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Tissue hypoxia in complex regional pain syndrome.

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Untreated complex regional pain syndrome (CRPS) may progress from acute stages with increased hair and nail growth in the affected limb to chronic stages with atrophy of the skin, muscles and bones. The aim of this study was to investigate whether tissue hypoxia could be one mechanism responsible for this late CRPS symptoms. Nineteen patients with CRPS and two control groups (healthy control subjects, surgery patients with edema) participated in this study. Skin capillary hemoglobin oxygenation (HbO(2)) was measured non-invasively employing micro-lightguide spectrophotometry (EMPHO). The EMPHO probe was mounted force-controlled onto the skin of the affected and unaffected hand. HbO(2) was measured at rest and during postischemic reactive hyperemia. HbO(2) did not differ between the right (58.20%+/-1.12) and left (57.79%+/-1.31, ns) hand in control subjects. However, in patients, HbO(2) of the affected side (36.63%+/-2.16) was significantly decreased as compared to the clinically unaffected side (46.35%+/-2.97, $P<0.01$). As compared to controls, HbO(2) in CRPS was reduced on both sides ($P<0.001$). Postischemic hyperoxygenation was impaired on the affected side in CRPS (60.81%+/-2.90)--as compared to the unaffected side (67.73%+/-1.50, $P<0.04$) and to controls (68.63%+/-0.87, $P<0.005$). The unaffected limb in CRPS did not differ from controls. Despite skin edema, pre- (49.06%+/-2.02) and postsurgery HbO(2) (53.15%+/-4.44, ns) were not different in the second control group. Our results indicate skin hypoxia in CRPS. Impairment of nutritive blood flow in the affected limb may be one factor contributing to atrophy and ulceration in chronic CRPS. The investigation of patients after surgery revealed that edema could not be the only reason for hypoxia.

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