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## Objectives

- Partial nephrectomy has been shown to achieve improved preservation of overall renal function compared to radical nephrectomy <sup>1</sup>
- However, partial nephrectomy is accompanied by concerns of local recurrences <sup>2</sup> as well as higher complication rates <sup>3</sup>
- There is paucity of data surrounding the subject of surgical margins, hence the lack of guidance on the best strategy for follow up and intervention
- Objective : To review the occurrences of positive surgical margins (PSM) and focally positive surgical margins after partial nephrectomy for kidney cancer, comparing their associations and clinical outcomes with those with negative surgical margins (NSM)

## Methods

- Single centre, retrospective study
- Inclusion criteria : Patients who underwent partial nephrectomy for localised renal cell carcinoma (cT1-cT3)
- Comparison made amongst 3 groups based on pathological surgical margins – focal (a single margin with 5mm involvement or less), extensive (greater than 5mm or if multiple margins involved) or negative margins
- Primary outcome : Recurrence and metastasis
- Secondary outcome : Peri-operative data, functional and oncological outcomes
- Data & Statistical analysis : Differences were reported using Chi-squared, Fisher's and Kruskal Wallis tests. Means were analysed using the One-Way Analysis of Variance (ANOVA) test. Statistical analysis was also performed using Kaplan-Meier survival curves

## Results

- A total of 137 renal cell carcinoma patients underwent partial nephrectomy
- 115 (83.9%) were classified as negative surgical margins after the partial nephrectomy. 22 (16%) patients had positive surgical margins, of which 7 (5%) were categorised as extensive based on our pre-determined definition, and 15 (3%) were focal positive margins
- Baseline clinical characteristics [Table 1] were comparable in all three groups except for gender, with a significantly greater proportion of male patients (P=0.02) with extensive positive surgical margins and focal positive surgical margins than negative surgical margins
- Negative surgical margins was associated with shorter operative time [Table 3] compared with extensive and focal positive surgical margins
- Pathologically, perinephric fat invasion [Table 2] was significantly associated (P<0.01) with positive surgical margins but there were no other differences in terms of cell type, grade and necrosis
- There were a total of 4 local recurrences [Table 3] all in the extensive positive surgical margins group with a median follow up period of 32.8 months

**Table 1.** Clinical demographics

Variable	Overall N=137 (SD)	Negative surgical margins N=115 (SD)	Extensive positive surgical margins N=7 (SD)	Focal positive surgical margins N=15 (SD)	P value
Median Age at Surgery (IQR)	58 (51-67)	58 (50-67)	66 (54-69)	60 (53-68)	0.62
Male Gender	97 (70.8)	76 (66.1)	7 (100.0)	14 (93.3)	0.02
Body Mass Index					0.92
18.49 and below	4 (2.9)	4 (3.5)	0 (0.0)	0 (0.0)	
18.5 to 24.9	50 (36.5)	42 (36.5)	2 (28.6)	6 (40.0)	
25.0 to 29.9	59 (43.1)	50 (43.5)	3 (42.9)	6 (40.0)	
30.0 and greater	24 (17.5)	19 (16.5)	2 (28.6)	3 (20.0)	

**Table 2.** Pathological data

Variable	Overall N=137 (SD)	Negative surgical margins N=115 (SD)	Extensive positive surgical margins N=7 (SD)	Focal positive surgical margins N=15 (SD)	P value
ISUP/WHO Grade					0.74
1-2	76 (55.5)	65 (56.5)	3 (42.9)	8 (53.3)	
3-4, Unclassified	61 (44.5)	50 (43.5)	4 (57.1)	7 (46.7)	
Histology					0.99
Clear cell	109 (79.6)	91 (79.1)	4 (57.1)	14 (93.3)	
Papillary	16 (11.6)	14 (12.1)	2 (28.5)	0 (0.0)	
Chromophobe	6 (4.4)	5 (4.4)	0 (0.0)	1 (6.7)	
Others	6 (4.4)	5 (4.4)	1 (14.3)	0 (0.0)	
Perinephric Fat Invasion					<0.01
No	126 (92.0)	109 (94.8)	4 (57.1)	13 (86.7)	
Yes	11 (8.0)	6 (5.2)	3 (42.9)	3 (13.3)	
Necrosis					0.37
No	123 (89.8)	102 (88.7)	6 (100.0)	15 (93.8)	
Yes	14 (10.2)	13 (11.3)	0(0.0)	1 (6.2)	

**Table 3.** Operative and oncological outcomes

Variable	Overall N=137 (SD)	Negative surgical margins N=115 (SD)	Extensive positive surgical margins N=7 (SD)	Focal positive surgical margins N=15 (SD)	P value
Approach					0.81
Open	37 (27.0)	33 (28.7)	1 (14.3)	3 (20.0)	
Laparoscopic	25 (18.3)	20(17.4)	2 (28.6)	3 (20.0)	
Robotic	75 (54.7)	62 (53.9)	4 (57.1)	9 (60.0)	
Mean operative time in minutes	235.8 (58.8)	228.5 (52.8)	282.1 (68.9)	270.5 (77.6)	<0.01
Warm Ischemia Time in Minutes	30.8 (12.7)	29.8 (12.6)	39.0 (10.6)	34.9 (13.5)	0.10
Estimated Blood loss in ML	280.3 (297.0)	266.2 (295.2)	498.1 (395.0)	284.7 (234.9)	0.14
Length of Hospitalisation Stay in Days	5.7 (4.3)	5.7(4.6)	6.1 (3.2)	4.8(2.0)	0.70
Clavien 3 and above Complications	12 (8.8)	11 (9.6)	0 (0.0)	1 (6.7)	0.65
Local Recurrence	4 (2.9)	0 (0.0)	4 (57.1)	0 (0.0)	<0.01
Metastasis	3 (2.2)	1 (0.9)	2 (33.3)	0 (0.0)	<0.01

## CONCLUSION

Extensive PSM and focal PSM share similar peri-operative associations when compared with NSM but have different pathological and oncological implications to each other. The higher association of perinephric fat involvement with extensive PSM may account for the finding that local recurrences exclusively occur in PSM. This study provides further clarification on the broad umbrella term of positive surgical margins for patient counselling, follow up and selection for treatment

## REFERENCES

1. Van Poppel H, Da Pozzo L, Albrecht W, et al. A prospective randomized EORTC intergroup phase 3 study comparing the complications of elective nephron-sparing surgery and radical nephrectomy for low-stage renal cell carcinoma. *Eur Urol.* 2007;51(6):1606-15.
2. Shah P, Moreira D, Patel V, Gaunay G, George A, Alom M et al. Partial Nephrectomy is Associated with Higher Risk of Relapse Compared with Radical Nephrectomy for Clinical Stage T1 Renal Cell Carcinoma Pathologically Up Staged to T3a. *Journal of Urology.* 2017;198(2):289-296.
3. Laguna M. Re: Partial Nephrectomy versus Radical Nephrectomy for Clinical T1b and T2 Renal Tumors: A Systematic Review and Meta-Analysis of Comparative Studies. *Journal of Urology.* 2017;198(6):1204-1206.