Fibrin sealing and histometrical changes in conventionally sutured microvascular anastomoses.

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Abstract:

Reports from the literature demonstrated an early occlusive thrombosis rate of microvascular anastomoses of up to 25%. In order to reduce free flap failure due to kinking and pressure in the region of the anastomosis, fibrin sealing of microvascular anastomosis was recommended in previous studies. However, it is well accepted that haemostasis is activated by vascular wall injuries (lesions of the endothelial layer). For that reason, a fast re-endothelialisation of the inner surface of the anastomosis is thought to reduce early occlusive thrombosis and, subsequent, free flap failure. To clarify whether application of fibrin adhesives exert any effect on microvascular anastomoses, we constructed 84 anastomoses in rat arteries applying sealant or non-sealant in randomized order. At certain time intervals, arteries operated on were removed and histologically analyzed. Early complete endothelial repeneration, 4 days after surgery, was observed in the unsealed anastomosis group, whereas sealed anastomosis showed a complete re-endothelialisation only after 7 days. These observations may be explained by a reduced multiplication rate and migration speed (0.3 mm/day) of endothelial cells during the first 3 days (unsealed anastomosis: 0.63 mm/day). In addition, in sealed anastomoses a higher incidence of media necrosis was found (60.7 % vs 49.3% in the unsealed group). These histological changes were confirmed by scanning and transmission electron microscopy.