

Peripheral Vascular Disease -- Its Relationship to the Clinical Application of Therapeutic Modalities

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Peripheral vascular disease is a component of the study of vascular disease which the physician, who is involved in the clinical application of therapeutic modalities, must of necessity be proficient in identifying and interpreting.

As a reminder, physical agents which result in the generation of heat when applied to the human body must be applied with caution or not at all, in those clinical situations where impairment of arterial flow could result in thermal damage to the tissues. Erythema ab igna constitutes an example of such damage and is a clinical possibility when applying infra red thermal agents.

Clinical symptoms which characterize peripheral vascular disease (PVD) may include pain, skin color changes, swelling and/or edema, and skin temperature changes.

Rest pain which occurs in an extremity subject to vascular insufficiency is a grave sign indicating extreme occlusion with ischemia. Rest pain is often partially relieved by placing the extremity in the dependent position and applying moist heat, being careful to avoid erythema ab igna. Thermal injury commonly occurs when the rate at which heat is dissipated is less than the rate at which it is generated. Heat dissipation takes place by way of convection as a result of an efficient arteriovenous circulation. When this circulation is impaired, however, the risk of thermal damage increases relative to the degree of circulatory impairment.

Ischemic neuritis is spasmodic, intense, diffuse, and without relationship to the distribution of peripheral nerves. Paroxysmally the extremity may present with a dark and bluish red mottling with a net-like characteristic. Paroxysms are commonly nocturnal and may last several hours.

Chronic arteritis is painless. With localized phlegitis there is tenderness and mild pain over the inflamed vein. When extensive in distribution there may be extreme pain commonly associated with edema. Lymphangitis commonly presents with soreness and tenderness over a red streak.

Intermittent pain may be the result of an exercise or postural etiology. Exercise may result in intermittent claudication which is a result of deficient arterial flow to contracting musculature. Although rest will reduce the pain, a sensation of muscle fatigue and tenderness may persist for a short time.

As the claudication intensifies, the length of exercise time diminishes. When the length of exercise time increases, it is a sign of diminished claudication. Posture may be related to chronic venous insufficiency with a history of aching, or a feeling of heaviness following a long period of standing erect. It is reduced by walking and relieved by recumbency.

Skin color changes are indicative of the volume and color of blood in the minute vessels of the integument. Regarding hemodynamics, the slower the blood flow through the arterial tree the

more oxygen is dissociated and the greater the cyanosis of the integument.

Pallor involves a reduction in blood flow due to vasospasm. Cyanosis involves stagnation of blood in capillaries and the dissociation of oxygen from it. Rubor involves greater local blood flow and follows local vascular constriction followed by capillary and arteriolar dilatation due to loss of vasomotor tone resulting from ischemia. Swelling and edema are contraindications to the application of shortwave diathermy because of the high volume presence of the polar molecule, water. Of course, edema due to systemic origin must be treated with the appropriate organ system in mind.

Increased integumental blood flow may be perceived by the examiners hand as skin warmth. The most satisfactory way of making such a determination is by comparing the same areas bilaterally.

The clinical theorem appropriate to using any thermogenic agent in treating a patient with peripheral vascular disease is to avoid any treatment in which the cellular demand for blood flow and oxygen will be greater than the available arteriovenous delivery capacity.

Consensual heating could be an example of providing an increased blood flow without increasing the cellular demand for supply. A mechanical waveform, such as medical ultrasonic energy, could be emboligenic over an area of thrombophlebitis or phlebothrombosis.

Erythema ab igna is a very possible result of a patient placing a heating pad under some part of their body. Their body weight compresses the arteriolar/capillary system and impairs the convectional cooling process.

Cryotherapy may result in skin pallor, but if cyanosis appears, this treatment must be discontinued immediately.

Clinical decisions involving appropriate application of therapeutic modalities are based upon the correlative disciplines of anatomy, physiology, pathology, physics, biochemistry, and clinical historical data. To be professionally competent in this field of clinical application, the student must be educated "in house" by professionals skilled in these disciplines which must involve patients who have been admitted to such an institution, such as a hospital setting.

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