

11317 - Preclinical Study On The Effect Of Neoadjuvant Radiotherapy On Microvascular Anastomosis

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Background: Success of free flap reconstruction after sarcoma resection in patients treated with neoadjuvant radiotherapy is thought to be altered by factors including local tissue changes induced by radiotherapy that can alter the viability of the microvascular arterial or venous anastomosis.

Purposes: Assess the effect of neoadjuvant radiotherapy (20Gy) in a preclinical rat model on both venous and arterial microvascular suture.

Materials and Methods: We performed a randomized controlled preclinical study in which 140 Sprague Dawley rats were distributed in 4 groups of 35 rats in the following manner: Group A, Irradiated arterial suture, Group B Irradiated venous suture, Group C control arterial suture, Group D control venous suture. Groups A and B received one dose of 20Gy neoadjuvant cervical radiotherapy. After 2 weeks we performed carotid arteriotomy or jugular venotomy and microvascular suture. Control groups C and D underwent arteriotomy or jugular venotomy and microvascular suture. All groups were followed clinically during 4 weeks. Before sacrifice surgical permeability tests were performed on all rats and histological samples harvested.

Results: In group A, irradiated arterial suture, 1 rat (3%) had a negative antegrade and retrograde permeability test due to thrombosis. In group B, irradiated venous suture, 7 rats (20%) presented altered antegrade permeability due to thrombosis and 13 rats (37%) showed aneurysms or pseudoaneurysm. Both results statistically significant when compared to non irradiated venous suture or to irradiated arterial suture ($p < 0.05$) Control groups C and D had 100% permeability both antegrade and retrograde. There were no cases of thrombosis either arterial or venous.

Conclusion: Neoadjuvant radiotherapy causes higher venous thrombosis in a preclinical microvascular anastomosis model and should therefore be considered the main factor in free flap reconstruction failure in patients who had received radiotherapy.

Level of Evidence: 2 (Randomized Controlled Preclinical Study)