Laparoscopic Surgery for Kidney Orthotopic Transplant in the Pig Model

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Introduction: The surgical technique for kidney transplantation has not been changed since the first successful kidney transplant in 1950’s. The kidney is routinely placed in the iliac fossa with renal artery anastomosed to iliac artery and renal vein anastomosed to iliac vein. The disadvantage of this technique is that the kidney graft is lack of protection in the groin area from contact sport injury or trauma. It also becomes challenge when the third or more kidney transplant is required for the recipient. Therefore, this study is to develop a new technique of kidney transplant at the region of native kidney by laparoscopic technique.

Materials and methods: The study was approved by the animal ethic committee of the University of Western Australia. It consists of two parts: The laparoscopic technique for vessel anastomosis was practiced in 10 cadaveric pigs that were used for other study. The study was then moved to life pig experiment after establishment of the laparoscopic technique for vessel anastomosis. Four pigs, two males and two females (Sus Scrofa), weighing 45-50 kg, were allowed to have acclimation for two weeks prior to surgery. The oral intubation was conducted with a cuffed endotracheal tube (Portex, Soft Seal Cuff, 8.0 mm ID. SIMS Portex Limited, UK) for general anaesthesia. The adequacy of the anaesthesia was maintained by adjusting the inhalation of Isoflurane. Firstly, the left laparoscopic donor nephrectomy was performed. The kidney was perfused with Ross solution (Orion, Australia, Ross solution 1 L + Heparin 10 000 IU) until the return clear at venous end and preserved in cold (4° C) Ross solution (Orion, Australia, Ross solution 1 L + Heparin 10 000 IU) until the return clear at venous end and preserved in cold (4° C) Ross solution. The kidney graft was prepared on bench table. The orthotopic auto-transplant was subsequently performed by laparoscopic technique with renal artery end to end and renal vein end to end anastomosis. The kidney graft blood flow was assessed by Doppler ultrasound and urine output was observed.

Results: All live pigs had successful laparoscopic nephrectomy. The first pig had failed renal vein anastomosis. The other three pigs had satisfactory renal artery and vein anastomosis with kidney graft reperfused rapidly and uniform. The blood loss is minimal (< 50 ml). There is no peri-operative mortality. The time for arterial anastomosis was 30-35 minutes and for vein was 25-30 minutes. The urine output was seen in the second and fourth pig. The Doppler ultrasound showed adequate blood flow in the kidney graft. The pigs were euthanized after 1-4 hours observation.

Conclusion: It has been demonstrated that Orthotopic kidney transplant by laparoscopic technique is feasible and safe although it is challenge. This technique will open a new approach in the kidney transplant, which will be favoured in the young recipient who is more likely to enjoy the sports. In addition, this technique will facilitate the third and fourth kidney graft transplant in most of recipients.

Intravesical Versus Extravesical Ureteroneocystostomy in Kidney Transplantation: A Systematic Review and Meta-Analysis

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Introduction: From the several techniques for facilitating urinary continuiy of the transplanted kidney, the ureteroneocystostomy appears to be most widely accepted and is associated by the least number of complications. Nevertheless, urological complications are still a major problem postoperatively with a reported incidence in up to 30%, associated with significant morbidity, mortality, prolonged hospital stay and high medical costs. There is no evidence to conclude if an extravesical or intravesical approach is superior to the other. This review and meta-analysis was carried out to investigate whether there is a technique for the ureteroneocystostomy that is to be preferred.

Methods: Comprehensive searches were conducted in PubMed, Embase and the Cochrane Library. Reference lists were searched manually. The methodology was in accordance with the PRISMA statement.

Results: Two randomized controlled trials and seventeen cohort studies were identified. Based on the meta-analysis, outcome was in favour of the extravesical anastomosis, including a relative risk (RR) of stenosis of 0.67 (confidence interval (CI) 0.48-0.93; p=0.002), of leakage 0.55 (CI 0.39-0.80; p=0.001) of total number of urological complications 0.56 (CI 0.41-0.76; p=0.002) and of haematuria 0.41 (CI 0.22-0.76; p=0.005).

Conclusion: Based on these results there is evidence in favour of the extravesical ureteroneocystostomy technique for decreased urological complications in kidney transplantation.