

Laparoscopic Off-Clamp Partial Nephrectomy for Complex RENAL Nephrometry Score Tumours

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Commentary

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Partial nephrectomy remains the gold standard approach for patients with localised renal tumours. However it comes with its own peri-operative challenges, especially when dealing with tumours in difficult locations. Several systems have been used in an attempt to standardise categorisation of tumours, of which the RENAL nephrometry scoring system has been the most widely utilised [1]. Hilar clamping (HC) during partial nephrectomy for tumours with moderate and complex RENAL scoring has been the most commonly adopted approach. It has the advantage of minimising peri-operative blood loss by operating in a relatively bloodless field allowing precise tumour resection and closure of the renal defect. This however, comes at the expense of operating in an ischaemic environment for the affected kidney, which can tolerate an agreed maximum ischaemia time of 25-30 minutes [2]. Techniques described to minimise this include off clamp and minimally ischaemic partial nephrectomy techniques consisting of pre-operative superselective transarterial embolization (P-STE), selective clamping, and zero-ischaemia using controlled hypotension or anatomical microsurgical clamping [3-5].

The current evidence is controversial regarding the effect of ischaemia time on the estimated glomerular filtration rate (eGFR) and subsequent long-term effects on renal function [6]. Renal function after partial nephrectomy is dependent on the 3 Qs: Quality (baseline eGFR), Quantity (percentage of renal function preserved), and Quickness (ischaemia time) [7]. By minimizing ischaemia time in off-clamp partial nephrectomy (OCPN), this has been shown to preserve renal function in tumours with low RENAL nephrometry scores [8].

There is however limited evidence about its safety and feasibility in tumours with intermediate and high RENAL nephrometry score [9,10]

In an unpublished series, we reviewed our series of 104 patients who underwent LPN by a single surgeon between April 2014 and October 2016. Those patients were in two groups; off clamp partial nephrectomy (OCPN) and the other groups constituted of those who underwent intraoperative hilar clamping (HC).

The mean RENAL nephrometry score was 8.5 and 8.47 in the OCPN and the HC (mean 25 min warm ischaemia time) groups respectively. There was a small difference in the mean peri-operative blood loss in the two groups; 286mls and 312mls in OCPN and HC groups respectively ($p=0.52$). One technically difficult procedure in the HC group with a high blood loss prior to conversion did increase the mean value of estimated blood loss.

The number of conversions to open procedures was three in OCPN and two in HC groups respectively.

There was no significant difference seen between the two groups in terms of urine leak (needing ureteric stenting) or post-operative sepsis. The mean difference in the peri-operative eGFR was a decline of 1ml/min/1.73m² and 2.5 mls/min/1.73m² in the OCPN and HC respectively ($p=0.08$).

When technically feasible, partial nephrectomy is regarded as the standard of care for patients diagnosed with a clinically localised renal mass, mainly due to a demonstrated benefit in terms of preservation of renal

function [11,12]. Off-clamp nephron sparing surgery potentially preserves the renal blood supply and eliminates ischemic reperfusion injury to the kidney [6]. However the benefits of OCPN have to be balanced against the risks of excessive bleeding compromising visualization of the surgical field.

OCPN is a skill needed by the entire surgical team including precise suction and irrigation and technical suturing facilities for successful bleeding control [13]. We followed Satkunasivam *et al.* method by performing our partial nephrectomy procedures with minimal margins, taking the advantage of working parallel to the radially-orientated intrarenal architecture and anatomy [14,15]. Late eGFR was directly associated with percentage functional volume preservation and highlighted the importance of technical modifications, including minimization of resection margins and of tissue incorporated into renorrhaphy, to optimize functional outcomes after PN [16].

Simone, *et al.* in their systematic review of 52 papers have shown an association between increased intraoperative blood loss and perioperative transfusion rates in OCPN in comparison to HC. They concluded that OCPN has potential functional benefits when longer ischemia time is anticipated, particularly for patients with lower baseline renal function.

In conclusion, off-clamp partial nephrectomy with an aim to eliminate parenchymal ischaemia, can be safely achieved on renal tumors with intermediate and complex RENAL scores, with preservation of perioperative renal functional and satisfactory oncologic outcomes.

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