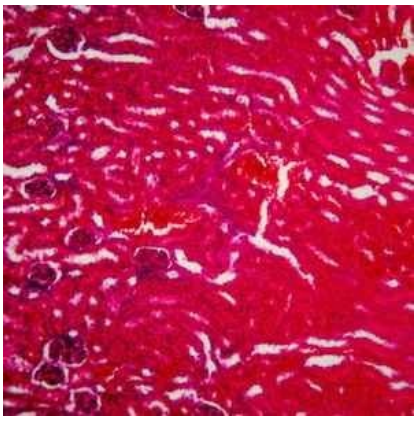
ICU
MANAGEMENT & PRACTICE

Remote Ischaemic Conditioning to Protect the Kidney



Two meta-analyses have been published recently that look at the effect of remote ischaemic conditioning (RIC) and remote ischaemic preconditioning (RIPC) on kidney protection, taking into account results from recent randomised clinical trials (RCTs).

Remote Ischaemic Conditioning

Ling Zhang, MD, PhD, Department of Nephrology, West China Hospital of Sichuan University, Sichuan, Chengdu, China, with colleagues from Austin Hospital, Melbourne, Australia and the Australian and New Zealand Intensive Care Research Centre analysed the results of 37 RCTs from 2007 to 2015 that included 8168 patients (Zhang et al. 2016). Their analysis of the evidence for kidney protection achieved by RIC also includes incidence of acute kidney injury (AKI), the need for renal replacement therapy (RRT), kidney biomarker levels and mortality. Of the RCTs analysed, they found 31 trials with 7777 patients that reported the incidence of investigator-defined AKI. 30 studies were pooled in meta-analysis. The analysis included trials of any form of remote ischemic conditioning (RIC), pre-, per- or post-, as long as the only difference in the 2 arms was the performance of RIC.

See Also: Remote Ischaemic Preconditioning Reduces Kidney Injury after Cardiac Surgery

Zhang et al.'s analysis found that RIC significantly reduced the incidence of investigator-defined acute kidney injury (AKI). When only the Risk, Injury, Failure, Loss, End Stage), AKIN (Acute Kidney Injury Network (RIFLE), or Kidney Disease Improving Global Outcomes (KDIGO) criteria were used, however, the difference was not significant. The subgroup analysis showed that RIC was beneficial in reducing investigator-defined AKI in patients following percutaneous coronary intervention, but not after cardiac surgery. There was no difference for changes in the incidence of renal replacement therapy, estimated glomerular filtration rate or serum creatinine. There was a significant difference in investigator-defined AKI incidence in blinded-design RCTs, and both pre-conditioning and post-conditioning were associated with lower incidence of investigator-defined AKI.

Zhang et al. conclude that while RIC might be beneficial for the prevention of investigator-defined AKI, the effect is likely small. They add that due to lack of an effect on use of renal replacement therapy, estimated glomerular filtration rate, RIFLE, AKIN, or KDIGO–defined AKI, and serum creatinine, the evidence for RIC is not robust. Finally, recent large scale RCTs of RIC focusing on patient-centred outcomes do not support the wider application of RIC. They conclude: "Therefore, the present evidence in favour of RIC as a technique of kidney protection does not appear robust enough for introduction into practice."

Remote Ischaemic Preconditioning

The analysis by Jiachang Hu, of the Division of Nephrology, Zhongshan Hospital, Fudan University, Shanghai, China and colleagues included 30 RCTs (7244 patients), and their primary outcome was incidence of AKI and hospital mortality (Hu et al. 2016). Their study set out to reassess the effects of remote ischaemic preconditioining RIPC on the incidence and outcomes of AKI and to apply meta-regression analyses of confounders associated with the effects of RIC on AKI to find out which patients might benefit most from RIPC. The time period selected was 1993 when the RIC concept was first proposed, up to February 2016. The researchers categorised the AKI definitions and staging system according to a Kidney Disease: Improving Global Outcomes (KDIGO)-equivalent AKI definition.

They found that total pooled incidence of AKI in the RIPC group was 11.5% compared to 23.3% in the control group. Their subgroup analyses showed that RIC reduced incidence of AKI in the contrast-induced AKI (CI-AKI) subgroup from 13.5 % to 6.5 %, but not in the ischemia/reperfusion-induced AKI (IR-AKI) subgroup (from 29.5 % to 24.7 %). They also found that RIC had no significant effect on the incidence of stages 1–3 AKI or renal replacement therapy, change in serum creatinine and estimated glomerular filtration rate (eGFR), hospital or 30-day mortality, or length of hospital stay. However, they found that RIC significantly increased the minimum eGFR in the IR-AKI subgroup compared with the control group. Length of ICU stay in the RIPC group was shorter than in the control group (2.6 vs 2.0 days). They did not find the effects of RIPC on the incidence of AKI stages 1–3 or the incidence of RRT. RIPC also did not reduce the hospital or 30-day
mortality or the length of hospital stay.

Discussing the limitations of their study, Hu et al. note that due to limited data and high heterogeneity they are unable to conclude which protocol was superior to another. They recommend further studies to test RIPC for kidney protection in patients with high-risk conditions and to test the various effects of RIPC on AKI at different levels of risk.

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