Remote Ischemic Conditioning for Kidney Protection: A Meta-Analysis

**Background, Aim & Objectives**

Remote ischemic condition (RIC) is a therapeutic strategy for protecting organs against the detrimental effects of acute ischemia-reperfusion injury. RIC describes a phenomenon in which one or more brief cycles of non-lethal ischemia and reperfusion to an organ protects a remote organ from sustained ischemic injury. Findings of recent randomized controlled trials (RCTs) into the effect of RIC on the kidney are inconsistent.

**Methods**

**Design**

We performed a systematic review and meta-analysis of all eligible RCTs of RIC with acute kidney injury as the primary outcome. Secondary outcomes were the incidence of renal replacement therapy (RRT), estimated glomerular filtration rate (eGFR), serum creatinine (Scr) and mortality. We searched Medline, Embase, the Cochrane Library, Google Scholar and Chinese database (SinoMed) from their inception to June 2015 to identify studies with acute kidney injury (AKI) as the primary outcome. We pooled relative risk (RR) or standardized mean difference (SMD) with 95% confidence intervals (95% CI) using Stata 12.0 and Review Manager 5.2.

**Results**

Thirty-four RCTs from 2007 to 2015 involving 5171 patients were included. Pooled analyses of showed RIC significantly reduced the incidence of AKI (as defined by investigators in each study) compared to the control group (RR 0.78, 95% CI: 0.67 to 0.91, P = 0.001) with no evidence of heterogeneity ($I^2 = 17\%$).

In subgroup analysis, similar results were found in patients undergoing cardiac surgery (RR 0.86, 95% CI: 0.73 to 1.01) or percutaneous coronary intervention (PCI) (RR 0.64, 95% CI: 0.46 to 0.87). While remote ischemic pre-conditioning (RR 0.77, 95% CI: 0.64 to 0.92) and post-conditioning (RR 0.70, 95% CI: 0.52 to 0.95) were both associated with lower incidence of AKI respectively.

Importantly, there was no difference in changes in eGFR (Fig. A) or Scr (Fig. B) between RIC and control patients and no effect on the incidence of RRT (Fig. C).

**Implications & Conclusions**

Remote Ischemic conditioning may provide a degree of kidney protection. However, based on our findings large prospective RCTs focusing on RIC for kidney protection appear warranted.