International Journal of Research in Medical Sciences
Sharma S et al. Int J Res Med Sci. 2023 Dec;11(12):4391-4394
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012

DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20233705

Original Research Article

Comparison between intraoperative and postoperative surgical outcomes of laparoscopic partial nephrectomy and open partial nephrectomy: laparoscopic versus open partial nephrectomy

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Received: 04 October 2023
Accepted: 13 November 2023

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ABSTRACT

Background: The aim of the study was to compare intraoperative and postoperative surgical outcomes of laparoscopic partial nephrectomy (LPN) and open partial nephrectomy (OPN).
Methods: We did prospective retrospective study on 33 cases of renal mass operated as partial nephrectomy (PN) (15 LPN and 18 OPN) in department of urology and renal transplant SCB medical college Cuttack Odisha from 1 may 2019 to 1 may 2023. Surgical outcome of both approaches compared based upon intraop time, estimated blood loss, ischemia time, hospital stay, complications and rise in creatinine.
Results: Mean intraop time 140.66 min in OPN vs 172.8 min in LPN ($p<0.05$-significant), mean estimated blood loss was 453 ml in OPN vs 345 ml in LPN ($p=0.113$-not significant), mean ischemia time was 15.88 min in OPN vs 20.53 min in LPN ($p<0.05$-significant), mean post op hospital stay was 7.5 days in OPN vs 6.3 days in LPN ($p=0.184$-not significant). Intra-op complications was 2 (11.11%) in OPN vs 2 (13.33%) in LPN and postop complications was in 5 (27.7%) in OPN vs 4 (26.66 %) in LPN. Mean rise in creatinine was 0.25 in OPN vs 0.29 in LPN ($p=0.642$-not significant).
Conclusions: LPN is a feasible and safe alternative to OPN with comparable surgical outcomes but operating time and ischaemia time is significantly more in LPN as compare to OPN.

Keywords: LPN, OPN, Comparison

INTRODUCTION

Renal cell carcinoma accounts 2-3% of all adult malignant cancers, one of most lethal of the common urologic malignancies. PN represents the gold standard for active treatment of cT1 renal masses.[1,2] Minimally invasive approaches such as laparoscopy or robotic surgery might offer similar oncological efficacy and better peri-operative outcomes when compared with the open technique.[3-5] The comparison of perioperative outcomes between open and minimally invasive techniques has been subject to considerable attention in the recent years. Accordingly, a clear need of a standardisation for surgical quality has raised. Previous studies investigated surgical margins status, complications rate, and intraoperative ischemia time to compare different surgical techniques.[6-7] Recently, these three parameters have been combined in the trifecta, used to describe favourable outcomes after PN.[8] current literature does not provide definitive conclusions about the impact of surgical technique on perioperative outcomes. In this study we compared intraoperative and postoperative surgical outcomes of laparoscopic and open PN. our aim was to compare intra op and post op surgical outcomes of laparoscopic PN (LPN) and open PN (OPN) based on operative time, warm ischemia time, estimated blood loss, intraoperative complications, postoperative complications, postoperative hospital stay and mean rise in creatinine.

METHOD

It is a retrospective study done in department of urology and renal transplant SCB medical college Cuttack Odisha India. Inclusion criteria were patients with a single, localized, suspected sporadic RCC 7 cm or less who were candidates for nephron sparing surgery and underwent PN either laparoscopically or by open method during May 2019 to May 2023. Patients with familial syndromes, multifocal tumors, or radiological evidence of locally advanced disease or metastases were excluded. Total 33 partial nephrectomies (15 LPN and 18 OPN) done for non-metastatic locally confined renal mass (T1) during May 2019 to May 2023 were included in the study. All patients admitted in department of urology and renal transplant SCBMCH Cuttack for renal mass.

Preoperative evaluation comprised of medical history, physical examination, routine laboratory studies, including serum Cr, hemogram, and urinalysis, chest x-ray and abdominopelvic computerized tomography/magnetic resonance imaging done and renal score calculated for each patient. Preop workup done and after proper evaluation and pre anaesthetic check-up PN done either laparoscopically/by open method.

Decision to proceed open or laparoscopic was taken based upon patient's choice and consent and decision of operating surgeon. Intra op and post op surgical outcomes of LPN and OPN compared based on operative time, warm ischemia time, estimated blood loss, Intraoperative complications, postop complications, postoperative hospital stay and mean rise in creatinine. Statistical analysis done and p value calculated.

RESULTS

Patient characteristics- age and sex distribution

Total 33 patients included in study (15 LPN and 18 OPN). Mean age in LPN group was 40.26 years while in OPN group it was 49.5 years. Total 20 males and 13 females were included out of which 10 males operated laparoscopically and 10 by open method while in female 5 were operated laparoscopically and 8 were operated by open method (Table 1).

Table 1: Patient characteristics-age and sex distribution.

Variables	LPN	OPN
No. of cases	15	18
Mean age (In years)	40.26	49.5
M/F	10/5	10/8

Tumor characteristics

Out of total 33 patients underwent PN, 23 were having right sided renal mass while 10 were having left sided renal mass. In right renal mass (n=23), 11 patients (47.8%) were operated laparoscopically and 12 (52.2%) were operated by open method. In left renal mass (n=10), 4 patients (40%) were operated laparoscopically and 6 patients (60%) were operated by open method.

Mean tumor size (maximum diameter in any dimension) in patients operated laparoscopically (LPN) was 41.26 mm while in patients operated by open method (OPN) mean tumor size was 44.5 mm. Mean renal nephrometry score in patients underwent LPN was 6.06 while in open method it was 5.94.

Table 2: Tumor characteristics.

Variables	LPN	OPN
Laterality L/R	4/11	6/12
Mean tumor size (mm)	41.26	44.5
Mean Renal score	6.06	5.94

Mean operating time

Mean intraoperative time was 140.66 min in OPN vs 172.8 min in LPN, on statistical analysis, p=0.0000000738 which in statistically significant.

Mean intraoperative estimated blood loss

Mean intraoperative estimated blood loss was 453 ml in OPN vs 345 ml in LPN. On statistical analysis p=0.113 which is statistically not significant.

Mean ischemia time

Mean ischemia time was 15.88 min in OPN vs 20.53 min in LPN. On statistical analysis, p=0.00000000872 which is statistical significant.

Mean post operative hospital stay

Mean post operative hospital stay was 7.5 days in OPN group while in LPN group it was 6.3 days. On statistical analysis, p=0.184 which is statistically not significant.

Mean rise in serum creatinine

Mean rise in serum creatinine was 0.25 in OPN group while in LPN group it was 0.29. On statistical analysis, p=0.642 which was statistically not significant.

Intraoperative and postoperative complications

In LPN group 2 out of 15 cases got complicated intraoperatively (13.33%). In OPN group 2 out of 18 cases got complicated intraoperatively (11.11%) (Table 3). Excessive intraoperative bleeding was the complication faced intraoperatively in all these 4 cases.

In postoperative period, In LPN group 4 out of 15 cases got complicated in postoperative period (26.66%) these

complications were acute kidney injury (AKI) in 1 case, postoperative ileus in 2 cases and in 1 case postoperative subhepatic and perinephric collection with sepsis developed. Three complications were having Clavien Dindo grade 2 and in one case Clavien Dindo grade was 3a as USG guided aspiration of perinephric collection and DJ stenting was done for perinephric and subhepatic collection. In OPN 5 out of 18 cases got complicated in postop period (27.77%). these complications were AKI in 1 case, surgical site infection in 3 cases and hematurian 1 case. All of these complications were Clavien Dindo grade 2 and managed conservatively (Table 4).

Table 3: Comparative parameters between LPN and OPN.

Variables	LPN	OPN	P value
Mean operating time (min)	172.8 min	140.66	0.0000000738
Mean intraop estimated blood loss (ml)	345.33	453.33	0.1134
Mean ischeamia time (min)	20.53	15.89	0.00000000872
Mean post-op hospital stays (days)	6.3	7.5	0.184
Mean rise in serum creatinine	0.29	0.25	0.642
Intraop complication (%)	2 (13.33)	2 (11.11)	
Postop complication	4 (26.66)	5 (27)	

Table 4: Post operative complications.

Variables	LPN	OPN	Clavien Dindo grade
AKI	1	1	2
Post op ileus	2	0	2
Post op collection	1*	0	3a*
Sepsis	1*	0	3a*
SSI	0	3	2
Hematuria	0	1	2
Total	4	5	

DISCUSSION

Many studies have examined the perioperative outcomes of PN. It is reasonable that surgical technique might influence perioperative outcomes. In our study LPN Vs OPN there was significant difference in the operating time (p=0.0000000738) Which is different from previous study done by You et al as in their study.[9] There was no statistical difference between LPN and OPN for operation time. In other study done by Reifsnyder et al, mean operative time was longer in the OPN group (p<0.001).[10]

In our study there was no significant difference in Mean intraoperative estimated blood loss between LPN and OPN groups, similar findings were found in study done by You et al, Reifsnyder et al and Bravia et al.[9-11]

In our study mean ischemia time was significantly less in OPN as compare to LPN group, similar finding was observed by previous studies.[11,12]

In our study there is no significant difference between OPN and LPN in terms of Mean postoperative hospital stay while in previous studies LPN was having significant shorter postoperative hospital stay.[10-12]

In our study there was no significant difference between LPN and OPN in terms of mean rise in serum creatinine, in study done by You et al there was less increased serum creatinine (p=0.002) with LPN as compare to OPN but no statistically significant difference found between the two surgical techniques regarding eGFR (p=0.31).[9]

In our study there was no difference between intraoperative and postoperative complications in OPN and LPN group while study done by Bravia et al show LPN had lower rate of Clavien-Dindo 2 complications than that of OPN (p=0.002) and no significant difference between intraoperative complications found in study done by You et al.[9,11]

Limitations

It is single institutional study with small sample size as total 33 cases of PN (15 LPN vs 18 OPN) included in study.

CONCLUSION

LPN is a feasible and safe alternative to the OPN with comparable surgical and functional outcomes. LPN has emerged as a viable alternative to OPN in appropriately selected patients. When applied to small renal tumors, LPN is associated similar blood loss and postoperative hospital stay and complication rate but longer ischemia time and operative time. Selection of an individual for LPN or OPN should depend on the particular patient and tumor characteristics, and the degree of laparoscopic expertise available at a given center. In experienced hands, LPN provides similar results compared to open surgery. Further quality studies are needed to evaluate effectiveness of LPN and its postoperative quality of life compared with OPN.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Sharma S, Swain S, Panda S, Tripathi A, Manharlal TY, Behera KK et al. Comparison between intraoperative and postoperative surgical outcomes of laparoscopic partial nephrectomy and open partial nephrectomy: laparoscopic versus open partial nephrectomy. Int J Res Med Sci 2023;11:4391-4.