

Severe early hyperperfusion syndrome in a patient with extracorporeal membrane oxygenation

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We report a case of a 57-year-old man with cardiogenic shock secondary to acute myocardial infarction. Venoarterial extracorporeal membrane oxygenation (ECMO) was used with the cannulation of the subclavian artery for arterial access. A Dacron graft with a perpendicular anastomosis was sewn into the artery (FIGURE 1A). He developed severe edema with blisters and Volkmann's contracture in the upper right limb in just 5 hours (FIGURE 1B). Moreover, the pulse was absent. Emergent fasciotomy

was required, and subclavian artery cannulation was removed and replaced by a femoral artery cannulation. The limb was saved and the venoarterial ECMO was removed 3 weeks later (FIGURE 1C). Unfortunately, the patient died 1 month later due to necrotizing pneumonia.

Hyperperfusion syndrome and edematous limb is a common complication of the cannulation of the subclavian artery which occurs in 25% of the patient population.¹ A proportion of these patients can develop ipsilateral upper extremity

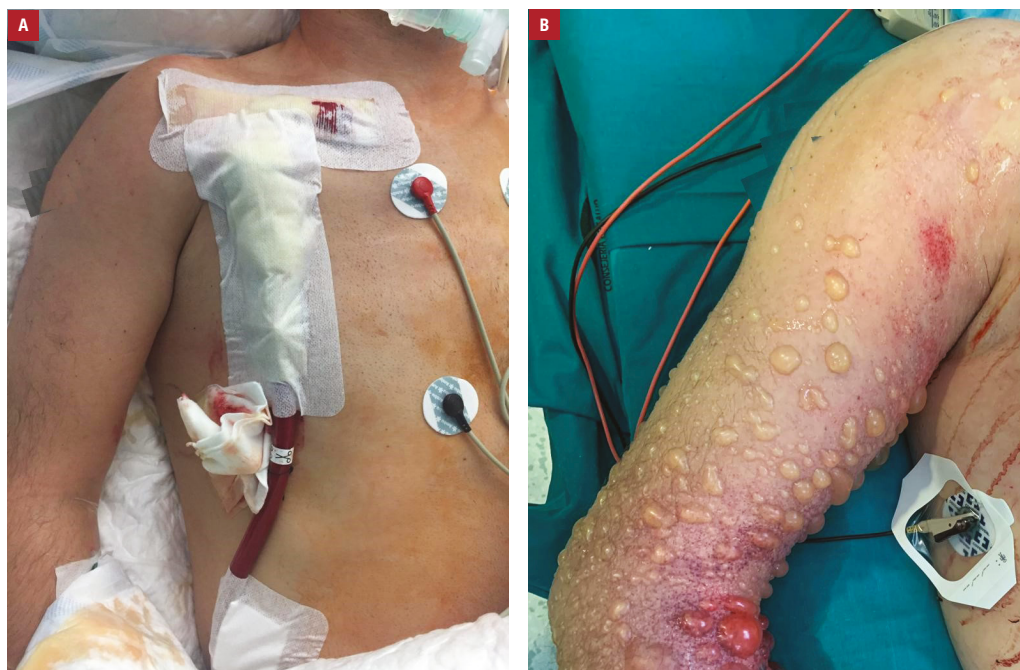


FIGURE 1 A – patient's arm upon arrival at the critical care unit; B – the arm 5 hours later: severe edema, with blisters, and absent pulse

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FIGURE 1 C – the arm with fasciotomy 2 weeks later

compartment syndrome, as was the case with our patient, but usually it is a severe and late complication. There are multiple reasons for the development of hyperperfusion syndrome that can be broadly divided into 2 categories: 1) resulting from arterial outflow obstruction and 2) associated with venous outflow obstruction.² These complications can be caused by technical problems associated with the construction of the anastomosis between the side graft and axillary artery and compressive hematoma into surrounding space. Compartment syndrome by hyperperfusion is almost exclusive to subclavian or axillary artery cannulation.³

There are techniques associated with subclavian artery cannulation whose objective is to reduce the preferential distal flow and to prevent complications resulting from hyperperfusion of the right arm.⁴ They include a restrictive snare or banding distal to the cannulation site to reduce the artery diameter to approximately 3 mm. A 45° oblique anastomosis rather than in a perpendicular fashion is strongly suggested to obtain a more laminar flow across the subclavian artery and reduce the risk of upper extremity edema.¹

Hyperperfusion syndrome is sometimes managed by only elevating the limb and decreasing the ECMO flow. If these maneuvers fail to relieve the syndrome, a surgical reexploration from the cannulation site is required. Compartment syndrome is a surgical emergency; therefore, early diagnosis and fast treatment of this complication can avoid irreversible damage of the limb.

Currently, ECMO is used for several different conditions, including cardiogenic shock, respiratory failure, sepsis-associated cardiomyopathy, and massive pulmonary embolism.⁵ Physicians should be familiar with the management of patients with cannulation-related complications.

ARTICLE INFORMATION

CONFLICT OF INTEREST None declared.

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