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Case Report

# Anesthetic Management of a Patient Undergoing Robotic Assisted Renal Transplant

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**Abstract**

A 29 years old female patient weighing 40kgs with known case of Systemic Lupus Erythematosus for the last 15 years with recent development of membranous nephropathy with end stage renal disease was scheduled for living related allograft robotic assisted left renal transplant. We highlighted the anesthetic management involved in performing robotic assisted renal transplant (RAT) at our institute.

**Keywords:** Robotic; Renal transplant; Anesthetic; Systemic lupus erythematosus

## Introduction

Urology has been in forefront for performing robot assisted techniques in prostatectomy, cystectomy and nephron sparing surgery. Robotic assistance for renal transplant is a new technique and gives dexterity in fine movements required for the complex anastomosis of renal transplant without the need of opening the abdomen [1,2]. This leads to less surgical morbidity and decrease in hospital stay with similar patient and graft survival [2]. However to deliver anesthesia in such surgeries is a new challenge and these test the very skills of an anaesthetist.

Here we highlight the anesthetic management involved inperforming the maiden robotic assisted renal transplant (RAT) at our institute.

## Case Presentation

A 29 years old female patient weighing 40kgs presented to us with a known case of Systemic Lupus Erythematosus since 2001 and was on treatment with oral wysolone with a recent development of membranous nephropathy with end stage renal disease (ESRD) [3] months back in November 2015.

She was posted for living related allograft robotic assisted left renal transplant. She was on hemodialysis twice a week. Her recent hemogram, biochemical profile, serum electrolytes, electrocardiogram, chest x-ray and echocardiograghy were within normal limits except blood urea of 57mg% and serum creatinine of 4.1mg%. She was hypertensive and her blood pressure was controlled (110/76mm of Hg during preoperative check-up) with oral amlodipine 10mg once daily, metoprolol 50mg twice daily and moxonidine 0.2 mg once daily. She was also on sevelamer carbonate 800mg for chronic renal disease.

On the day of surgery, an 18G intravenous cannula was secured in the right hand. Standard American Socitey of Anesthesiologists monitoring, such a 5 lead electrocardigram, non-invasive blood presssure and pulse oximetry probe were attached to the patient. General anesthesia was induced with 2mcg/kg intravenous fentanyl and 2-3 mg/kg intravenous propofol and muscle relaxation was achieved by intravenous atracurium at a dose of 0.5mg/kg after confirmation of adequate mask ventilation. Airway was secured by a 7.5mm ID cuffed endotracheal tube and anesthesia was maintained with isoflurane, air and oxygen targeting a end-tidal isoflurane concentration of 1-1.2 MAC. We used neuromuscular monitoring in the form of train-of-four to judge adequate muscle relaxation and to avoid the overuse of muscle relaxant.

Right radial artery was cannulated by a 20G arterial cannula for invasive blood pressure monitoring and right internal jugular vein was cannulated with 7.5Fr tripple lumen catheter for central venous pressure measurement. Intraoperative analgesia was provided with intravenous fentanyl at a dose of 0.5-1 mcg/kg. At the end of surgery, residual neuromuscular blocked was reversed with neostigmine and glycopyrrolate and trachea was extubated when she was following commands and generating adequate regular tidal volume.

Intravenous fluid boluses were initiated before completetion of vascular anaostomosis of the graft targeting a CVP of 10-12 mm Hg. After completetion of vascular anastomosis, 100-120 ml of urine output per hour was obtained.

## Discussion

Apart from the pathophsyiological changes in end stage renal disease, the biggest challenge for an anesthesiologist is to work in a congested operating room environment with a robot [3]. It is very important that there should not be any patient movement during docking of the robot and insertion of camera and instruments through the laparoscopic ports otherwise tearing could occur at port sites [4]. Adequate muscle relaxation is of utmost importance in these cases. The operating table should not be moved after docking. We used neuromuscular monitoring in our patients to ensure adequate muscle relaxation. Beat to beat invasive blood pressure monitoring is important as there is a possibility of tachycardia and hypertension during port insertion and creation of pneumoperitoneum [5]. As many patients with ESRD have a compromised left ventricular systolic and diastolic function, they may poorly tolerate these hemodynamic




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**Table 1:** Pathopysiological changes in ESRD patients.

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|---|---|
| Cardiovascular system | ↑ systemic vascular resistance<br>↑ mean arterial pressure<br>↑ myocardial oxygen consumption<br>↓ renal, portal, and sphlanchnic flow |
| Respiratory system | ↑ ventilation–perfusion mismatch<br>↓ functional residual capacity<br>↓ vital capacity<br>↓ compliance<br>↑ peak airwaypressure<br>Pulmonary congestion and oedema<br>Hypercarbia, respiratory acidosis |
| Central nervous system | ↑ intracranial pressure<br>↑ cerebral blood flow<br>↑ intraocular pressure |
| Endocrine | Catecholamine release<br>Activation of renin–angiotensin system |
| Others | Gastro-oesophageal regurgitation<br>Venous air embolism<br>Neuropraxia, especially brachial<br>Tracheal tube displacement<br>Facia and airway oedema |

changes. Together with tredelendburg position required for the surgery, it makes anesthesia management more challenging. The pathophysiological changes in ESRD relevant to the anesthesiologists have been depicted in table [1].

Premedication should be given keeping in mind the general level of anxiety and gastroparesis associated with ESRD. Benzodipines can be used as their pharmacokinetics is not altered by ESRD. In addition to standard monitoring, central venous pressure (CVP), core temperature should also be monitored. Unlike other surgeries in patients with ESRD where fluid restriction is a prerequisite, in renal transplant surgery, adequate hydration and optimal mean arterial pressure should be maintained for better perfusion of the newly grafted kidney.

Formulation of a prior emergency plan is needed in case any emergency occurs during surgery to initiate rapid response according to the ACLS guidelines [6].

Postoperative pain after robotic assisted surgery is expected to be less than open conventional renal transplant as experiences obtained from other robotic surgical procedures [7]. A multimodal technique combining port site local anesthetic infiltration and post operative patient controlled analgesia can be a logical option; however, NSAIDs should be avoided. Postoperative fluid management is challening in these paients and should be guided by CVP, urine output and mean arterial pressure.

## Conclusion

We tried to combine our anesthetic experience in renal transplant surgery and robot assisted surgery to provide an optimal anesthesia in this patient. Although it is an anesthetic challenge, a proper planning will help in safe anesthesia care in these patients.

## Compliance with Ethical Standards

### Ethical approval

All procedures performed in this case report involving human participant were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

### Informed consent

Written informed consent was obtained from the patient for publication of this Case Report. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

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