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TRIFECTA OUTCOME IN INITIAL 20 CASES OF ROBOT ASSISTED PARTIAL NEPHRECTOMY – OUR EXPERIENCE

Urology

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ABSTRACT

Objectives: To study the trifecta outcome of initial 20 cases of robot- assisted partial nephrectomy (RAPN) at our institute.

Materials and Methods: A total of 20 patients underwent robot assisted partial nephrectomy between January 2017 and May 2019 by a single urologist. We prospectively analysed the trifecta outcome defined as a warm ischemia time (WIT) of <25 min, negative surgical margins, and no complications intraoperatively or within 3 months of RAPN.

Results: All patients successfully underwent robot assisted partial nephrectomy. Median warm ischemia time was 15 minutes. One patient with complex tumour had positive surgical margin. There were no Clavien- Dindo Grade IV and V complications. Grade I-III complications were seen in 20% of patients.

Conclusion: RAPN is feasible and safe even with surgeons who have not much experience in robot assisted surgeries.

KEYWORDS

Partial Nephrectomy, Robot assisted, Trifecta

INTRODUCTION

Renal Cell Carcinoma (RCC) accounts for 2-3% of all adult malignant neoplasm. It has a male predominance (1.5: 1). Peak incidence occurs between 60 and 70 years. Due to increased usage of ultrasound (US) and computed tomography (CT), incidentally diagnosed RCCs have increased. However these tumors are of small size and of lower stage[1]. These incidentally detected renal tumors constitute 48 to 66% of renal tumors. Historically radical nephrectomy is the treatment for any renal tumors, however partial nephrectomy has now became gold standard for clinically localized small renal masses [2]. The rates of partial nephrectomy have increased in past decades, comprising about 30% of all renal surgeries for clinically localized renal masses [3]. Robot assisted surgeries have better safety profile and better oncological outcome compared to laparoscopic surgeries. Our study aims to assess the outcome following robotic assisted partial nephrectomy in patients with clinically localized RCC.

MATERIALS AND METHODS:

20 patients who underwent robot assisted partial nephrectomy (RAPN) from January 2017 to May 2019 were included in our prospective study. All participants gave informed written consent. All surgeries were performed by the same urologist with the assistance of two other urologists of the team. All cases were clinically localised RCC's. Collected data included epidemiologic information, preoperative evaluation, surgical notes, biopsy reports, TNM staging, postoperative complications (Clavien- Dindo Classification of Surgical Complications). Statistical analysis was performed using the chi-square test and SPSS v17 software.

Inclusion Criteria – All patients with clinically localized RCC (Stage I and Stage II) admitted from January 2017 to May 2019 regardless of age and sex were included in the study.

Stage I tumors

- T1 (tumor ≤ 7 cm in the greatest dimension, limited to the kidney).
- T1 is further divided into T1a (≤ 4 cm) and T1b (> 4 cm but ≤ 7 cm).
- N0 (No regional lymph node metastasis)
- M0 (No distant metastasis)

Stage II tumors

- T2 (tumor > 7 cm in the greatest dimension, limited to the kidney). T2 is additionally divided into T2a (> 7 cm but ≤ 10 cm) and T2b (> 10 cm).
- N0 (No regional lymph node metastasis)
- M0 (No distant metastasis)

Exclusion criteria – Stage III and IV, concomitant cancers, severe systemic illness.

Factors assessed:

1. Intra Operative: Operative time, Console time, Warm Ischemia Time (WIT), Injury to major vessels or abdominal organs, gross violation of tumour bed.
2. Post-operative adverse events - Spleenic damage, Pleural injury, Perioperative bleeding, Urinary fistula and other complications within 3 months of surgery
3. The functional endpoint used was the decrease in eGFR, defined as absolute and percentage decrease in eGFR at 3-months postoperatively compared to the preoperative value. (Estimated GFR (eGFR) calculated using the Cockroft-Gault formula [4])
4. Margin positivity in histopathological specimen

RESULTS:

About 20 patients underwent partial nephrectomy with a median follow-up of 10 (2 –24) months, with 7 patients having a follow-up of >24 months. The cohort's characteristics are summarized in Table 1.

Table 1: Cohort characteristics

Age, years, median	56 (42–70)
Sex, n (%)	
Males	16 (80%)
Females	4 (20%)
Symptoms, n (%)	

Incidentally detected mass	14 (70%)
Local symptoms	6 (30%)
Clinical stage, n (%) (n = 20)	
T1a	14 (70%)
T1b	4 (20%)
≥T2a	2 (10%)
Tumour size, cm, median (n = 20)	2.6 cm
R.E.N.A.L. nephrometry score, (%)	
Low (4–6)	13 (65)%
Intermediate (7–9	5 (24%)
High (10–12)	2 (10%)
Preoperative eGFR, mL/min/1.72 m^2, median	61

Table 2: Represents the Operative and perioperative characteristics of the 20 patients who underwent robot assisted partial nephrectomy

Variable	Value
Operative time, min, median	184 (142–230)
Estimated blood loss, mL, median	160 (100–350)
WIT, min, median	15 (9 –26)
Intraoperative complications, n (%)	
Gross violation of tumour bed	1(5%)
Major bleeding from tumour bed	1(5%)
Injury to major vessels	2(10%)
Injury to abdominal organs	1(5%)
Histopathology, n (%)	
Clear cell RCC	18(90%)
Non-clear cell RCC	2(10%)
Pathological stage, n (%)	
pT1a	14 (70%)
pT1b	4 (20%)
pT2a	2(10%)
Fuhrman grade (Clear Cell RCC), n (%)	
Grade 1	2(11.1%)
Grade 2	11(61.1%)
Grade 3	5(27.7%)
Surgical margin, n (%)	
Positive	1(5%)
Negative	19(95%)
Clavien–Dindo grade of complications, n (%)	
I	2(10%)
II	1(5%)
III	1(5%)
IV	0
V	0

DISCUSSION:

In this modern era renal masses are increasingly treated with NSS, whenever feasible. The RENAL (radius, exophytic/endophytic properties, nearness of tumor to the collecting system or sinus in millimeters, anterior/posterior location relative to polar lines) nephrometry scoring system was recently introduced as an objective reproducible means to describe salient renal tumor anatomy[7]. Since its introduction, the RENAL nephrometry scoring system has been shown to provide important preoperative and perioperative information used to predict long term outcomes and is increasingly being incorporated into the management of renal tumour.

Minimally invasive approaches, e.g. robotic assisted partial nephrectomy are being increasingly used[5,6]. RAPN has been shown to be safe and effective, even for complex renal tumors[8]. The advantages of the robotic approach include better ergonomics, enhanced vision, and short learning curve.

The concept of Trifecta outcomes in partial nephrectomy was first introduced by Gill et al[9]. In trifecta outcome 3 key outcomes of negative cancer margin, warm ischemia time (WIT) <25 min and no urological complications are simultaneously realized. It is a key surrogate of successful partial nephrectomy.

Table 3: Compares our present study results with existing literature on RAPN.

	Present study	Hillyer et al.[5] 2007–2012 (*N* = 26)	Zargar et al.[6] 2007–2013 (*N* = 30)	Arora et al.[10] 2007–2016 (*N* = 74)
Approach	Robotic	Robotic	Robotic	Robotic
Tumour size, cm, media	2.6 cms	4.3	2.8	2.3
R.E.N.A.L. nephrometry score, median				
Low (4–6)	13 (65)	11 (42)		34 (45.9)
Intermediate (7–9)	5 (25)	7 (26.9)		27 (36.5)
High (10–12)	2 (10)	3 (12)		6 (8.1)
Operative time, min, median	184	210	174.9	180
Estimated blood loss, mL, median	160	225	200	150
Overall complications, n (%)	4 (20%)	5 (19.2)	9 (30)	18 (24.1)
WIT, min, median	15 (9 –26)	17 (12–28)	15 (9)	15.5 (8.75–20)
Positive surgical margins, n (%)	1 (5%)	1 (3.8)	2 (6.7)	4 (5.4)
% decrease in eGFR, median	-9 (14.75%)	–15.8	-	–7(11.01%)

Like in Hillyer et al and Tanagho YS et al studies, in our study also there was no conversion to open surgery, even in tumors with high R.E.N.A.L. nephrometry scores. Thus solidifying the fact that RAPN has a low conversion rate[11]. Although both renal function preservation and advantages of minimally invasive surgery are important, the former is of utmost importance and a low threshold of conversion must be maintained, especially in larger tumours. Cold ischaemia, either through an open or robotic approach should be considered in cases where longer ischaemia times are expected to reduce the risk of acute kidney injury and its sequelae.

The median WIT in our present study when the main renal artery was clamped was 15 min, with only two patients (10 %) having a WIT of >25 min. This is similar to the 17–18.8 min reported in previous RAPN series[5,6].

The complication rate in our study was 4/20 (20%) patients, of which Clavien–Dindo grade I and II complications occurred in 3(15%). This is higher than the 19.2% reported by Hillyer et al.[5] and lower than the 30% reported by Zargar et al[6]. Although there are no randomized controlled trials comparing OPN and RAPN, meta-analyses have shown that RAPN has a lower rate of complications when compared to OPN[12,13].

Positive surgical margin was seen in one patient of the 20 cases. It was a large tumour of RENAL score 12 located at hilum. This patient is in regular follow up.

The median drop in estimated glomerular filtration rate at 3 months was 9.0 mL/min/1.72 m^2 (14.75%).

CONCLUSION:

Thus our present study concludes that RAPN is a safe and effective treatment option for renal tumors whenever feasible in terms of a trifecta of negative surgical margins, low WIT, and low operative and perioperative morbidity.

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