Severe early hyperperfusion syndrome in a patient with extracorporeal membrane oxygenation

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Severe early hyperperfusion syndrome in a patient with extracorporeal membrane oxygenation.

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We report a 57-year-old male with cardiogenic shock secondary to acute myocardial infarction. A venoarterial ECMO (extracorporeal membrane oxygenation) is implanted with subclavian artery cannulation for arterial access, a Dacron graft with a 90° perpendicular anastomosis was sewn (Figure 1A). The patient develops in the upper right limb a severe edema with flictenas, absent pulse and Volkmann’s contracture in just 5 hours (Figure 1B). 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 three weeks later (Figure 1C). Unfortunally, the patient died one month later by a necrotizing pneumonia.

Hyperperfusion syndrome and edematous limb is a common complication in subclavian artery cannulation involving 25% of the patient population [1]. As this case report, a portion of these patients can develop ipsilateral upper extremity compartment syndrome, but usually it’s a advanced and late complication. The reasons for the development of hyperperfusion syndrome are multiple and can be broadly divided into 2 categories: those causes resulting from arterial outflow obstruction and those associated with venous outflow obstruction [2]. The technical problems associated with construction of the anastomosis between the side graft and axillary artery and compressives hematoma into surrounding space can be causes for these complications. Compartment syndrome by hyperperfusion is almost exclusive to subclavian or axillary artery canulation [3].
There are associated techniques to subclavian artery cannulation whose objective is to reduce the preferential distal flow and to avoid complications associated with right arm hyperperfusion [4]. These techniques consist of using a restrictive snare or banding distal to the cannulation site to reduce the artery diameter to approximately 3 millimeters. Some authors suggest 45° oblique anastomosis rather than in a perpendicular fashion is strongly suggested to have a more laminar flow across the subclavian artery and reduce the risk of upper extremity edema [1].

Sometimes hyperperfusion syndrome is managed only elevating the limb and decreasing ECMO flow. If these maneuvering fail to relieve the syndrome, a surgical re-exploration from the cannulation site is required. Compartment syndrome is a surgical emergency, early diagnosis and fast treatment of this complication can avoid irreversible damage of the limb.

Actually ECMO is used for several different conditions, including cardiogenic shock, respiratory failure, sepsis-associated cardiomyopathy and massive pulmonary embolism [5]. Physicians must know the management of patients with cannulation-related complications.
References.


Figure 1. A: Patient’s arm upon arrival at the critical care unit. B: Patient’s arm in just 5 hours after. The patient has a severe edema, with flictenas and absent pulse. C: Arm with fasciotomy two weeks later.