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RESEARCH ARTICLE

LAPAROSCOPIC PARTIAL NEPHRECTOMY OF SMALL RENAL TUMORS: EXPERIENCE FROM A TERTIARY CARE HOSPITAL OF NORTH INDIA

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ABSTRACT

Background: Partial nephrectomy is the treatment of choice for small renal tumors, however in recent times the open nephrectomy is being replaced by robotic or laparoscopic approach which varies from centre to centre and surgeon expertise and hence different success and complication rates. **Aim and Objective:** To assess the feasibility of laparoscopic partial nephrectomy in small renal tumors. **Methods:** In this observational study 16 consecutive subjects over a period of 18 months full filled the criteria of selection. All the subjects were operated by a single surgeon using laparoscope. **Results:** All the subjects recovered fully without any major complication. None of the subjects had postoperation leak and all were discharged within 4 days of surgery. **Conclusion:** In experienced hands the laparoscopic partial nephrectomy should be preferred because robotic surgery has cost restrictions in resource limited settings.

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INTRODUCTION

Renal tumours constitute a rather large and heterogeneous group of renal lesions that can be found in the kidney. These include numerous types of benign and malignant lesions. Multiple management strategies are available to deal with such lesions; which maybe just active surveillance for localized disease to radical nephrectomy (RN) for advanced disease. Partial nephrectomy (PN) is preferred for small renal masses (T1a, < 4.0 cm) whenever feasible, because radical nephrectomy (RN) represents gross over treatment for most such lesions, which tend to have limited biologic potential (1). PN is also strongly preferred whenever preservation of renal function is potentially important, such as patients with preexisting CKD, those with an abnormal contralateral kidney, or those with multifocal or familial RCC. However, larger renal tumors (clinical stages T1b and T2) have increased oncologic potential and have often already replaced a substantial portion of the parenchyma, leaving less to be saved by PN. In the setting of a normal contralateral kidney, the relative merits of PN over RN is a debate.

The conventional open approaches of surgery have several disadvantages like longer hospital stay; increased chances of surgical site infections, damage to nearby viscera, more post op analgesia requirement and longer recovery. A more recent trend has been to perform PN by minimally invasive approaches, with several series reporting encouraging results (2). Margin status and oncologic outcomes associated with laparoscopic or robotic PN appear to be equivalent to open PN in experienced hands, presuming sensible patient selection. The RENAL (Radius, Endophytic vs. exophytic, Nearness to collecting system, Anterior/posterior, Location relative to polar lines) and other nephrometry scoring systems allow for assessment of the complexity of the tumor and have facilitated comparison of evolving surgical techniques for PN in this era. Early to intermediate experience with laparoscopic PN demonstrated increased rates of urologic complications such as postoperative hemorrhage and need for subsequent surgery despite selection for less complex tumors. However, further experience and more prevalent utilization of robotic assistance have led to substantially reduced morbidity, and these minimally invasive approaches are now well established in our armamentarium for PN, presuming sensible patient selection based on tumor complexity and surgeon experience.

The present prospective clinical study was conducted for the management of renal tumours using laparoscopic procedures in the patients who reported to Postgraduate department of general surgery, GMC Srinagar. 16 underwent laparoscopic partial nephrectomy.

Aims and Objective: To assess the feasibility of laproscopic partial nephrectomy in small renal tumors.

MATERIAL AND METHODS

This observational study was conducted in the Postgraduate Department of General Surgery, Government Medical College, Srinagar over a period of one and a half years. A consecutive sample of 16 patients fulfilling inclusion and exclusion criteria underwent laparoscopic nephrectomy performed by a single urologist. The patient were taken for the surgery after proper clinical workup. The whole diagnostic screening was done for renal masses before and after the surgery. The subjects were observed for haemoglobin fall/transfusion needed, conversion rate/causes of conversion if any, complications, haemorrhage and adjacent organ injury. A self designed proforma was used to collect data.

Inclusion Criteria

- Any age and Gender
- Patients presenting with renal tumours
 - T1a (<4cm and confined to kidney)
 - T1b (4-7cm and confined to kidney)
 - T2 (>7cm and confined to kidney)
 - T3a (extends into renal vein or its segmental branches or invades perirenal fat but not beyond gerotas fascia)
- Cytoreductive nephrectomy
- Palliative nephrectomy

Exclusion Criteria

- T3b (tumour grossly extends into vena cava below diaphragm) and higher stage tumour
- Bulky nodal disease
- General contraindication for laparoscopy
- Severe cardiopulmonary disease.
- Coagulopathy
- Poor performance status
- Pregnancy

Data Analysis: Data was entered in Microsoft Excel and analysed using SPSS version 20.0.

Ethical Clearance: The study was approved by institutional ethics committee (IEC), Government Medical College Srinagar.

OBSERVATIONS AND RESULTS

Table 1 shows the age and gender distribution of the study participants. 12 patients belonged to 41-50 years age group (75%), 4 (15%) patients were aged ≤ 40 years. The mean age in our study patients was 50.08 ±13.44 years. Youngest patient operated was 16 years of age, and the eldest patient operated was 50 years of age. In our study male to female ratio was 1:7.

Table 1. Age and Gender Distribution of Study Participants

Variable		Number	Percent
Age (Years) Mean±SD = 50.08 ± 13.44 (16-50 Years)	≤40	4	25
	>40	12	75
Gender	Male	2	12.5
	Female	14	87.5

Table 2. Features of renal tumor among study participants

Variable		Number	Percent
Kidney involved	Right	8	50
	Left	8	50
Size of Tumor (Mean size = 3.1±1.1)	≤4 cm	8	50
	4-7 cm	8	50
Tumor Stage	T1a	7	43.7
	T1b	8	50
	T2	0	0
	T3a	1	6.3
Nephrometry Score (Mean Score = 5.5)	4-6	15	93.7
	7-9	1	6.3
Lesion Focus	Unifocal	16	100
	Multifocal	0	0

Table 2 shows the tumor features in study population. In our study right and left sided renal tumors were equal in number (8 each). The mean tumour size observed was 3.1±1.1 cm. Seven (43.7%) patients had T1a stage and 8 (50%) patient had T1b and 1(6.3%) had T3a stage of tumor. In our study, 15 (93.7%) of the subjects planned for partial nephrectomy had low complexity nephrometry score and only 1(6.3%) had moderate complexity nephrometry score. The mean nephrometry score observed was 5.5. In our study all the tumours were unifocal.

Table 3. Perioperative measures taken in study participants

Variable		Number	Percent
Ureteric Catheter Placement	Placed	12	75
	Not placed	4	25
Pelvicalyceal system	Opened and repaired	4	25
	Not opened	12	75
Tumor Bed	Sutured	0	0
	Not sutured	16	100
Rescue Suturing	Done	2	12.5
	Not done	14	87.5
Warm Ischemia Time (Mean time= 38.75± 10 min) (35 min to 75min)	<60 minutes	14	87.5
	60-120 minutes	2	12.5

Table 3 shows the perioperative measures taken among study participants. In our study ureteric catheter was placed in 12 (75%) patients and 4 (25%) patients were operated without catheter placement. In our study pelvicalyceal system was opened and repaired in 4 (25%) of the patients, and no repair was required in 10 (75%) of the patients. Tumour bed suturing was not required in any of the study patients, however, 2 subjects required rescue suturing. In our study, 14 (87.5%) patients had warm ischemia time of less than 60 min and 2(12.5%) patients had warm ischemia time of 60-120 min. Mean warm ischemia time was 38.75± 10 min. Least warm ischemia time was 35 min and max time was 75min.

Table 4: Postoperative Outcome among Study Participants

Post Operative Urine Leak	Present	0	0
	Absent	16	100
Duration of Drain Placement	<7 Days	7	43.7
	≥7 Days	9	56.3
Hospital Stay	≤4 Days	16	100
	>4 Days	0	0
Postoperative complication	Yes	1	6.3
	No	15	93.7

The complication along with other outcomes among the study subjects are shown in table 4. In our study none of the patients developed postoperative urine leak. The drain was removed in < 7 days in 7 (43.7%) patients and in ≥7 days in 9 (56.3%) of the patients. All the subjects were discharged within 4 days of operation. Only one patient (6.3%) developed port site infection which was managed conservatively.

Table 5. Histo-cytological Features of Renal Tumors among Study Participants

Histo-cytological Feature		Number	Percent
Histological Type	Clear cell	10	62.5
	Papillary	6	37.5
Lymphovascular Invasion	Present	1	6.3
	Absent	15	93.7
Perineural Invasion	Present	1	6.3
	Absent	15	93.7
Resection Margins	Involved	1	6.3
	Not involved	15	93.7

The histo-cytological features observed on biopsy of the resected tumor are shown in table 5. In our study, 10 (62.5%) patients had clear cell RCC and 6 (37.5%) had papillary variety. One (6.3%) of the patients had lymphatic invasion, perineural invasion and resection margins were also involved.

DISCUSSION

In our study 16 subjects fulfilled the eligibility criteria for partial nephrectomy during 18 months of study. The mean age of the subjects was 50.08±13.44 years. The study conducted by Springer C. *et al* (2013) observed the mean age of the patients as 55.6±13.1 years. They evaluated the long-term oncological and functional outcomes of laparoscopic partial nephrectomy (LPN) compared with open partial nephrectomy (OPN) for pT1 renal tumours. In this retrospective single-centre study, 340 consecutive patients underwent LPN and OPN for localized, incidentally discovered, renal masses of <7 cm (cT1). The median (SEM) warm ischaemia time was 11.7 (2.2) min in the LPN and 14.4 (1.9) min in the OPN group (P = 0.03). The median (SEM) RENAL nephrometry scores for LPN and OPN were 5.9 (1.6) and 6.1 (0.3), respectively (P = 0.11) (Springer, 2013). In our study 2(14%) females and 14(86%) males were enrolled. Male to female ratio was 1:7. However in the study conducted by Bitkin A. *et al*. (2019) the male to female ratio observed was 5:9 (Bitkin, 2019). They evaluated the results of laparoscopic nephrectomy cases performed in patients with locally advanced renal cell carcinoma. Between July 2015 and December 2018, 14 patients underwent laparoscopic nephrectomy for locally advanced renal tumor. In our study, mean tumour size was 3.1 ± 1.1 cms. Our results are comparable to a study conducted by Springer C. *et al* (2013) in which the mean tumour size is 2. 8± 1.9 cm (Springer, 2012). Similar results were observed in Moinzadeh A. *et al* (2006) study were mean tumour size was 2.6 cms (Moinzadeh, 2006). Similar tumor size was observed by Romani AP *et al* (2005 and Wright JL *et al* (2005) (Wright, 2005).

In our study RENAL nephrometry score was 4-6 in 15 (87%) of the patients, nephrometry score was 7-9 in 1 (13%) patient. Mean RENAL nephrometry score was 5.5. Similar results were observed in a study done Springer C. *et al* (2013) in which mean tumour size was 5.9 ±1.6 cms (Springer, 2013). In our study warm ischemia time was 38.75 min. In our study, 14(88%) patients had warm ischemia time of less than 60 min and 2(12%) patient had warm ischemia time of 60-120 min. Mean warm ischemia time was 38.75±10 min. Least warm ischemia time was 35 min and max time was 75min. In our study none of the patients required blood transfusion. Similar results were observed in a study done by Wright JL *et al*. (2005) in which none of the patients required blood transfusion (Wright, 2005). Conclusion: Majority of the subjects of laparoscopic partial nephrectomy recovered without any complications.

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