection-related complications [9,10]. It is worth noting that despite minor technical challenges related to the recipient's vessel size, the patient had a stable postoperative course. This underscores the importance of rigorous hemodynamic and vascular management, consistent with literature that stresses the need for optimal preoperative preparation as well as intra- and postoperative care to ensure favorable outcomes following kidney transplantation [2,3,6].

Conclusion

This case highlights the importance of meticulous preparation and anesthetic management tailored to the patient's anatomical and vascular particularities. Kidney transplantation from a living donor can be successfully performed when all variables—including vessel size and ischemia management—are carefully considered. Strict postoperative surveillance and multimodal analgesia are essential to ensure a complication-free recovery and optimal graft function.

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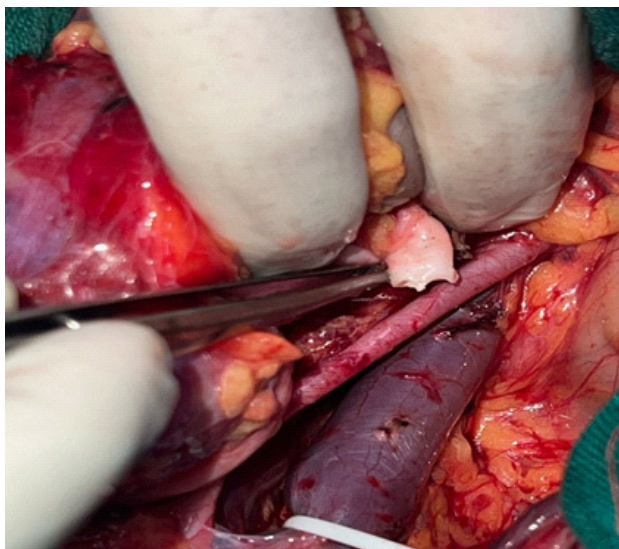


Figure 1: Perioperative exposure of the renal pedicle prior to renal graft implantation.

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