Robotic Bilateral Nephrectomy for Large Kidneys with Adult Polycystic Kidney Disease with Da Vinci Xi and Da Vinci SP

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Introduction & Objective

Autosomal dominant polycystic kidney disease (ADPKD) is the most common hereditary kidney disorder.

Approximately 50% of patients with ADPKD have end stage renal disease (ESRD) by age 60. Native nephrectomy in ADPKD is historically an open procedure with complication and mortality rates of 38% and 5% respectively.

In this study, we discuss our technique and review our experience with synchronous robotic bilateral nephrectomy for large kidneys in ADPKD with the Da Vinci XI and Da Vinci Single Port platforms (Intuitive Surgical, Sunnyvale, CA).

Methods

After Institutional Review Board approval was obtained, we performed a retrospective review of all robotic bilateral nephrectomy cases from January 2020 to present.

We collected demographic details about the patients and reviewed perioperative details including preoperative CT scans, indication for nephrectomy, and renal function.

We also collected details on the post-operative course and the final pathology of the specimens.

In this series, the da Vinci Xi platform was used for nine cases and the da Vinci SP (Single Port) platform was used for one case.

Results

Patient demographics, indications for surgery, and specimen data are outlined in Table 1 and Figure 1.

Median operating time from incision to closure was 299 minutes (IQR 260, 339) however median combined dock to undock time was 189 minutes (IQR 155.8 to 215.5).

Median estimated blood loss was 100cc (IQR 50, 175). Two patients were transfused intraoperatively, one with autologous blood, and one whose preoperative hemoglobin was 8.8 g/dl; median pre- and post-operative hemoglobin was 11.3 and 9.7 respectively.

Median length of stay was 3 days (IQR 2, 3.5). One patient was admitted to the surgical ICU post operatively for ventilatory support.

There were no intraoperative complications. Post-operative complications included one incisional hematoma, and one superficial wound infection.

Four patients successfully underwent kidney transplantation with a median 95 days (IQR 81 to 108) after bilateral nephrectomy.

	N (%)
Total subjects	11 (100%)
Female	6 (54.5%)
Male	5 (45.5%)
Age at operation (median, IQR)	48 (45, 57)
BMI at operation (median, IQR)	27.3 (23.1, 31.9)
Indication for surgery	
To create space for transplant	7 (63.6%)
Symptomatic (abdominal distention, hematuria)	5 (45.5%)
Recurrent pyelonephritis	1 (9.1%)
Surgical details	
Multi-port, Xi	10 (90.1%)
Single port, Sp	1 (9.1%)
Operative time in minutes (median, IQR)	299 (260, 338.5)
Estimated blood loss in cc (median, IQR)	100 (50, 175)
Length of stay in days (median, IQR)	3 (2, 3.5)
Largest kidney dimension on preop CT (cm)	
Right kidney (range)	14.3 – 29.3
Left kidney (range)	15.6 – 31.8

Table 1. Population characteristics

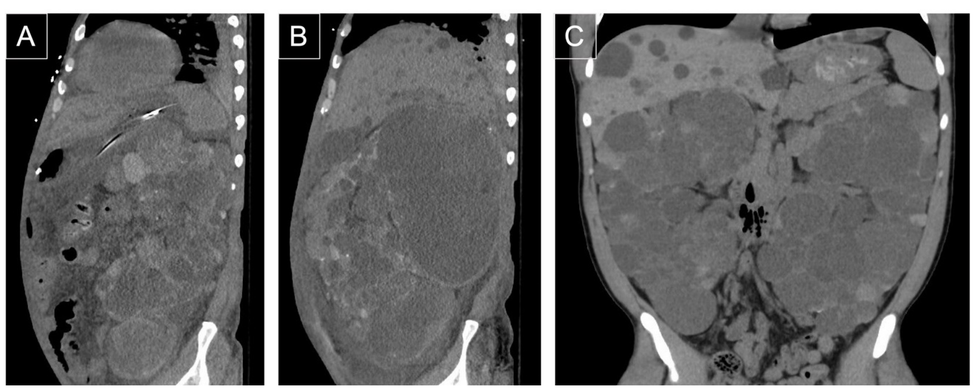

Figure 1. Preoperative CT images of polycystic kidneys: (A) largest right kidney removed 29.3 cm craniocaudally; (B) largest left kidney removed 31.8 cm craniocaudally; (C) bilateral kidneys cross midline and nearly fill the abdominal cavity.

Conclusions

Open bilateral native nephrectomy in ADPKD has historically been a highly morbid procedure. Due to potential risks associated with the operation, the timing and need for removal of both native kidneys has been debated. Several series have described successfully laparoscopic approaches however, robotic approaches have been only recently described.

Our technique with Da Vinci XI and SP requires undocking and rotating the patient to the contralateral side, however, operative times and outcomes compare favorably to prior laparoscopic series and offers important advantages over open bilateral nephrectomy. This technique works even for large kidneys.

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