Case Report

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Spontaneous Hematoma of the Right Large Lumbar Muscle, Hemorrhagic Vasculitis, Multiple Arterial Thrombosis in the Background of COVID-19

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SUMMARY Patient A., 65 years old, male. He was admitted to the City Alexandrovskaya Hospital with complaints of fever within 5 days to 39.0°C, dry cough, shortness of breath during exertion, pain in the right flank of the abdomen and right lumbar region for 7 days. Three days earlier, the patient had received a positive polymerase chain reaction test for the presence of SARS-CoV-2. Examination of the patient revealed a hemorrhagic rash on both legs. The patient was consulted by a dermatovenerologist, acute infectious hemorrhagic vasculitis, bullous form, was diagnosed.

According to multispiral computed tomography with angiography (MSCT AG) of the abdominal organs: the psoas major muscle on the right was thickened, its structure was determined by the accumulation of the contents of hemorrhagic density with signs of partial lysis in the marginal zone, with a total size of 52x48x148 mm. No data available for aortic aneurysm / dissection. The patient denied the presence of injuries, taking anticoagulant drugs. The psoas major muscle hematoma was regarded as spontaneous hematoma against the background of coagulopathy caused by COVID-19.

According to the MSCT data of the chest organs, it was visualized: polysegmental lesion in both lungs, numerous areas of compaction of the lung tissue were determined by the type of ground glass, with zones of consolidation and reticular changes in the structure. The degree of damage to the lung tissue was 55%.

In view of the fact that the patient had data for the presence of a hematoma of the psoas major muscle on the right, as well as hemorrhagic vasculitis, anticoagulant therapy was contraindicated. Laboratory tests revealed an increase in the level of procalcitonin up to 12.8 ng/ml, C-reactive protein up to 135.1 mg/l, leukocytes up to 13.46 10^9/l, ferritin up to 532.2 ng/ml, D-dimer up to 1145 ng/ml. A multidisciplinary council (infectious disease specialist, general surgeon, therapist, pulmonologist, vascular surgeon, dermatovenerologist, septologist) decided to revise and drain the hematoma of the psoas major muscle on the right, as a likely source of sepsis (increased procalcitonin). Under intravenous anesthesia, the hematoma was opened posteriorly peritoneally, evacuated (about 300 ml in volume), 2 drains were installed. On the 10th day after the operation, a control MSCT was performed, according to which the hematoma of the right psoas muscle decreased in size by half. A decision was made to remove the drains.

On the 13th day after admission to the hospital, the patient developed pain in the right forearm, hand, left leg and foot. Performed MSCT revealed hypertension of the arteries of the upper extremities and arteries of the lower extremities: thrombosis of the distal third of the brachial, ulnar and radial arteries; thrombosis of the superficial femoral artery (PFA) on the left. An anticoagulant therapy was started (heparin 7500 IU intravenously in a stream with subsequent transfer to continuous intravenous administration using an infusion pump with an initial rate of 1000 IU per hour, under the control of APTT with an indicator reaching 1.5–2.5 times higher than the norm), disaggregant therapy (acetylsalicylic acid 100 mg once a day), analgesic therapy (ketorol 1.0 ml/m). An emergency simultaneous operation was performed: thrombectomy from the brachial, radial, and ulnar arteries on the right under local anesthesia (transverse arteriotomy of the brachial artery, Fogarty catheters 3F, 5F) with satisfactory antegrade and retrograde blood flow; plus under spinal anesthesia, an attempt was made to thrombectomy, Fogarty 5 catheter passed freely, a weak retrograde blood flow was obtained, but after 3 minutes, repeated thrombosis of the PBA developed). That followed by femoral-popliteal prosthetics (above the knee joint gap) with a synthetic prosthesis "Ekoflon" with obtaining a satisfactory pulsation distally.

On the 21st day after the operation, the patient was discharged from the institution in a satisfactory condition.

Keywords: COVID-19, new coronavirus infection, arterial thrombosis, thrombectomy, femoral-popliteal prosthetics, spontaneous psoas muscle hematoma, infectious hemorrhagic vasculitis

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INTRODUCTION

The novel coronavirus pandemic has affected all branches of medicine. Speaking of cardiovascular surgery, the usual nature of the development of arterial thrombosis has changed [1,2,3]. Blood clots began to form not only in atherosclerotic arteries, but also in completely “clean” vessels [1,2,3,4]. The genesis of this event began to consist in the combination of two processes: coagulopathy and endothelitis. And if the first one was treatable thanks to modern anticoagulant / antiplatelet therapy, then the endothelial inflammation, especially in large arterial areas, could not be eliminated [1,2,3,4]. This situation was accompanied by the development of repeated thrombosis after thrombectomy in 50–80% of cases with an increase in the number of amputations. [1,2,3,4]. Traditional schemes of conservative and surgical treatment of this pathology have not demonstrated their effectiveness, proven in the "pre-COVID" period [4,5]. Thus, the optimal type of correction of this condition has not been found so far.

An additional difficulty faced by cardiovascular surgeons was the lack of any information regarding the choice of tactics for the treatment of patients with spontaneous hematomas of the anterior abdominal wall and/or large lumbar muscles. Similar conditions have been repeatedly observed in patients with a new coronavirus infection against the background of severe coagulopathy. In some cases, such conditions reached critical sizes with a decrease in hemoglobin levels and the formation of severe anemia, which aggravated the course of hypoxia. However, today this pathology was discussed only in a narrow circle of specialists in social networks. Along with the fact that, according to the data of multislice computed tomography with angiography, it was almost impossible to find the source of bleeding, some specialists suggested embolization of large vessels in the area of interest. Other physicians tended to conservative management of such patients. Still others were in favor of radical removal of the hematoma with drainage of this zone. However, severe coagulopathy called into question the use of open surgical methods due to the impossibility of achieving satisfactory hemostasis. Thus, there is no consensus on the choice of treatment strategy for patients with spontaneous hematomas of the anterior abdominal wall and/or psoas major muscles.

This article describes a case of surgical treatment of spontaneous development of a hematoma of the psoas major muscle on the right, followed by the development of thrombosis of the brachial artery on the right and the superficial femoral artery on the left against the background of infectious hemorrhagic vasculitis and moderate course of COVID-19.

Case report

Patient A., 65 years old, male. He was admitted to the City Alexander Hospital with complaints of fever up to 39.0 °C for 5 days, dry cough, shortness of breath during exertion, pain in the right flank of the abdomen and right lumbar region for 7 days. За три дня до этого больной получил положительный тест полимеразной цепной реакции на наличие SARS-CoV-2. The local therapist was called, therapy was started. However, subsequently, an increase in shortness of breath was noted, in view of which the patient called an ambulance and was taken to the hospital.

The level of consciousness – clear. The skin was pale. Hemodynamics was stable, blood pressure was 134/82 mm Hg, pulse 82 per minute, rhythmic. Breathing spontaneous, hard, no wheezing, SpO2 96% (no oxygen support was needed). The abdomen was soft and painless. Examination of the patient revealed a hemorrhagic rash on both legs (Fig. 1).

Fig. 1. Infectious-hemorrhagic vasculitis, bullous form in a patient with COVID-19

The patient was consulted by a dermatovenereologist, the diagnosis was made: “Acute infectious-hemorrhagic vasculitis, bullous form”. It was recommended: akriderm cream 3 times a day, for opened bullous elements - an antiseptic solution; ceftriaxone 1 g 1 time per day; dexamethasone 12 mg IV drip twice a day.

Next, the patient underwent an ultrasound examination of the abdominal organs (AO), according to which a volumetric formation was revealed along the posterior abdominal wall on the right, along the psoas major muscle. A general surgeon examined the patient, multislice computed tomography with angiography (MSCT AG) of the AO was recommended, according to which it was determined that the psoas major muscle was thickened on the right, accumulation of hemorrhagic density contents with signs of partial lysis in the marginal zone, with a total size of 52x48x148 mm, was determined in its structure. Data for aortic aneurysm/dissection were not obtained (Fig. 2).

The patient denied the presence of injuries, taking anticoagulant drugs. The hematoma was considered as spontaneous due to coagulopathy connected with COVID-19 infection.

According to MSCT of the chest organs, it was visualized: polysegmentally in both lungs, numerous areas of compaction of the lung tissue according to the ground glass type, with consolidation zones and reticular changes in the structure. The degree of damage to the lung tissue was 55% (Fig. 3).

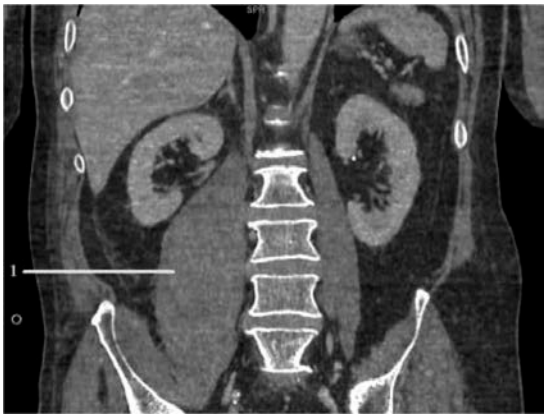


Fig. 2. Multispiral computed tomography of the abdominal organs: 1 - spontaneous hematoma of the psoas major muscle on the right with signs of partial lysis

Fig. 3. Multispiral computed tomography of the chest organs: areas of compaction of the lung tissue in the form of ground glass in both lungs

According to laboratory parameters, there was an inflammatory syndrome (leukocytosis, increased CRP, ferritin), coagulopathy (increased D-dimer) (Table 1).

Table

Dynamics of the patient's laboratory parameters

Indicator	Unit of measurement	Norm	On admission	12th day after admission	10th day after surgery	20th day after surgery (discharge)
APTT	sec	25–35	31.9	25.2	83.6	74.2
Prothrombin time	sec	11.5–16.0	14.3	17.9	14.1	15.2
International normalized ratio		0.8–1.2	1.04	1.32	1.06	1.12
D- dimer	ng/ml	<230	1145	5144	2461	448
Ferritin	ng/ml	(21.81–274.66)	532.2	780.6	497.28	193.1
Procalcitonin	ng/ml	(<0.5)	>12.8	0.4		0.502
CRP	mg/l	0–5.0	135.1	159.4	146.0	64.5
Hemoglobin	g/l	130–160	132	109	105	102
Leukocytes	109/l	4–9	13.46	10.7	13.9	8.4

Notes: АЧТВ — activated partial thromboplastin time; МНО — international normalized ratio; СРБ — *C*-reactive protein

The patient was hospitalized in the infectious department, where he was also tested for procalcitonin (an increase in the indicator). The patient was examined by a septologist and was diagnosed with sepsis. To search for the source of sepsis, MSCT of the brain was performed: a picture of dyscirculatory encephalopathy, substitutive hydrocephalus of a mixed type. Cystic-atrophic changes in the right hemisphere of the cerebellum, atherosclerosis of cerebral vessels. No site of infection identified.

A multidisciplinary consultation (infectious disease specialist, general surgeon, internist, pulmonologist, vascular surgeon, dermatovenereologist, septologist) made a decision to revise and drain the hematoma of the psoas major muscle on the right as a likely source of sepsis. At the same time, therapy for a new coronavirus infection was started in accordance with 11 versions of the Interim Guidelines for the Prevention, Diagnosis and Treatment of a New Coronavirus Infection (COVID-19) of the Ministry of Health: Remdesivir (1st day 200 mg once a day i.v.; from day 2100 mg once a day i.v.); Baricitinib (4 mg once a day); paracetamol (500 mg once a day). For the treatment of sepsis Mironem 1 g 2 times a day iv/ in the drip; Vancomycin 1 g 2 times a day iv/in the drip. However, in view of the fact that the patient has data for the presence of a hematoma of the psoas major muscle on the right, as well as hemorrhagic vasculitis, anticoagulant therapy was contraindicated.

The course of the operation for draining a hematoma (operation time 10 minutes) of the right psoas major muscle: under intravenous anesthesia, an oblique access to the retroperitoneal space in the right iliac region was made. The peritoneum was pushed aside, a hematoma of the psoas major muscle on the right was visualized and

opened, evacuated (about 300 ml). Continued bleeding was not visualized. The contents were taken for culture and sensitivity to antibiotics. There were no data for abscess. Two drains were installed. Hemostasis and wound closure in layers.

According to the results of sowing, the bacterial microflora was not obtained. On the 10th day after the operation, a control MSCT of the AO was performed, according to which the hematoma of the right lumbar muscle decreased in size by half (Fig. 4). A decision to remove the drains was made.

Fig. 4. Multislice computed tomography of the abdominal organs on the 10th day after removal of the hematoma: 1 — drainage in the area of the hematoma; 2 — spontaneous hematoma of the psoas major muscle on the right with signs of partial lysis

Against the background of the implemented therapy, the level of procalcitomin returned to normal (0.4 ng/ml), leukocytosis decreased (10.7 x 10^9/l) by 12th day after admission to the hospital. However, coagulogram parameters, as well as ferritin, CRP continued to grow (Table 1).

On the 13th day after admission to the hospital, the patient developed pain in the right forearm, hand, left leg and foot. Status localis: the indicated parts of the body are cold, pale, active movements are inhibited, passive ones are preserved, there is no edema, there are minimal disturbances in sensitivity in the fingers of both limbs. The pulse on the brachial artery on the right is satisfactory, on the ulnar and radial arteries is absent. The pulse on the common femoral artery (CFA) on the left is satisfactory, on the popliteal (PA), posterior tibial (PTA) and anterior tibial arteries (ATA) is absent.

Color duplex scanning (CDS) of the arteries of the right upper limb: thrombosis of the distal third of the brachial, ulnar and radial arteries. CDS of the arteries of the left lower extremity: the arteries are atherosclerotically altered, with areas of calcification, thrombosis of the superficial femoral artery (SFA) on the left, weak collateral blood flow is determined by the ATA and PTA on the left.

MSCT AG of the arteries of the upper extremities and arteries of the lower extremities was performed, according to which the results of CDS were confirmed (Fig. 5, 6).

Fig. 5. Multislice computed tomography with angiography of the arteries of the upper extremities: 1 — thrombosis of the right brachial artery

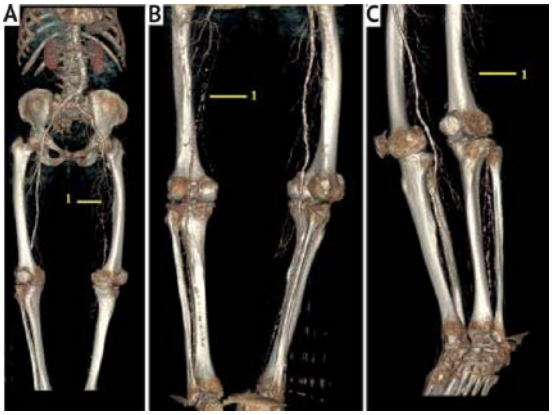


Fig. 6. Multispiral computed tomography with angiography of the arteries of the lower extremities: A — front view; B — rear view; C — left side view; 1 — thrombosis of the superficial femoral artery on the left

According to the electrocardiogram, there are no data for atrial fibrillation, the rhythm is sinus, the heart rate is 84 per minute. According to echocardiography, the ejection fraction is 58%, there is no data for changes in valves, heart cavities, vegetation. The cause of thrombosis was regarded as severe coagulopathy (increased D-dimer, prothrombin time) with probable endotheliitis on the background of COVID-19.

Multidisciplinary consultation (vascular surgeon, infectious disease specialist, general surgeon, pulmonologist, internist, cardiologist) in view of the prescription of hemorrhagic complications and the need to treat acute ischemia of the extremities, it was decided about starting anticoagulant (heparin 7500 IU intravenously by bolus with subsequent transfer to continuous intravenous administration using an infusion pump with an initial speed of 1000 units per hour, under the control of APTT with the achievement of an indicator of 1.5 - 2.5 times the norm), antiplatelet (acetylsalicylic acid 100 mg 1 time per day), analgesic therapy (ketorol 1.0 ml IM); the need for emergency revascularization in the amount of thrombectomy from the right brachial artery and thrombectomy from the SFA, or femoro-popliteal prosthetics on the left with a synthetic prosthesis.

A simultaneous operation was carried out: under local anesthesia, thrombectomy from the brachial, radial, and ulnar arteries on the right was performed (transverse arteriotomy of the brachial artery, Fogarty catheters 3F, 5F) with satisfactory antegrade and retrograde blood flow + under spinal anesthesia, an attempt was made to perform thrombectomy from the SFA (Fogarty 5F catheter passed freely, a weak retrograde blood flow was obtained, but after 3 minutes, repeated thrombosis of the SFA developed) followed by femoral-popliteal prosthesis (above the knee gap) with a synthetic prosthesis "Ecoflon" with a satisfactory pulsation on the PTA and ATA (Fig. 7,8).

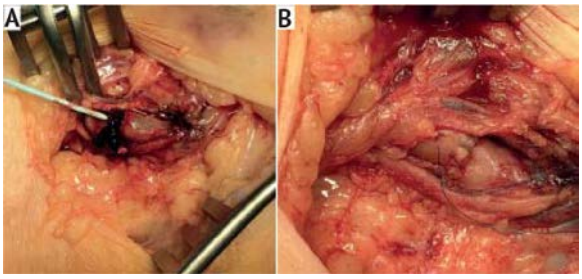
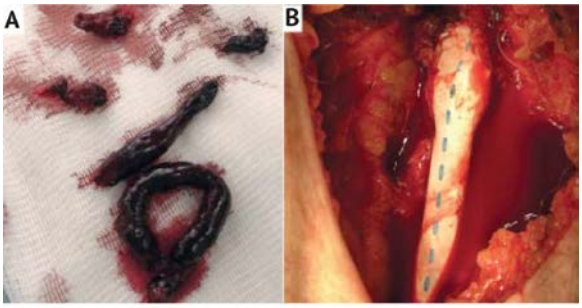


Fig. 7. Thrombectomy from the brachial artery on the right: A — removal of blood clots with a Fogarty catheter; B — vascular suture



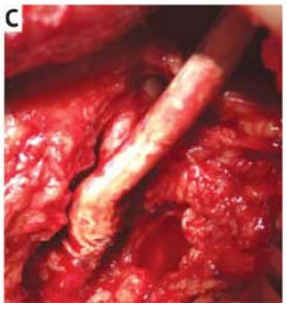


Fig. 8. Thrombectomy from SFA, femoropopliteal prosthesis on the left: thrombectomy from SFA, femoropopliteal prosthesis on the left: A — blood clots from SFA; B — proximal end-to-side anastomosis between the prosthesis and CFA; C — distal anastomosis between the prosthesis and the PA, end-to-side

Implemented therapy was continued in the postoperative period. On the 3rd day after the operation, the patient was transferred to subcutaneous administration of heparin with an initial dose of 5000 IU 4 times a day under the control of APTT. According to the control CDS, the brachial, radial, and ulnar arteries are passable on the right; the femoropopliteal shunt on the left is passable, the blood flow through the ATA and PTA is satisfactory. On the 10th day after surgery, the sutures were removed, there was a regression of inflammatory parameters and coagulopathy according to laboratory tests (Table 1).

On the 20th day after the surgery, according to the CDS data of the arteries of the upper and lower extremities, there were no dynamics. According to the ultrasound of the AO, the hematoma of the psoas major muscle on the right significantly regressed in volume, partially lysed. According to MSCT of the chest organs, 5% damage to the lung tissue was noted (Fig. 9).

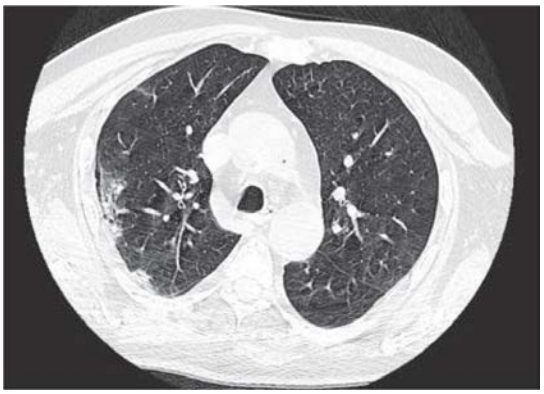


Fig. 9. Multislice computed tomography of the chest before leaving the hospital: 5% lung tissue damage

According to the results of laboratory studies there were detected absence of leukocytosis, mild anemia, residual effects of coagulopathy and inflammatory syndrome (Table 1). On the part of the skin - a partial decrease in hemorrhagic eruptions.

On the 21st day after the operation, the patient was discharged from the institution in a satisfactory condition (SpO_2 99%), with the following recommendations: 1) Rivaroxaban 2.5 mg 2 times a day; 2) Acetylsalicylic acid 125 mg once a day; 3) Ointment akriderm topically; 4) Observation by a vascular surgeon in a polyclinic at the place of residence.

DISCUSSION

The development of arterial thrombosis after the relief of sepsis and hematoma drainage in the framework of this clinical example created an opportunity for the implementation of anticoagulant / antiplatelet therapy and subsequent revascularization. In the event that both conditions developed simultaneously, the appointment of heparin and acetylsalicylic acid could provoke the growth of a hematoma and continued bleeding during its revision, which would lead to death. In turn, without the prescription of these medications, the likelihood of re-thrombosis of the brachial artery and shunt would be maximum with an increased risk of limb amputation.

The development of SFA thrombosis was due, among other things, to the current atherosclerotic process, despite the absence of an occlusive lesion (the Fogarty catheter passed freely intraoperatively). In combination with endotheliitis, re-thrombosis developed already 3 minutes after successful thrombectomy. The lack of involvement of the distal bed (the presence of collateral blood flow according to the ATA and PTA according to the CDS) became a preventive factor in the successful outcome of revascularization. According to the literature, the most common cause of recurrent thrombosis is damage to the distal tibial arteries and microvasculature. Successful thrombectomy from the main arteries against this background most often ends with re-thrombosis due to capillary damage. Selective thrombolysis may be effective under these conditions, according to some sources [6]. However, not all thrombolytic drugs are approved for use in the setting of peripheral thrombosis. At the same time, not every medical institution has the financial capabilities for their routine "conveyor" use [6]. Thus, this type of reperfusion is not widely used today.

The choice in favor of a synthetic prosthesis, rather than an autovein, despite the absence of an angina clinic (when examined by a cardiologist), was due to reports of infectious endothelitis of both the venous and arterial systems in patients with COVID-19 [1,2,3,4]. Thus, implantation of an autovenous conduit could be accompanied by a risk of thrombosis with recurrent acute ischemia of the left lower limb and probable amputation. Therefore, the choice of a multidisciplinary consultation was made in favor of a synthetic prosthesis.

An important factor in the successful outcome of revascularization and hematoma drainage was the rejection of general anesthesia. It is known that the transfer of a patient to mechanical ventilation against the background of COVID-19 is combined with the risk of developing barotrauma (emphysema, pneumothorax, pneumomediastinum), which is most often accompanied by the subsequent development of a fatal outcome. [7,8]. Therefore, the implementation of the listed interventions under intravenous, spinal and local anesthesia has become a preventive factor in a successful outcome.

CONCLUSION

The presented clinical case demonstrated a non-trivial course of COVID-19 with the development of such conditions as bilateral polysegmental pneumonia, infectious hemorrhagic vasculitis, spontaneous hematoma of the psoas major muscle on the right, thrombosis of the brachial and superficial femoral arteries. Implemented surgical and conservative methods of treatment have shown their effectiveness and safety. The use of a synthetic prosthesis and the rejection of an autovein for femoropopliteal shunting was due to an increased risk of thrombosis of the latter against the background of current infectious endothelitis. Thus, the choice of strategy for this cohort of patients should be personalized, carried out by a multidisciplinary consultation based on individual patient parameters and indicators of systemic inflammation/coagulopathy.

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