

Comparison of skeletal muscle microcirculation between clamp ischemia and microsurgical ischemia

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摘要

Abstract

We compared ischemia reperfusion injury-associated vasospasm and perfused capillary density (PCD) at the microcirculatory level between clamp ischemia and microsurgical ischemia in rat skeletal muscle. Rat cremaster muscle was prepared as an island flap, attached only with pudic-epigastric vessels branching from external iliac vessels. Two types of ischemia, with clamping only or with microvascular anastomosis, were applied at the external iliac vessels for 2 hours followed by 1-hour reperfusion before in vivo microscopic examination for hemodynamic changes. At the end of observation, small segments of the vessels at the clamping site and microsurgical anastomoses site were also harvested for histological examination. It was found that the first- and second-order arterioles had about 12-15% diameter reductions in both groups, whereas diameter reductions of the third-order arterioles were up to 37.8% in the microsurgical ischemia group, much greater than that in the clamp ischemia group (2.3%). There was also no significant difference in PCD reduction between the two groups, although the red blood cell velocity was much slower in the microsurgical ischemia group. Histological examination of the anastomosis site showed massive accumulation of polymorphonuclear neutrophils on the venous endothelium. These results suggested a different degree of endothelial damage and local leukocyte activation between microsurgical ischemia and clamp ischemia. Therefore, we conclude that clamp ischemia cannot replace microsurgical ischemia for studying microcirculatory changes in free tissue transfer.