

Critical Lower Extremity Ischemia and Physical Vascular Therapy, Bemer®

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ABSTRACT

Taking anabolic steroids is associated with many side effects, including hormonal effects, liver damage, blood pressure increase, concentric left ventricular hypertrophy, damage to fat metabolism, immune damage, skin symptoms and arterial thrombosis. In the presented case, the 46-year-old man used anabolic steroids as a cure for 10 years. When he was admitted to the hospital, he complained of pain in his left leg for three days, which was caused by blockage of the left iliac and popliteo-crural arteries. An embolectomy was performed, supplemented with a fasciotomy. Two days later, a CT angiography performed due to an increase in complaints showed a floating thrombus in the left common iliac artery and repeated occlusion of the leg vessels. The CT also showed damage to the liver, right kidney, intestines, and partial thrombosis of the superior mesenteric artery. Repeated lower extremity embolectomy did not yield definitive results. There was an increased chance of possible limb loss. The ischemia of the limb requiring opiate analgesia was compensated with vasodilator infusion treatment, as the source of the central embolism was not confirmed. The fasciotomy wound showed a tendency to heal with regular surgical control. Upon discharge of the patient, after detailed information, we prescribed medications, special nutrients, physical vascular therapy and weekly bandage changes at our specialist ambulance. Thanks to the patient's cooperation, it was possible to achieve complete recovery and return to his previous work. If the surgical thrombectomy is not successful, there is a possibility of limb loss due to critical limb ischemia, prostacyclin treatment is recommended even in the hospital. If the infusion proves to be effective, the limb can be saved by using physical vascular therapy (BEMER®) six times a day at the patient's home. In case of critical limb ischemia, BEMER® proves to be a good choice and is recommended.

Keywords: Arterial Embolism; Anabolic Steroid Abuse; Critical Lower Limb Ischemia; Chronic Wounds; Iloprost; Physical Vascular Therapy; Bio-Electro-Magnetic-Energy-Regulation (Bemer®)

Key Messages

Taking anabolic steroids has many side effects, including arterial thrombosis. These can cause a heart attack, stroke, internal organ or lower limb ischemia. If the thrombus cannot be completely and definitely removed surgically, and the prostacyclin treatment promises to be effective, BEMER®, physical vascular therapy is a good choice and is recommended as a follow-up to the infusion treatment at home.

Introduction

The most common cause of embolism is cardiac arrhythmia, and in relatively young patients, rheumatic or congenital valvular disease. Rarer diseases include the abuse of anabolic steroids.

Case Report

The history of the 46-year-old man includes untreated hyperthyroidism, left-sided endocrine ophthalmopathy, hypertension and the use of anabolic steroids (Trenbolone, Vinstrol) as a cure for ten years. The patient was admitted to our department on March 20, 2023, because of a burning, stabbing, stretching pain in the left lower limb that had lasted for 3 days, which increased to unbearable pain upon minimal exertion. During the physical examination, the peripheral pulse was palpable on the right side, the femoral artery and popliteal artery were palpable on the left side, but not the periphery. The Doppler index was 0 at the left dorsal artery pedis and 0.45 at the posterior tibial artery. ECG showed sinus rhythm, no palpitation. Upon admission, we started to sort out the hyperthyroid

status. Thyreostatic (thiamazole), antihypertensive (ACE inhibitor) and beta-blocker therapy were used, so that the initial systolic blood pressure of 200 mm Hg decreased to 140-150 mm Hg, and the heart rate decreased from 119/min to <100/min. Lower extremity CT confirmed the embolus causing stenosis of the left common and external iliac artery, the 3rd segment of the popliteal artery and the occlusion of the anterior tibial and peroneal arteries. During the operation, an embolectomy was performed, a large amount of thrombus was removed from the anterior tibial artery, but we could not remove thrombus from the branches of the truncus.

During the intraoperative control angiography, the anterior tibial artery up to the ankle was represented. We performed a medial fasciotomy. On the day after the operation, he confirmed paraesthesia and pain in the left lower limb, he was unable to put weight on his limb, and no Doppler flow was found in the periphery. Due to severe abdominal pain, a thoracic-abdominal CTA examination was performed, which in the arterial phase confirmed hypoperfusion of the patient's liver, partial infarction of the right kidney, and signs of moderate passage obstruction, as well as a partial wall thrombus in the superior mesenteric artery. Clinical symptoms of hyperthyroidism - hypertension, tachycardia - appeared, which we supplemented by increasing the dose of thiamazole, using alprazolam and propranolol, in consultation with an endocrinologist. No significant increase in parenchymal liver enzymes was detected in his laboratory, but LDH was high, and CK showed an increasing tendency with a moderate decrease in kidney function. His pain was alleviated with 10-20 mg of pethidine per day, and his therapeutic anticoagulation was continued with LMWH. During transthoracic echocardiography, no embolic source was confirmed. Chest CTA excluded the possibility of aortic arch and atrial thrombus. During his observation left lower extremity lividity appeared, against the background of which repeated lower extremity CTA confirmed a floating thrombus in the left iliac artery in the same location as before and repeated blockage of the leg vessels. We performed reoperation, femoro-popliteal and selective crural thrombectomy and anterior fasciotomy.

In the early postoperative period, we detected bleeding in the drain, and we performed repeated exploration. We treated the bleeding from the main trunk of the great saphenous vein. During his further observation, he was fever-free, his wounds were peaceful, but showed no tendency to heal. In addition to the lividity and ischemia detected in his left lower limb, he complained of a moderate sensation disorder, despite this, he successfully mobilized. His anticoagulation was performed with heparin perfusion under APTI control. During his repeated laboratory examination, CK showed a decreasing trend, liver enzymes remained unchanged, and his kidney function was unchanged. After a week, the patient was transferred to the Angiology Department. Internal medicine colleagues used enoxaparin therapeutic anticoagulation, double platelet aggregation inhibitor administration and 3 weeks of iloprost infusion treatment.

In addition, we perform regular vascular surgery wound control and bandage changes. We were able to partially close the fasciotomy wound, but due to the lack of wound healing, the sutures loosened, and we had to treat it open. For a long time, we had to perform necrectomy when changing bandages. In addition to the infusion, the condition of the wound showed a slow improvement and the degree of ischemia also decreased. The patient's pain was relieved by a fentanyl patch and tramadol. When he was discharged home, the drug treatment was supplemented with the daily consumption of special nutrients (Cubitan®, Glutamin Medical WH®) and the use of physical vascular therapy (BEMER®) six times a day. The patient was cooperative. On the anterolateral side of the patient's left leg, next to the edge of the tibia, there was an 18x4x0.5 cm fibrin plaque-based wound with a hyperemic and ulcerated edge. The left foot and leg were edematous.

Initially a vascular surgeon and then a wound care nurse performed the bandage changes until the epithelialization phase. We applied after wound disinfection (Granudacyn®) and the use of hemoglobin spray (Granulox®) and care of the wound area (Medifleur®), an antimicrobial gelling fiber dressing (Exufiber AG®), a hydrofiber bandage (Aquacel AG Foam®) and a compression bandage. In the following month, the wound visibly and rapidly filled up, granulation, and epidermisation. In the middle of the back of the left foot, a 1x1x0.5 cm necrotic wound was formed during the tight use of the compression bandage at home. This wound was also treated as detailed above and we achieved healing there as well. In addition to the regular use of BEMER® physical vascular therapy at home, the patient experienced not only wound healing, but also a gradual cessation of pain, the discontinuance of painkillers, and increasingly easier movement. He returned to exercise (without steroids), started dancing and went back to work.

Discussion

Anabolic steroid abuse is associated with many side effects, including hormonal effects, liver damage, blood pressure increase, concentric left ventricular hypertrophy, damage to fat metabolism, immune damage, skin symptoms and arterial thrombosis. There are many case studies of young, otherwise healthy athletes and bodybuilders who suffered heart attacks or strokes due to anabolic steroid abuse. In few studies, we can read about peripheral arterial embolism, [1-3] dissection [4,5] and acute superior sagittal sinus thrombosis. [6] Anabolic steroid abuse increases the serum level of low-density lipoproteins, decreases the serum level of high-density lipoproteins, increases platelet aggregation, increases the synthesis of procoagulant factors, and suppression of fibrinolysis. [7] Long-term glucocorticosteroid therapy in patients for various chronic inflammatory diseases also affects the lower limb arteries, but in this case causes media calcinosis and incompressibility of infragenicular arteries. [8] Treatment of lower extremity embolism caused by anabolic steroids consists of surgical embolectomy,

anticoagulation, and iloprost treatment. Return to daily activities is slow. Since the iloprost treatment can only be used for a certain period of time (for financial reasons, it can be given in a hospital), treatment at the patient's home can speed up recovery. Such a treatment is physical vascular therapy, Bio-Electro-Magnetic-Energy-Regulation (BEMER®), also used in our presented case. BEMER® is a specific, biorhythmically defined stimulation, which can influence the spontaneous arteriolar vasomotion and thus a deficient blood flow regulation. [9] This physical vascular therapy increases vasomotion and microcirculation, open capillaries, increase red blood cell flow rate and the difference between arterial and venous pO₂ for improved organ blood flow, supply of nutrients and removal of metabolites. BEMER® uses a low-frequency, pulsed magnetic field with a series of half-wave-shaped sinusoidal intensity variations.

The reason for it is the spontaneous autorhythmic arteriolar vasomotion, which is the most important regulation mechanism of organ perfusion. In the deficient state it is necessary to stimulate body regulatory mechanisms via a suitable physiological stimulus to be able to clear the disturbance that has occurred by themselves. [10,11] According to a study, pain-free walking distance and maximum walking distance increased significantly as a result of isolated BEMER® and isolated pentoxifylline therapy, and the combination of the two treatments provided an additional therapeutic advantage. Although, there is no study literature in a special case like ours, promotes both wound healing, pain and return to daily activities in the ischemic limb with a similar speed. Additional planned studies are also required for the further use of BEMER® in such cases [12].

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