Comparative outcomes of partial vs. radical nephrectomy for localized renal carcinomas: Insights from real-world data

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Background

The choice of surgical method for renal tumors remains controversial. This study aimed to evaluate the differences in 5-year overall survival (OS) between partial nephrectomy (PN) and radical nephrectomy (RN) in patients with nonmetastatic localized renal cell carcinoma using real-world data from the Baden-Württemberg cancer registry (BWCR), Germany.

Methods

- **Study population**: non-metastatic pT1a-T3a renal tumors diagnosed between 2009-2022 and treated with either PN or RN.
- Survival Analysis: OS was assessed using the Kaplan-Meier method and adjusted by the Cox proportional hazards model.

Results: Overall Survival

OP	PN <i>(N=6047)</i>	reference			÷.			
	RN (<i>N=3860</i>)	1.51 (<i>1.35 - 1.69</i>)					-	<0.001
age	(N=9907)	1.06 (1.06 - 1.07)						<0.001
sex	M (<i>N=6625</i>)	reference			÷.			
	W (N=3282)	0.81 <i>(0.73 - 0.89)</i>	,					<0.001
oT-stage	pT1a (<i>N=4826</i>)	reference			÷.			
	pT1b-pT2b (<i>N=3377</i>)	1.11 (0.99 - 1.25)						0.085
	pT3a (<i>N=1704</i>)	1.44 (1.26 - 1.65)			,	-	-	<0.001
nistology	clear celí (N=7182)	reference			÷ •			
	papillary (N=1695)	1.13 <i>(0.99 - 1.29)</i>			•	-		0.075
	chromophobe (N=810)	0.67 (0.51 - 0.88)						0.004 *
	others (N=220)	1.32 (0.88 - 1.98)		·		-		0.178
grade	1-2 (<i>N=7890</i>)	reference			.			
	3-4 (N=1253)	1.52 (1.35 - 1.71)						<0.001
RStatus	R0 (<i>N=8253</i>)	reference						
	R+ (N=325)	1.48 (1.20 - 1.83)				-		<0.001

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Bias Adjustment: Propensity score weighting (PSW) was applied to minimize bias resulting from baseline characteristic differences.

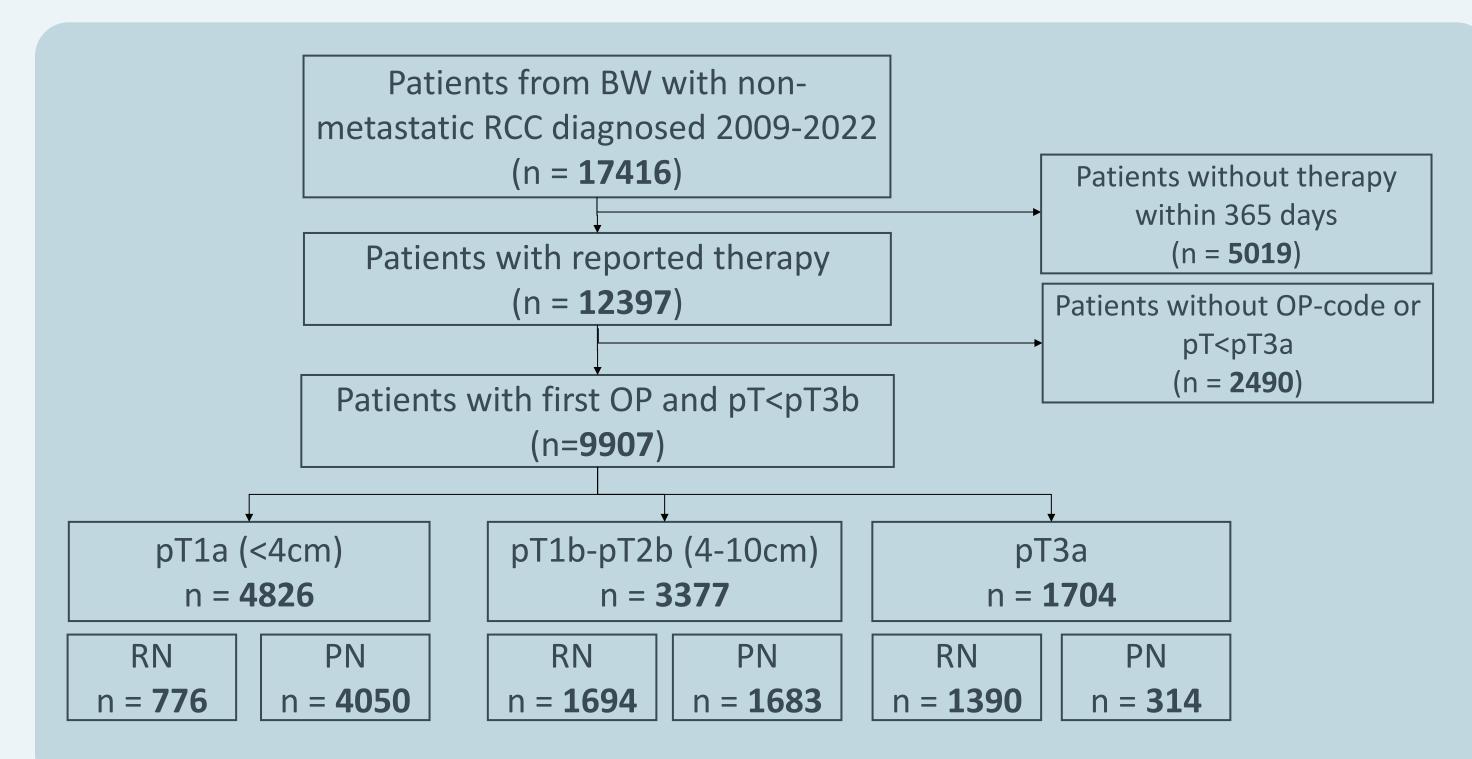


Fig. 1: Flow Chart

Results : Baseline clinical and patient characteristics

• A total of 9907 patients with a median follow-up of 64.1 months were identified

Fig.3: PSW-Adjusted Multivariate Cox Regression Analysis

	pT1a			oT1b-pT2b		
OP	PN (<i>N=4050</i>) reference		ОР	PN <i>(N=1682)</i> reference		
	RN 1.30 (<i>N=776) (1.11 - 1.52</i>)		• 0.001 *	RN 1.16 (<i>N=1695</i>)(0.97 - 1.38)	—	0.100
age	(N=4826) 1.07 (1.06 - 1.08)		<0.001 age	(N=3377) 1.07 (1.06 - 1.08)	•	<0.0
sex	M (<i>N=3279</i>) reference		sex	M (N=2173) reference		
	W 0.83 (<i>N=1547</i>)(0.72 - 0.97)	-	0.018 *	W 0.76 (N=1204)(0.64 - 0.91)		0.00
grade	(N=1304) reference		grade	1-2 (<i>N=2599</i>) reference	•	
	2 1.02 (<i>N=2886</i>)(0.86 - 1.20) 3-4 1.01		0.818	(N=2355) 3-4 1.55 (N=470) (1.23 - 1.94)		■ <0.0
(weights)	3-4 1.01 (<i>N=270</i>) (0.73 - 1.41) ⁻ (<i>N=4826</i>) reference		0.94 (weights			
OP	pT3a PN (N=314) reference		• Aft	er adjusting for all	risk factors,	patient
	(N=314) RN 1.16 (N=1390)(0.97 - 1.38)	⊢ i	0.108	h pT1a stage show		efit from
age		•	0.108			efit from
age sex	RN 1.16 (<i>N=1390</i>)(0.97 - 1.38)		<0.001 RN	h pT1a stage show (HR 1.31, 95% CI 1	.12-1.54 <i>,</i> P<	efit from 0.001)
-	RN 1.16 ($N=1390$)(0.97 - 1.38) ($N=1704$) 1.07 ($1.06 - 1.08$)		 0.108 RN <0.001 For 	h pT1a stage show	.12-1.54, P< 1a, PN and	efit from 0.001)
-	RN 1.16 ($N=1390$)(0.97 - 1.38) ($N=1704$) 1.07 ($1.06 - 1.08$) M ($N=1173$) reference		 0.108 RN <0.001 For 	h pT1a stage show (HR 1.31, 95% CI 1 stages beyond pT	.12-1.54, P< 1a, PN and	efit from 0.001)
sex	RN 1.16 (N=1390)(0.97 - 1.38) $(N=1704) \begin{pmatrix} 1.07\\ (1.06 - 1.08) \end{pmatrix}$ M (N=1173) reference W 0.76 (N=531) (0.64 - 0.91)		0.108 <0.001 For 0.002 * cor	h pT1a stage show (HR 1.31, 95% CI 1 stages beyond pT	.12-1.54, P< 1a, PN and outcomes	efit from 0.001) RN yield

	pT1a		pT1b-pT2b		pT3a	
	PN	RN	PN	RN	PN	RN
Total — no. (%)	4050 (83.9)	776 (16.1)	1683 (49.8)	1694 (50.2)	314 (18.4)	1390 (81.6)
Age — mean (SD)	64.4 (11.7)	67.6 (11.4)	63.2 (12.9)	65.8 (12.4)	67.9 (11.1)	69.1 (11.6)
Agegroup — no. (%)						
• <70	2542 (62.8)	402 (51.8)	1086 (64.5)	969 (57.2)	148 (47.1)	633 (45.5)
• ≥70	1508 (37.2)	374 (48.2)	597 (35.5)	725 (42.8)	166 (52.9)	757 (54.5)
Sex — no. (%)						
• M	2780(68.6)	499(64.3)	1140(67.7)	1033(61.0)	240(76.4)	933(67.1)
• W	1270(31.4)	277(35.7)	543(32.3)	661(39.0)	74(23.6)	457(32.9)
Histology — no. (%)						
Clear cell	2802 (69.2)	588 (75.8)	1078 (64.1)	1292 (76.3)	230 (73.2)	1192 (85.8)
Papillary	840 (20.7)	124 (16.0)	385 (22.9)	206 (12.2)	48 (15.3)	92 (6.6)
Chromophobe	324 (8.0)	39 (5.0)	192 (11.4)	153 (9.0)	30 (9.6)	72 (5.2)
Others	84 (2.1)	25 (3.2)	28 (1.7)	43 (2.5)	6 (1.9)	34 (2.4)
Grading — no. (%)						
• -	3508 (94.2)	682 (92.8)	1333 (87.4)	1266 (82.0)	227 (78.5)	874 (66.0)
• - V	217 (5.8)	53 (7.2)	192 (12.6)	278 (18.0)	62 (21.5)	451 (34.0)
R-status — no. (%)						
• R0	3369 (95.8)	651 (99.5)	1417 (95.6)	1459 (99.7)	239 (86.9)	1118 (94.0)
• R+	146 (4.2)	3 (0.5)	65 (4.4)	4 (0.3)	36 (13.1)	71 (6.0)

In all three pT-stage groups:

• PN is significantly more common in patients <70 years, males, with papillary

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5-years Survival: Subgroup Analysis

		All patients	Grade 1-2	Grade 3-4	Clear cell	Age < 65y	Age 66-75
pT1a							
٠	PN	88.3%	88.3%	83.9%	87.8%	94.3%	86.5%
٠	RN	79.2%	79.1%	78.6%	79.3%	87.6%	78.4%
pT1b-	pT2b						
٠	PN	85.0%	87.2%	69.8%	84.6%	93.1%	81.6%
٠	RN	79.3%	80.6%	71.2%	79.3%	87.5%	83.3%
pT3a							
٠	PN	76.5%	80.4%	57.6%	74.2%	88.2%	82.7%
•	RN	64.9%	70.4%	54.2%	65.3%	79.9%	63.3%

histology, and lower grading.

• RN is significantly more common in patients ≥70 years, with higher grading and a higher R0 resection rate.

Prognostic factors

- Key prognostic factors influencing OS include age, sex, and tumor histology, with the chromophobe subtype associated with a more favorable prognosis.
- Additionally, tumor grading and the presence of residual tumor status play significant roles in determining outcomes

Red marked numbers denote no statistically significant difference for 5-year OS between PN and RN.

Conclusion

- Patients, younger than 65 years or with low grading, as well as clear cell histology had better survival after receiving PN compared to RN.
- For aggressive tumors with high grading, OS is comparable between the two procedures, regardless of pT stage.
- Individual risk assessment for PN is important.
- Data from the cancer registry enable flexible analysis of patient subgroups



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