Drain Placement Can be Safely Omitted After the Majority of Robotic Partial Nephrectomies

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Purpose: Drain placement after partial nephrectomy is considered standard but it is based on routine and not on evidence. With experience we performed robotic partial nephrectomy and routinely omitted a drain even with significant collecting system violation. We have rarely used drains after robotic partial nephrectomy for several years, and we report our outcomes.

Materials and Methods: We reviewed a single surgeon, prospective database of all robotic partial nephrectomies from February 2008 to March 2012, including the characteristics of those with and without a drain.

Results: The 150 patients underwent a total of 160 robotic partial nephrectomy procedures with a drain used in 11 patients and omitted in 93%. Mean patient age was 57 years (range 22 to 89), mean American Society of Anesthesiologists score was 2.8 (range 2 to 4) and mean body mass index was 32 kg/m^2 (range 18 to 54). Values were similar in patients with and without a drain. In patients without a drain and in those with a drain mean tumor size was 3.5 cm (range 1.0 to 11.0) and 4.6 cm (range 1.1 to 8.6), and mean R.E.N.A.L. (radius, exophytic/endophytic, nearness of tumor to collecting system or sinus, anterior/posterior, location relative to polar lines, hilar tumor touching main renal artery or vein) nephrometry score was 7.8 (range 4 to 12) and 8.8 (range 6 to 11), respectively. Collecting system violation occurred in 88 patients (59%), including 78 without a drain. Two patients (1.3%) required transfusion with no intervention for bleeding. All except 5 patients (97%) were discharged home on postoperative day 1 with all drains removed before discharge. In 2 patients (1.3%) without a drain small urinomas without infection developed more than 2 weeks postoperatively, which were treated with a week of Foley catheter drainage and percutaneous drainage, respectively.

Conclusions: Drain placement after robotic partial nephrectomy can be routinely omitted with a low rate of urine leaks, which can be managed safely when they rarely occur.

Key Words: kidney, robotics, nephrectomy, nephron sparing, drainage

Abbreviations and Acronyms

RPN = robotic partial nephrectomy

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PLACEMENT of a drain after partial nephrectomy, whether performed by an open or a minimally invasive approach, is considered a standard part of the procedure by most surgeons. This practice is based on entrenched routine rather than on evidence. Drain placement after partial nephrectomy is primarily intended as a safety measure to remove urine that may leak from the renal resection bed when the collecting system is entered during tumor excision, which can occur knowingly or unknowingly on occasion.

While drains are believed to be inert by most and they are often so, drains may contribute to postoperative discomfort and infection. When

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Demographic and perioperative characteristics of entire RPN patient series, including those with and without drain

	Overall	No drain	Drain	p Value
No. pts	150	139	11	—
No. tumors	160	146	14	—
Mean age (range)	57 (22–89)	57 (22–89)	57 (24–81)	0.93
Mean kg/m^2 body mass index (range)	32 (18–54)	32 (18–54)	33 (23–45)	0.67
Mean American Society of Anesthesiologists score (range)	2.8 (2–4)	2.8 (2–4)	2.7 (2–3)	0.64
Mean mg/dl preop creatinine (range)	0.89 (0.43–2.79)	0.89 (0.43–2.79)	0.89 (0.56–1.51)	0.98
Mean cm tumor size (range)	3.6 (1.0–11.0)	3.5 (1.0–11.0)	4.6 (1.1–8.6)	0.06
Mean R.E.N.A.L. nephrometry score (range)	7.9 (4–12)	7.8 (4–12)	8.8 (6–11)	0.05
No. hilar tumors (%)	36 (24)	30 (22)	6 (43)	0.06
No. collecting system violation (%)	88 (59)	78 (56)	10 (91)	0.02
Mean ml blood loss (range)	173 (20–1,500)	171 (20–1,500)	191 (50–350)	0.75
Mean mins operative time (range)	197 (77–436)	192 (77–400)	258 (145–436)	<0.01
No. urine leak (%)	2 (1.3)	2 (1.7)	0	0.69

closed suction drains are used, they may theoretically encourage or prolong urine leakage or encourage delayed hemorrhage.[1] Additionally, rare physical complications can occur, such as bowel entanglement causing obstruction and, upon drain removal, retained fragments or herniation of intra-abdominal structures.[2–5]

Recently, Godoy et al suggested that drainage could be safely omitted in the minority of patients who undergo open partial nephrectomy for small, exophytic tumors without collecting system violation.[6] In addition to patients without collecting system entry, those in whom the disrupted collecting system is closed in watertight fashion do not benefit from a drain other than as an insurance policy, which may treat the surgeon rather than the patient.

If urine leakage were rare after partial nephrectomy, one could suggest that routine use of a drain is not necessary. With increasing RPN experience we thought that enhanced visibility and precision allowed reliable, watertight closure of the collecting system even after excision of large and deep tumors, including heminephrectomy. Therefore, we have routinely omitted drain placement after RPN for more than 3 years, using drains rarely. We analyzed the outcomes of our practice and any associated complications to determine whether routine drain omission rather than routine drain use is a reasonable, safe strategy.

METHODS

A single surgeon (RA), prospectively collected RPN database was reviewed with institutional review board approval. All patients were included since the database was begun in February 2008 until March 2012, comprising 150 consecutive patients who underwent a total of 160 RPN procedures. Demographic, perioperative and tumor characteristics were reviewed as well as the postoperative course.

RPN was performed using the da Vinci® S or Si robot with cold scissor excision of tumor in all cases without electrocautery or another energy device to allow visualization of collecting system entry and minimize thermal injury to tissue. The collecting system was routinely closed with running 3-zero polyglactin sutures along the resection bed and selectively closed with V-loc™ sutures when they became available in later cases. Renorrhaphy was completed with 0-zero or 2-zero polyglactin capsular sutures without bolsters in all patients. Collecting system violation was only assessed visually during tumor resection since no ureteral stents or catheters were used in any patients for intraoperative identification of collecting system defects, for leakage after closure or for postoperative drainage.

Postoperative care included Foley catheter removal the day after surgery with typical discharge home the same day. Patients were seen 2 to 3 weeks postoperatively and then typically at 6 months for surveillance imaging and renal functional assessment. Patients with benign pathological findings after RPN underwent at least 1 cross-sectional imaging study 6 months after surgery. Patients were not released to local providers for long-term care until at least 6 months after surgery regardless of distance.

RESULTS

The 150 consecutive patients underwent a total of 160 RPNs for 1 or more tumors, including 7 patients with 2 and 1 with 4 tumors. Overall, mean patient age was 57 years (range 22 to 89 years), mean American Society of Anesthesiologists score was 2.8 (range 2 to 4) and mean body mass index was 32 kg/m^2 (range 18 to 54) with no statistically significant difference between patients with and without a drain (table).

Mean tumor size on preoperative imaging was 3.6 cm (range 1.0 to 11.0) and mean nephrometry score was 7.9 (range 4 to 12). Of the 150 patients 11 (7%) had a drain placed at the end of the procedure. Thus, a drain was omitted in 139 patients (93%).

In patients without a drain (including 30 hilar tumors) mean tumor size was 3.5 cm (range 1.0 to 11.0) and mean nephrometry score was 7.8 (range 4 to 12). For patients in whom a drain was left in place