

Comparison of intermittent versus continuous ischemian during laparoscopic partial nephrectomy in a porcine model

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INTRODUCTION

The primary goal of partial nephrectomy is to preserve as much renal function as possible. Thus, expanding the duration of safe warm ischemia and increasing the renal tolerance of vascular clamping are important objectives for complex laparoscopic partial nephrectomy. We aimed to explore whether intermittent ischemia could reduce renal function injury during partial nephrectomy in a porcine model and the feasibility of this technique during nephrectomy.

METHODS

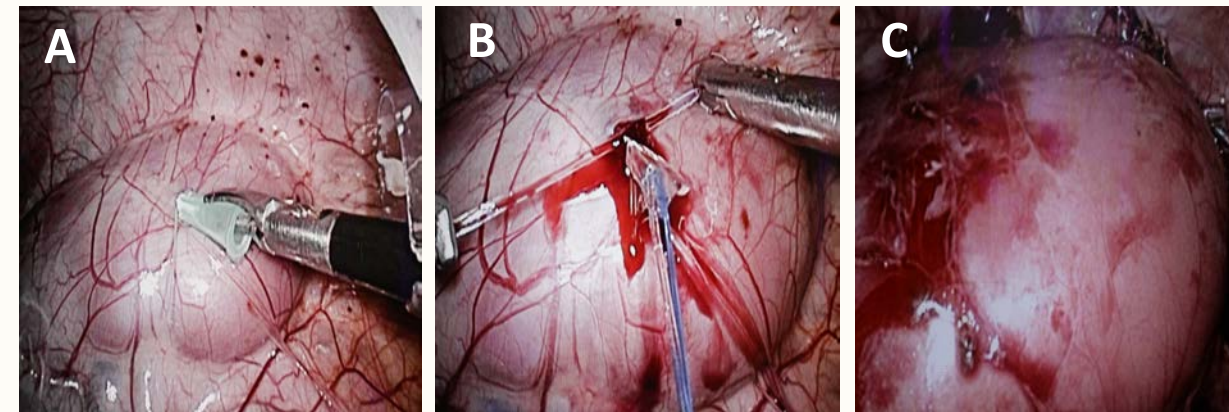
A kidney ischemia-reperfusion injury model was successfully established in six pigs under laparoscope. Continuous ischemia was applied to one kidney and intermittent ischemia to the other kidney in each pig.

Laparoscopic renal artery occlusion was applied to each kidney for 120 min. Intermittent ischemia was applied in 15/3 min cycles (15 min of ischemia and 3 min of reperfusion).

Renal function injuries were assessed using microdialysis technique, immunohistochemistry, and histopathological examination.

Microdialysis is a technique that involves placing a small probe in the organ of interest to collect samples that can be analysed for interstitial molecules. It was found that glycerol was a potential real-time, organ-specific marker for renal function.

ANIMALS AND OPERATIONS



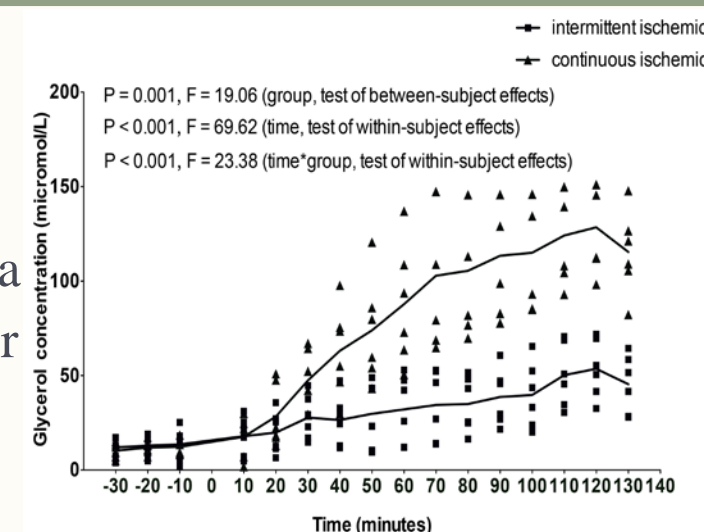
A: An 18 gauge 24 mm needle was laparoscopically guided to the anterior mid kidney at less than a 45-degree angle to the surface of the kidney.

B: Then the needle was removed and a CMA/20 Elite 14/10 polyarylethersulphone microdialysis probe was introduced into the needle path. Renal dialysis fluid was collected into a separate collection bottle for every 10 minutes.

C: After the 120 min ischemia + 30 min reperfusion period, kidney colour changes were observed in the continuous ischemia groups.

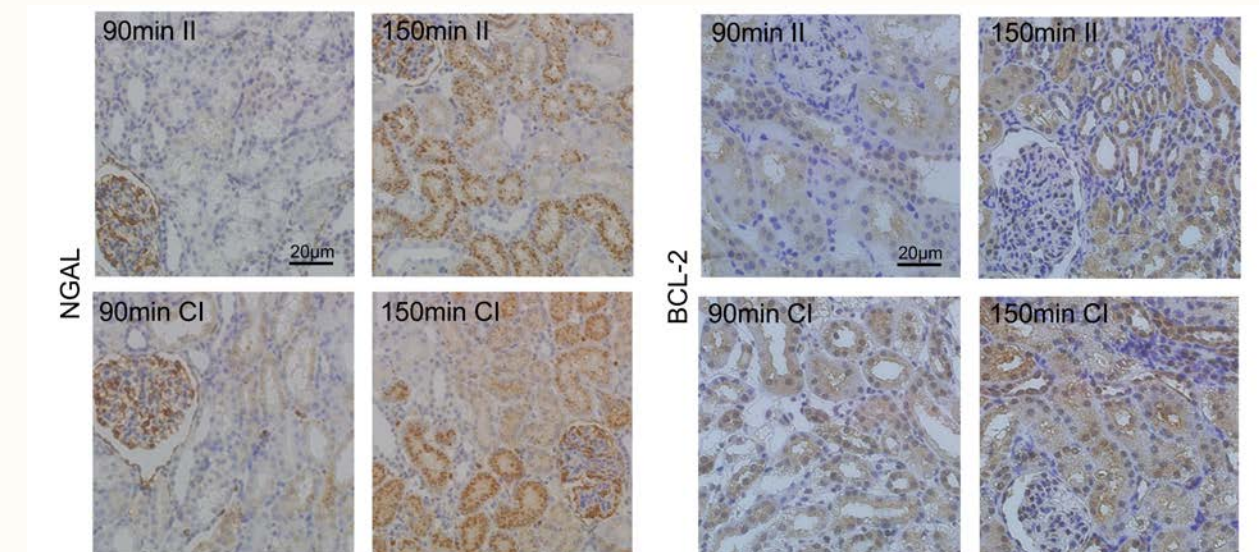
RESULTS

The glycerol concentrations for the intermittent ischemia kidneys during ischemia were significantly lower than those for the continuous ischemia kidneys ($P = 0.001$).



RESULTS

NGAL and BCL-2 immunostaining of the renal tubular epithelial cell in the intermittent ischemia kidneys were significantly reduced compared to those in the continuous ischemia kidneys ($F = 5.51, P = 0.041$; $F = 13.53, P = 0.004$).



However, the histopathological examination of renal tissues revealed no significant difference between the continuous ischemia group and the intermittent ischemia group.

CONCLUSION

Our study demonstrates that intermittent ischemia is a potentially effective and feasible method for the prevention of renal function injury in nephrectomy in the Porcine Model.

ACKNOWLEDGEMENTS

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