Beyond the Learning Curve: Robotic Partial Nephrectomy Outcomes Continue to Improve With Surgeon Experience

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Introduction and Objectives: The learning curve to attain acceptable levels of warm ischemia time (WIT), postoperative complication (PC) rates and estimated blood loss (EBL) during robotic partial nephrectomy (RPN) is reportedly short (~20-30 cases) for high volume surgeons with extensive experience in robotic surgery or laparoscopic partial nephrectomy. Since increasing surgeon experience beyond the initial learning curve has been shown to result in improved perioperative outcomes in radical prostatectomy, we sought to determine whether this phenomenon also exists in RPN by analyzing the influence of surgeon experience on perioperative outcomes in two experienced surgeons who have surpassed the initial learning curve of RPN.

Methods: The present retrospective study identified 573 patients undergoing RPN from 2 surgeons at 2 medical centers. The most recent 175 consecutive RPN cases performed by the first surgeon and 398 recent cases performed by the second surgeon were analyzed. We assessed trends in perioperative outcomes and tumor specific characteristics using pearson product moment correlations and univariable logistic regression analysis to assess the association of the number of RPNs on WIT, EBL, PC, body mass index (BMI), tumor size and R.E.N.A.L. nephrometry score.

Results: Median R.E.N.A.L. score, tumor size, BMI were 6, 2.6cm and 29.22. Median WIT, EBL, and complication rates were 15 minutes, 75 cc and 17.5% respectively. With increasing surgeon experience, WIT ($r=-.340$, $p<.001$) decreased (**Figure 1**) while R.E.N.A.L. score ($r=.174$, $p<.001$) (**Figure 2**), tumor size ($r=.102$, $p=.012$) and BMI ($r=.082$, $p=.049$) increased over time. Increasing surgeon experience was not associated with PC ($p=.826$) or EBL ($p=.984$).

Conclusions: The learning curve for RPN improves steadily even after the initial learning curve is reached. WIT continues to trend downwards despite increasing tumor complexity, size, and higher BMI patients suggesting the true learning curve is longer than previous reports have suggested.

Figure 1. Warm Ischemia Time Over Time

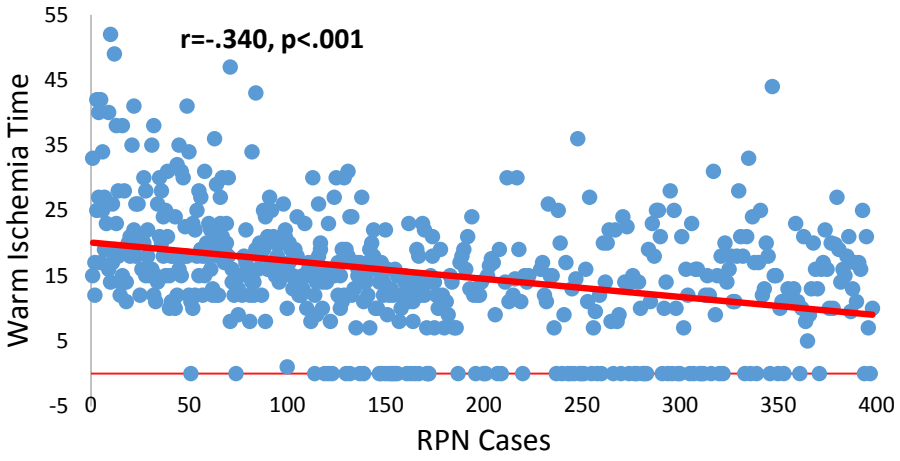

Figure 2. R.E.N.A.L. Nephrometry Score Over Time