

Thrombectomy vs conservative therapy in patients with COVID-19

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See “**Surgical thrombectomy versus conservative treatment in cases of acute limb ischemia with COVID-19 pneumonia**” Fahad A. M., Al-Khalidi H. A., Altimimi Y. Q. M. in **Original articles**, pp. 82-86

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The paper “*Surgical thrombectomy versus conservative treatment in cases of acute limb ischemia with COVID-19 pneumonia*” by Fahad AM, Al-Khalidi HA, Altimimi YQM is devoted to the urgent problem in the context of coronavirus disease 2019 (COVID-19) pandemic — peripheral arterial thrombosis. The authors describe the outcomes of treating two groups of patients with surgical thrombectomy and conservative treatment. An important finding of this work is that both methods are of comparable effectiveness. In other words, none of them allows to achieve an exact satisfactory outcome of revascularization without a high risk of rethrombosis and limb amputation.

Numerous international papers indicate the absence of a “gold standard” for the treatment of COVID-19-related peripheral arterial thrombosis [1]. The lack of research on this issue has created uncertainty in solving this problem. The vast majority of cardiovascular surgeons implement reperfusion methods according to the current guidelines created before the COVID-19 pandemic [2]. However, their effectiveness remains questionable. According to various reports, the incidence of rethrombosis and amputation after a well performed thrombectomy can reach 50% in this cohort of patients [1]. The cause lies in the fact that operating surgeons follow conservative views on the choice of treatment strategy for COVID-19-related peripheral arterial thrombosis, overlooking the disease pathogenesis. If in routine practice the thrombosis is commonly associated with the onset of multifocal atherosclerosis, then in the context of COVID-19, there are four links of this condition.

On the one hand, this is a pronounced coagulopathy with increased levels of D-dimer, fibrinogen, prothrombin. This combination can cause changes characteristic of disseminated intravascular coagulation with a decrease in clotting time and an increase in its density [3]. The manifestation of this condition leads to macro- and microvascular thrombosis. And if the first can be managed with open thrombectomy with a Fogarty catheter or endovascular thrombectomy, then it is often impossible to restore capillary flow even with powerful thrombolytic agents [1, 3]. In turn, it is noted in practice that the administration of thrombolytics in patients with COVID-19-related coagulopathy is in some cases accompanied by spontaneous hematomas, which requires an open radical surgery, which is not always possible due to the high risk of ineffective hemostasis.

Another mechanism of peripheral thrombosis is the activation of hyperinflammation with the development of a cytokine storm. An increase in the levels of tumor necrosis factor, interleukin-6, and interleukin-1 β can induce intravascular coagulopathy followed by a cascade of unfavorable reactions that significantly contributes to the development of systemic process [3].

The role of SARS-CoV-2 itself (Severe Acute Respiratory Syndrome CoronaVirus 2, coronavirus 2, causing severe acute respiratory distress syndrome) is also important. Due to the presence of overexpression of the angiotensin-converting enzyme receptor 2, the virus enters endothelial cells, causing multiple damage to the artery wall with the development of endotheliitis. In turn, the atherosclerotic lesion preceding this condition,

as a rule, aggravates the course of the pathological process [3]. This pattern may explain the more frequent development of peripheral thrombosis in the presence of COVID-19 in elderly patients. Among them, the diagnosis of multifocal atherosclerosis can reach 80%, with localization not only in the peripheral, but also in the coronary and cerebral arteries, accompanied by myocardial infarction, stroke, and death [2]. Thus, the presented pattern explains the causal relationship of high mortality rates in this age cohort of the population.

The final link in thrombosis development is long-term immobilization of patients. Patients with COVID-19 suffer from hypoxemic respiratory failure, shortness of breath with minimal physical activity, community-acquired multisegmental pneumonia [1, 3]. Such circumstances are associated with forced bed regime. One of the elements of effective oxygen support in these conditions is the prone position, which ensures greater mobility of the chest cavity during breathing. Being in strict bed rest throughout the acute disease phase, which can last >7 days, patients put an end to Virchow's triad: hypercoagulation + endothelial injury + stasis [3].

According to current guidelines, the surgical methods of treating patients with peripheral thrombosis are aimed at thrombus extraction with the anticoagulant and antiplatelet therapy [1, 2]. However, their effectiveness is not optimal and is characterized by a high risk of rethrombosis and limb amputation [1]. The cause lies in the impossibility of removing a large area of atherosclerotic arterial endothelium (without

hemodynamically significant stenosis and occlusion). As evidence for this conclusion, we can cite examples of emergency carotid endarterectomy in patients with acute internal carotid artery (ICA) thrombosis and COVID-19. This operation is aimed at removing the atherosclerotic plaque together with the altered endothelium from the ICA lumen [4]. Ultimately, no recurrent ICA thrombosis is observed in this cohort of patients [5]. It is not possible to carry out such an open endarterectomy in an extended area, for example, of the tibial arteries, due to the anatomical specifics.

The paper "*Surgical thrombectomy versus conservative treatment in cases of acute limb ischemia with COVID-19 pneumonia*", as well as the experience accumulated over the past year, indicate that there is no effective method of treatment and prevention of peripheral arterial thrombosis today. Modern antiviral, Immunomodulatory, antiinflammatory therapy does not allow to inhibit the endotheliitis. In turn, open and endovascular thrombectomy, as well as drug treatment are able to restore the macrovascular circulation, but they cannot improve the macrovascular hemodynamics under conditions of endothelial injury. Ultimately, it became necessary to update the current Russian and international guidelines, taking into account modern circumstances. Thus, in the absence of a universal effective method of treating patients with COVID-19-related peripheral arterial thrombosis, the only correct way out is to prevent this disease through timely vaccination with Sputnik V.

Relationships and Activities: none.

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