

An Anaesthetic Challenge: Perioperative Management of Renal Transplant Recipient Undergoing total Hip Replacement Surgery

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Abstract: *A transplant recipient trades in a life - threatening illness for a chronically immuno - suppressed state. Further anaesthetic management for non - transplant surgical procedures, thus, proves to be a challenge. This case report reviews the perioperative management of an allogenic renal transplant recipient for total hip replacement surgery and aims to highlight the salient features of post - renal transplant anaesthesia.*

Keywords: Renal Transplant, Post - Transplant Anaesthesia, Non - Transplant Surgery

1. Introduction

As a result of well - established surgical techniques and effective immunosuppressive therapy, the rate of renal transplantation and survival post - transplant has considerably improved. This has resulted in an increased incidence renal transplant recipients presenting for elective or emergency non - transplant surgeries (1, 2). Therefore, it is of importance for all anaesthesiologists to be familiar with the perioperative challenges associated with renal transplantation.

Avascular necrosis of the femoral head creates considerable morbidity in renal transplant recipients who are generally young and expect active lifestyles. Surgery for total hip replacement is considered the treatment of choice in these patients, though it poses an increase in the risk of infection and graft related complications (3).

Here we present the case of middle - aged man, the recipient of an allogenic renal transplant 5 years ago, with complaints of difficulty in walking and pain in bilateral hips. He was diagnosed with bilateral a vascular necrosis of hip joint and was posted for right total hip replacement.

This case report outlines the need for obtaining a detailed medical and drug history, performing pertinent investigations, as well as the challenges faced in perioperative management. We also place a special emphasis on the need for a multi - disciplinary approach to case management for optimal patient outcome.

2. Case Report

The patient was a 41 - year - old male, driver by occupation. He was diagnosed with chronic kidney disease as a result of reflux nephropathy 8 years ago, after which he was put on haemodialysis for two years. He underwent a living related donor renal transplant 5 years ago at our centre. A year later, he was diagnosed with graft dysfunction with progressively worsening renal functions since then. Other relevant details

included a history of hypertension, an ICU admission for covid pneumonia requiring NIV - CPAP support a year ago, and signs suggestive of obstructive sleep apnoea. The patient was on a standard immunosuppressive regimen including tablets Tacrolimus and Mycophenolate Mofetil, and anti - hypertensive agents tablets Amlodipine and Atenolol.

Physical examination was found to be normal, with a BMI of 23.1kg/m². Preoperative laboratory values were significant for a haemoglobin of 7.6gm/dl, and serum creatinine of 3.6mg/dl. Room air arterial blood gases were within normal limits with a saturation of 98%. Serum tacrolimus levels were also noted to be within normal limits. Echocardiography revealed severe concentric left ventricular hypertrophy, with an ejection fraction of 60%.

A multi - disciplinary approach was adopted for risk stratification and optimisation, which included representation from Anaesthesiology, Nephrology, Cardiology, Pulmonology and Orthopaedic specialties, and a comprehensive plan for perioperative management was decided upon. The importance of perioperative fluid management to minimise disruption of blood flow to transplanted kidney was highlighted. The need for intra - operative blood transfusion to maintain intravascular volume was anticipated and to that effect, leukocyte filters were kept ready, and packed red cells were cross - matched and subsequently irradiated to prevent alloimmunisation. A higher threshold for blood transfusion was maintained to prevent transfusion induced worsening of graft function.

On the morning of surgery, a repeat serum creatinine and electrolyte panel was obtained, all immune - suppressive and anti - hypertensive agents were continued. Patient was allowed water up to two hours prior to procedure in keeping with the ERAS guidelines.

Patient handling, and drug loading and administration were performed under strict aseptic protocols to decrease the chances of iatrogenic infections. Induction agents and muscle relaxants were judiciously used to compensate for their decreased metabolism and excretion. Patient was

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administered balanced general with endotracheal intubation and mechanical ventilation. Intubation was performed by a senior anaesthesiologist using a c - mac video laryngoscope. Anaesthesia was maintained with Oxygen and Nitrous (1: 1 ratio), desflurane and intermittent muscle relaxation with Injection Atracurium. Intra operatively the mean arterial pressure (MAP) above 70mm Hg. Crystalloid infusion was restricted to 2 litres and bolus injections of 0.5% injection albumin were supplemented to maintain MAP as needed. Estimated blood loss during the surgery was 350ml and hence intraoperative blood transfusion was deferred. Intra - operative urine output was carefully monitored and was measured to be 300ml at the end of surgery. Pain relief was provided by local anaesthetic infiltration of surgical site and intravenous analgesia with injection paracetamol. Patient was reversed with a combination of injection neostigmine and glycopyrrolate and extubated uneventfully post procedure.

Immediate post - operative lab investigations revealed a Haemoglobin of 7.1gm/dl, serum creatinine of 3.7mg/dl and normal serum electrolytes. Patient was monitored in the recovery area before being shifted to Nephrology ICU for further management. Frequent wound checks and dressings were done to monitor wound healing and prevent infection.

3. Discussion

Perioperative anaesthetic management in most renal recipients is similar to the standard practice for any patient. However, we must bear in mind some essential considerations: problems of allograft dysfunction, the adverse effects of immunosuppression and its interaction with anaesthetic drugs, the risk of infection, and the potential for organ rejection. When transplant recipients require non-transplant surgery, immune competence can be altered from the stress of surgery, acute illness, or disruption of the regimen by inexperienced providers (4). A comprehensive preoperative evaluation by the anaesthesiologist should include: evaluation of the graft function, presence of infection, function of other organ systems, the presence of concomitant diseases as well as the preoperative functional status. Information and medical history should be gathered from the medical records, interview with the patient and family members.

Chronic immunosuppressive therapy has its adverse effects such as lowered seizure threshold, diabetes, hypertension, hyperlipoproteinemia, decreased glomerular filtration, hyperkalaemia, hypomagnesemia, increased risk of infection and tumours, pancytopenia, osteoporosis, and poor wound healing. The blood level of tacrolimus must be kept within the indicated therapeutic range to get the desired effect. The perioperative fluctuation of the plasma level of these two drugs should be strictly monitored. There is a significant reduction of drug blood level by dilution with volume infusion and therefore many of the drugs administered perioperatively can affect its plasma levels (5, 6).

During anaesthesia, we administer a range of drugs from different groups, which increase the possibility of drug interaction and thus potentially endanger the patient in the perioperative period. Most of the inhalational agents are well

tolerated unless there is a significant heart failure. Most of relaxants can be used safely, though prolonged neuromuscular blockade has been described. Atracurium and cis - atracurium are preferred agents because their elimination is not affected by renal or hepatic function. Bupivacaine and ropivacaine can be safely used through regional routes without any side effects (7, 8).

There is no ideal anaesthetic plan that can be used for all transplant recipients undergoing nontransplant surgery. A variety of anaesthetic techniques have been successfully used in patients with a transplant history including general, neuraxial, and regional anaesthesia.

The increasing prevalence of previously transplanted patients makes it likely that every anaesthesiologist will care for renal transplant recipients, either for accidental or transplant - related surgery in the future. Local, regional, or general anaesthesia can be safely delivered to transplant recipients and a successful anaesthetic and perioperative management can be provided. Many of the perioperative problems in the transplant population have not been specifically studied, and there are no formal recommendations for their management. Additional research should be performed in order to identify perioperative issues and facilitate the formulation of guidelines for anaesthesia in renal transplant recipients.

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