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## EDITORIAL COMMENT



In this interesting study, the authors report their results from an 80-patient prospective randomized controlled trial comparing perioperative outcomes in patients undergoing robot-assisted partial nephrectomy, either on-clamp with warm ischemia or off-clamp.<sup>1</sup> The authors should be commended on publishing the first prospective randomized controlled trial comparing on-clamp and off-clamp RAPN. The results of their study demonstrate no difference in perioperative outcomes including estimated blood loss, complications, or positive surgical margins between the different clamping techniques.<sup>1</sup> Additionally, there was no difference in postoperative renal function as measured by estimated glomerular filtration rate and renal scintigraphy at 3-month follow-up.<sup>1</sup> These results provide level-one evidence which contradicts previous reports demonstrating improved renal function with an off-clamp technique, and questions urologic dogma that short-warm ischemic time has a detrimental effect on the kidney and postoperative renal recovery.<sup>2,3</sup>

Nephron sparing surgery has become the mainstay of treatment for clinically staged T1 renal masses, which are amenable to this approach, given the superior outcomes in renal function compared with radical nephrectomy.<sup>4</sup> This is especially important when considering the implications of long-term cardiovascular and overall survival benefits that are associated with preventing chronic kidney disease.<sup>5</sup> However, the ideal operative technique for maximizing renal preservation in partial nephrectomy has yet to be determined and remains widely debated. The importance of preserving renal function is especially important for patients at higher risk of developing chronic kidney disease; such as those with baseline renal insufficiency, a solitary kidney, or multiple renal masses.<sup>6,7</sup> This subset of patients is likely to be most vulnerable to renal insults and thus benefit the most from an off-clamp technique. Unfortunately, only patients with 2 kidneys, normal preoperative renal function, and a solitary renal mass were included in the present study; this may explain why the authors failed to demonstrate a difference in postoperative renal function outcomes.

In addition, the patients in the on-clamp arm were only exposed to a short duration of warm ischemia (mean 19 minutes), which may minimize the difference in postoperative renal function observed. Furthermore, the authors only report on short-term renal function at 3 months postoperatively. It is likely that several factors including operative clamping technique may have an important impact on long-term renal function. The predictors of renal function outcomes following partial nephrectomy have been shown to be different in the early postoperative period compared with longer term follow-up.<sup>8</sup> The present study provides high-level evidence that performing a partial nephrectomy utilizing an off-clamp technique does not provide any measurable benefit in early postoperative renal outcomes. However, these results contradict some previously

published reports and challenge our understanding of the pathophysiological impact of renal ischemia.<sup>2,3</sup> Consequently, further well-designed prospective studies comparing clamping techniques, which include patients at high risk for postoperative renal insufficiency with longer term follow-up data, are required before a consensus regarding the ideal clamping technique can be reached.

**Jennifer Bjazevic, B.H.Sc., M.D., F.R.C.S.C., Stephen E. Pautler, B.Sc., M.D. FRCSC**, Division of Urology, Western University, London, Ontario, Canada

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## AUTHOR REPLY

Indeed, the benefit of performing nephron sparing surgery off-clamp remains controversial. The present findings are meaningful to the extent that, at least in the short term, the off-clamp approach does not appear to result in vastly superior renal functional preservation in most patients; surgeons who perform RAPN on-clamp clearly need not avoid doing so in reaction to this study. However, the findings should be considered in the context of the abovementioned limitations including a relatively short follow-up period and the enrollment of patients with normal baseline renal function. Furthermore, if warm ischemia times are minimized to the extent reported herein, the choice between on-clamp and off-clamp in terms of functional preservation may ultimately prove to be inconsequential. The path is clear for future prospective trials to further examine this potentially underutilized technique in patients more susceptible to renal functional loss.

**Barrett G. Anderson, Aaron M. Potretzke, Kefu Du, Joel M. Vetter, Karla Bergeron, Alethea G. Paradis, R. Sherburne Figenshau**, Department of Urology, Detroit Medical Center, Detroit, MI; Department of Urology, Mayo Clinic, Rochester, MN; Division of Urologic Surgery, Washington University School of Medicine, St. Louis, MO

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