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

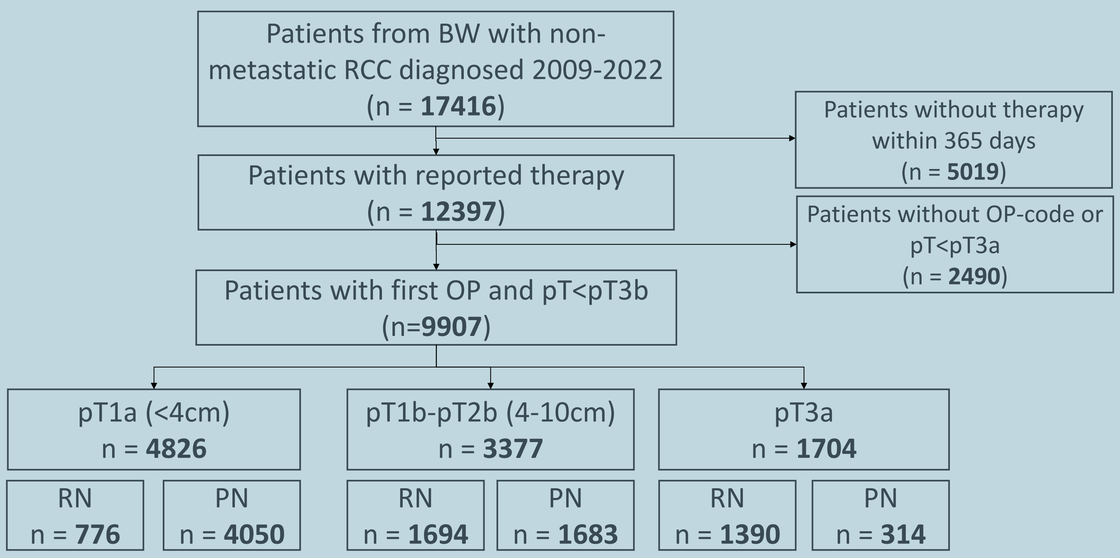


Fig. 1: Flow Chart

Results : Baseline clinical and patient characteristics

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

	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. (%)						
• I-II	3508 (94.2)	682 (92.8)	1333 (87.4)	1266 (82.0)	227 (78.5)	874 (66.0)
• III-IV	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 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

Results: Overall Survival

Fig.2: Prognostic factors

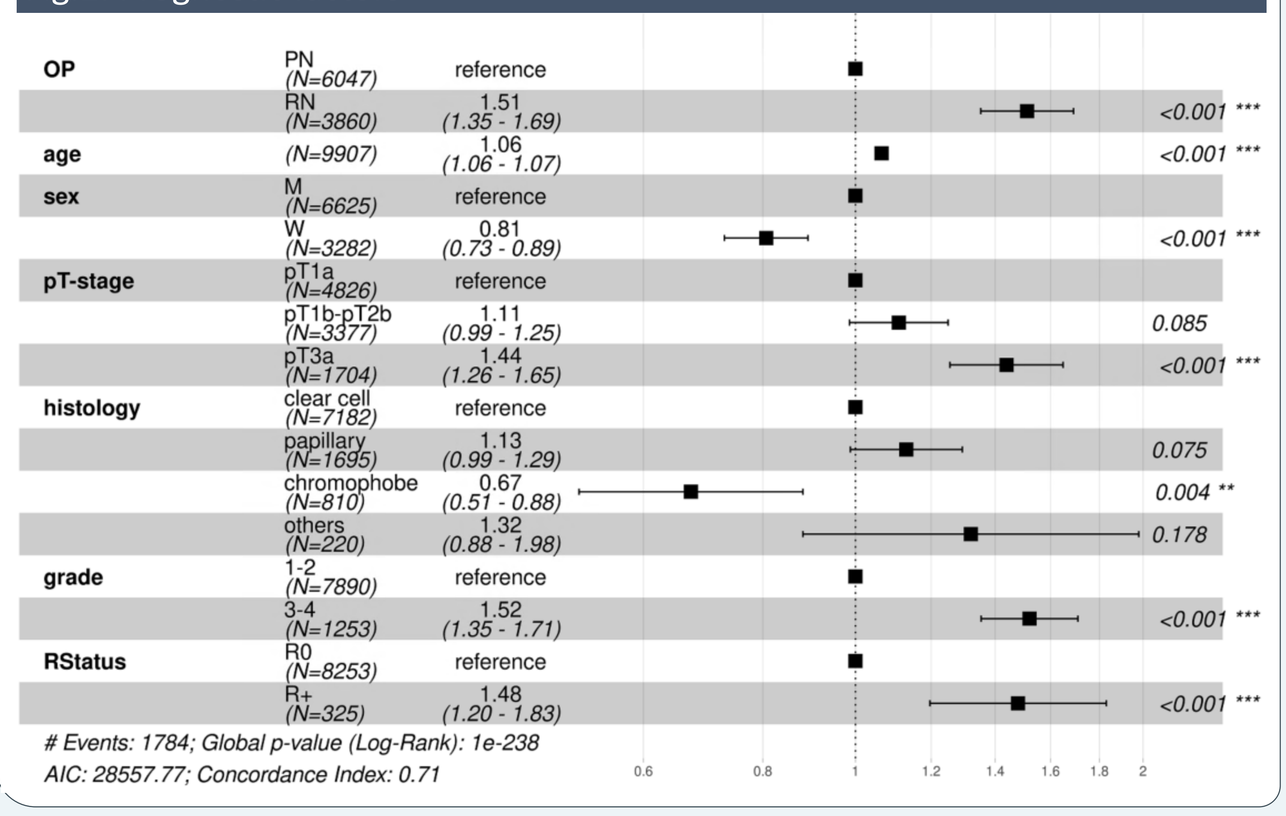
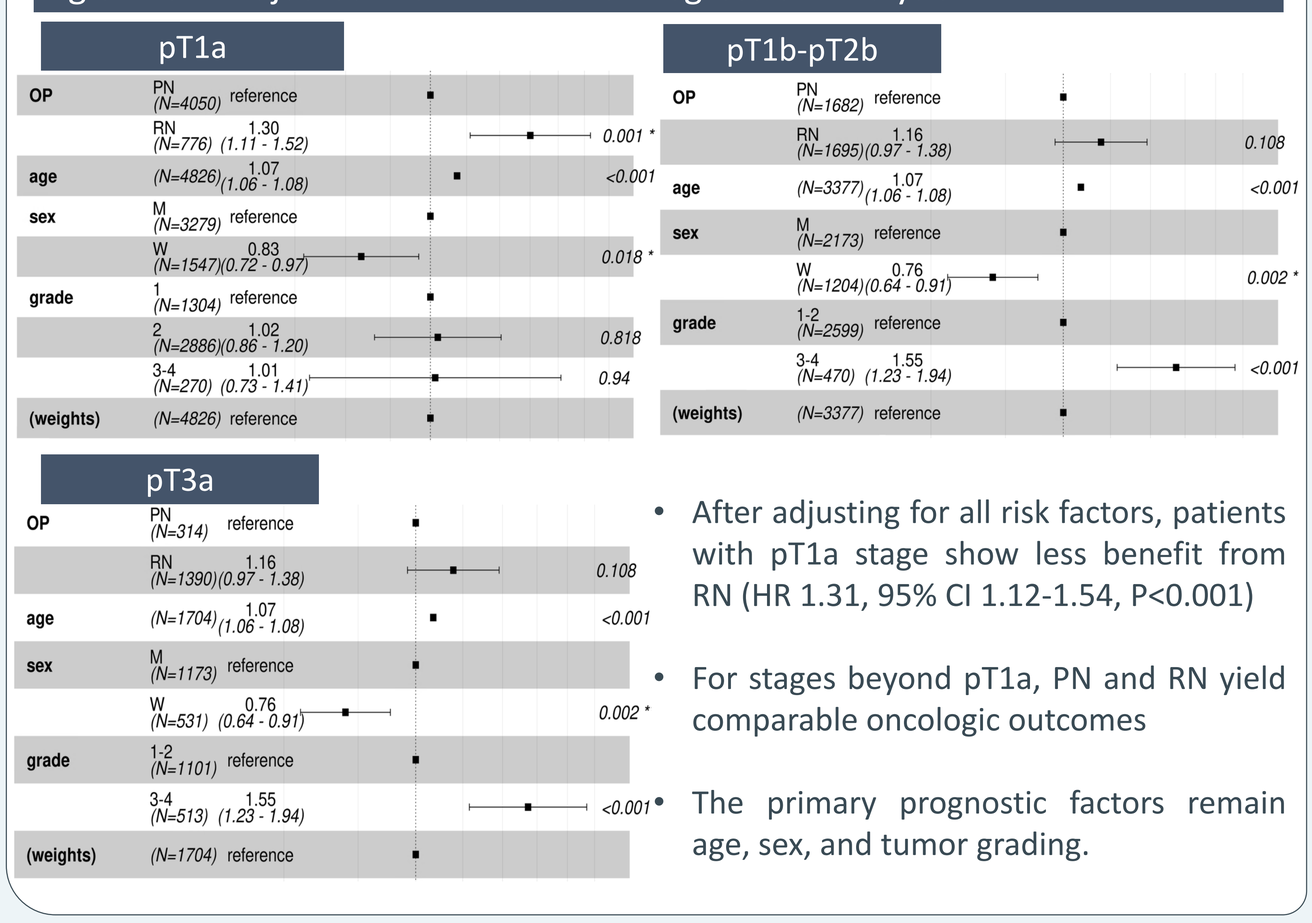


Fig.3: PSW-Adjusted Multivariate Cox Regression Analysis



- After adjusting for all risk factors, patients with pT1a stage show less benefit from RN (HR 1.31, 95% CI 1.12-1.54, P<0.001)
- For stages beyond pT1a, PN and RN yield comparable oncologic outcomes
- The primary prognostic factors remain age, sex, and tumor grading.

5-years Survival: Subgroup Analysis

	All patients	Grade 1-2	Grade 3-4	Clear cell	Age < 65y	Age 66-75
pT1a						
• PN	88.3%	88.3%	83.9%	87.8%	94.3%	86.5%
• RN	79.2%	79.1%	78.6%	79.3%	87.6%	78.4%
pT1b-pT2b						
• PN	85.0%	87.2%	69.8%	84.6%	93.1%	81.6%
• RN	79.3%	80.6%	71.2%	79.3%	87.5%	83.3%
pT3a						
• 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%

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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