Introduction: Abrupt restoration of blood flow after prolonged ischemia results in ischemia/reperfusion (I/R) injury. This paradoxical unwanted phenomenon remains an unsolved problem in musculoskeletal reconstructive surgery even after successful microsurgical anastomosis. Recently, the newly emerging concept of post-conditioning (post-con) has been introduced and hopeful experimental results have been reported through the limited trials in heart and cerebral I/R injuries. The authors tested the hypothesis that the intermittent interruption of reperfusion, i.e. post-conditioning attenuates ischemia/reperfusion (I/R) injury in rat adipocutaneous flaps.

Materials and Methods: Complete ischemia for 4 hrs was generated by occluding the vascular pedicle supplying the dissected adipocutaneous flaps. The ischemic post-con procedure was started immediately after the end of ischemia. A cycle of 15 sec of full reperfusion, followed by 15 sec of complete re-occlusion was repeated 3 times (total intervention time 1min 30 sec). Flap necrosis areas were compared with those in sham (no ischemic exposure) and control (4 hrs of ischemia followed by full reperfusion without post-con procedure) groups on post-reperfusion day 5. Histology and MPO activities of flaps were evaluated to verify the amount of acute inflammatory reaction in each group on post-reperfusion day 1 and 3.

Results: The average necrotic area of adipocutaneous flap was definitely reduced in post-con group compared to control group on post-reperfusion day 5. Decreased inflammatory cell infiltration and MPO activity on post-reperfusion day 3 indicated that post-con successfully attenuated acute inflammatory reaction caused by I/R.

Discussion: The authors report for the first time that ischemic post-con procedure attenuates the rat adipocutaneous flap I/R injury. With further study, post-con may eventually be clinically applicable for the musculoskeletal I/R injury, such as replantation of an amputated limb, revascularization of the transplanted limb or free flap surgery, as an 'after-injury strategy'.


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