#744 A 7-Year Review of Robot-Assisted vs Laparoscopic Radical Nephrectomy at a UK District General Hospital (2018–2024)

Department of Urology, Surrey and Sussex Healthcare NHS Trust.
Miss. Asmita Hossain, Miss. Shweta Das, Mr. Ahmed Albnhawy, Mr. Shahid Khan

Background

Radical nephrectomy remains the cornerstone in managing large or locally advanced renal masses unsuitable for nephron-sparing surgery. The procedure involves en bloc removal of the kidney, perinephric fat, Gerota's fascia, and occasionally the adrenal gland or lymph nodes depending on tumor extent. Renal Cell Carcinoma (RCC) accounts for 2–3% of adult malignancies. With rising incidental detection via imaging, nephrectomy rates have surged in the past two decades.

Objective

Radical nephrectomy remains a primary treatment for renal cell carcinoma (RCC) when nephron-sparing surgery is not feasible. This study compares robot-assisted and laparoscopic radical nephrectomy performed at DGH over a 7-year period, focusing on perioperative outcomes, complications, oncological safety, and treatment timelines.

Methodology:

Retrospective review, 113 patients (2018–2024). Grouped by surgical technique:
Robot-Assisted Radical Nephrectomy (n=50), Laparoscopic Radical Nephrectomy (n=63)
Parameters: Demographic variables, renal function, TNM staging, operative metrics, complications, margin status, and POSSUM risk scores were collected.

Results

Mean Age: Robotic 66.4 yrs | Laparoscopic 64.8 yrs
- Robotic: M 27 / F 23 (37–86 yrs)
- Laparoscopic: M 35 / F 30 (23–89 yrs)
- eGFR: Robotic 69.04 | Laparoscopic 73.86 mL/min/1.73m^{2}Serum

Creatinine: Robotic 85.29 | Laparoscopic 80.85 µmol/L

Pathway Timings
- **Diagnosis → Decision:** 33 days
- **Decision → Surgery:** 29 days
- **Total:** 69 days

Some cases exceeded the 62-day cancer target.

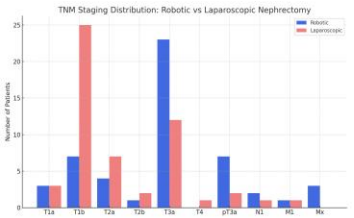
Presentation and Indications:

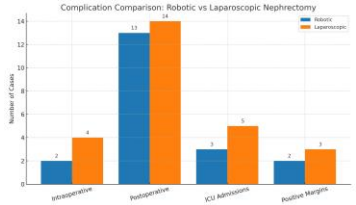
- **Incidental finding:** 59
- **Hematuria:** 28
- **Pain/mass:** 28

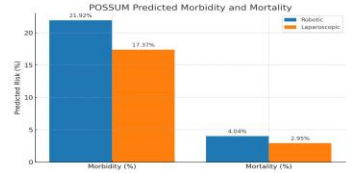
Note: Most masses were detected incidentally; hematuria remains a key symptom.

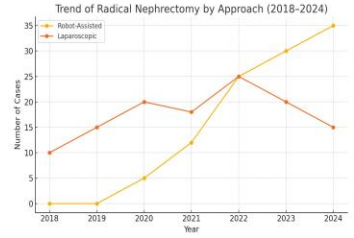
Operative Outcome

Outcome	Robotic	Laparoscopic
Op time (avg)	238 mins	191 mins
Blood loss	No difference	No difference
Transfusions	2 minor	1 mod, 1 minor
LOS (avg)	3.61 days	4.22 days
ICU admissions	3	5
Margin positivity	Slightly lower	—
Complications	Mostly Grade I–II in both groups	









TNM Staging Distribution

Robotic nephrectomy was more frequently used in patients with advanced-stage disease(T3a/pT3a and N1/M1 involvement), suggesting it was the preferred approach in more complex or higher-risk cases. Laparoscopic nephrectomy had a broader representation of early-stage tumors, particularly T1b, indicating its primary use in less complex scenarios.
Robotic surgery often selected for more complex or higher-stage tumors.

Complications: Both surgical groups had similar rates of postoperative complications. Robotic cases had lightly fewer intraoperative complications and lower margin positivity. The Clavien-Dindo grading indicated most events in both groups were mild (Grade I–II) ICU admission was needed in 3 robotic and 5 laparoscopic cases. Statistical analysis showed nonsignificant difference in ICU admission rates between the groups ($p = 1.0$; OR =0.74),suggesting similar risk profiles for major complications.

POSSUM scoring showed slightly higher predicted morbidity and mortality in the robotic group. This may reflect greater case complexity, as robotic surgery was more frequently used for higher-stage or challenging tumors.

Trends in Robotic Use

At our DGH, the transition towards robotic radical nephrectomy has been even more pronounced:
- **2018–2019**: All radical nephrectomies were performed using non-robotic methods.
- **2020–2021**: Introduction of robotic surgery, accounting for approximately **20%** of radical nephrectomies.
- **2022–2023**: Robotic procedures increased to **50%** of all radical nephrectomies.
- **2024**: Robotic surgeries constituted about **70%** of radical nephrectomies, indicating a strong institutional shift towards robotic techniques.

Conclusion

Robot-assisted radical nephrectomy is a safe and effective treatment for renal cell carcinoma, with perioperative outcomes comparable to laparoscopic surgery. In our cohort, the robotic group had slightly fewer intraoperative complications, lower margin positivity, and a trend toward shorter hospital stay, despite longer operative times, likely reflecting more complex tumor profiles and setup demands.
At our institution, we use the CMR Surgical Versius system, a newer and more expensive alternative to the more widely adopted da Vinci system. While cost remains a consideration, Versius offers modular flexibility, improved ergonomics, and surgeon-controlled open consoles, aligning with our institutional goals for advanced, high-precision minimally invasive care.

Key References

- Asimakopoulos et al., BMC Urology 2014 – Robotic radical nephrectomy: A systematicreview.
- British Association of Urological Surgeons (BAUS) Surgical Outcomes Audits, 2020–2024.
- SIU Congress Abstracts – Trends in minimally invasive urology, 2018–2023.
- JAMA Network Open (2022) – National surgical trends in robotic-assisted oncology.