

Case report

ПРИКАЗ НА СЛУЧАЈ: ТРЕТМАН СО ЕМБОЛИЗАЦИЈА НА ХЕМАТОМ ВО ПРАВИОТ СТОМАЧЕН МУСКУЛ КАЈ ПАЦИЕНТ СО КОВИД-19

A CASE REPORT: EMBOLIZATION TREATMENT OF RECTUS SHEATH HEMATOMA IN A COVID-19 PATIENT

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Abstract

Introduction. In this case report we present a patient with COVID-19 pneumonia and rectus sheath hematoma (RSH) treated with embolization.

Methods. A 63-year-old man positive for SARS-CoV-2 presented with cough, fever and dyspnea to our Clinic. The patient was admitted and treated with oxygen, antibiotics, corticosteroid, anticoagulant and oral antiplatelet therapy. Thirteen days after admission the patient had severe abdominal pain, the CT scan confirmed left rectus sheath hematoma and he underwent a CT angiography with embolization of the left inferior epigastric artery. Ten days after embolization the patient recovered completely and was discharged.

Result. SARS-CoV-2 infection is associated with coagulopathy, hence the anticoagulant therapy. The main side effect of anticoagulant therapy is an increased risk of bleeding. A rare complication of anticoagulant therapy is rectus sheath hematoma. The treatment is usually conservative with intravenous fluids, pain medication, discontinuation of anticoagulant therapy, and blood transfusion in cases of severe anemia. The computed tomography is the most common method to establish or confirm the diagnosis. Embolization of bleeding vessels can be performed in large RSH with hemodynamic instability and/or with evidence of active bleeding.

Conclusion. Inpatient treatment of COVID-19 pneumonia includes anticoagulant agents, but clinicians must carefully monitor their possible side effects and suspect a rectus sheath hematoma in patients with abdominal pain and palpable mass. Those with clinically relevant rectus sheath hematoma that do not respond to supportive care can be successfully treated using embolization, thus avoiding invasive surgical approach.

Keywords: anticoagulants, LMWH, COVID-19, rectus muscle of abdomen

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Апстракт

Вовед. Во овој приказ на случај претставуваме третман со емболизација кај пациент со КОВИД-19 пневмонија и крварење во правиот stomачен мускул.

Методи. 63 годишен маж позитивен за SARS-CoV-2 кој се јави на нашата Клиника поради кашлица, покачена телесна температура и глад за воздух, беше примен и третиран со кислород, антибиотици, кортикостероид, антикоагулантна и антиагрегациона терапија. Тринаесет дена по приемот пациентот се пожали на силна stomачна болка, а компјутеризираната томографија покажа крварење во левиот прав stomачен мускул и пациентот подлегна на КТ водена емболизација на левата епигастрична артерија. Десет дена по емболизацијата пациентот се оправи и беше испишан.

Резултати. Инфекцијата со SARS-CoV-2 е асоцирана со коагулопатија, оттука и примената на антикоагулантна терапија. Главен несакан ефект на антикоагулантната терапија е зголемиот ризик за крварење, а нејзина ретка компликација е крварењето во правиот stomачен мускул. Третманот е обично конзервативен со инфузиони раствори, обезболување, прекин на антикоагулантната терапија, а во случај на тешка анемија и трансфузија на крв. Најчесто користена метода за поставување или потврдување на дијагнозата е компјутеризираната томографија. Емболизација на крваречки крвни садови се врши при големи крварења со хемодинамска нестабилност и/или знаци за активно крварење.

Заклучок. Хоспиталното лекување на КОВИД-19 пневмонија вклучува антикоагулантни агенси, но клиничарот мора внимателно да следи за можни несакани ефекти и да има сомнеж за крварење во правиот stomачен мускул кај пациенти со stomачна болка и палпабилна маса. Пациентите со клинички

значајно крварење во правиот стомачен мускул кои не реагираат на супортивна терапија може успешно да се третираат со емболизација, а така се избегнува инвазивниот хируршки пристап.

Клучни зборови: антикоагулантна терапија; нискомолекуларни хепарини; КОВИД-19; прав стомачен мускул.

Introduction

Coronavirus disease 2019 (COVID-19) is an infection caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) first reported in December 2019 in Wuhan, China. Coagulopathy is a frequent complication that occurs in patients with severe COVID-19 infection and may manifest as bleeding or thrombosis. The thromboembolic events in this setting are more common than hemorrhage. Anticoagulant therapy is used to prevent and treat abnormalities in coagulation, but may increase the risk for bleeding, especially in older patients with comorbidities. [1] One example for spontaneous bleeding is the rectus sheath hematoma (RSH). In this case report we present a patient with COVID-19 pneumonia, who developed a rectus sheath hematoma (RSH) during the hospital stay and was treated with embolization.

Case presentation

A 63-year-old man presented to our clinic after being tested positive for SARS-CoV-2 with COVID-19 rapid antigen test, because of persistent cough, fever and recently developed shortness of breath. His first symptoms dated 10 days prior admission. The patient was without fever with heart rate 114 beats per minute, respiration rate of 33 per minute and oxygen saturation 89% on ambient air. From his medical history the patient has an essential hypertension that is regulated with enalapril once daily.

The patient was admitted on the COVID-19 ward and treated with oxygen therapy on face mask with oxygen flow 10 to 15 l/min. Intravenous antibiotics (beta lactam and fluoroquinolones class), methylprednisolone 240mg, enoxaparine 2x60mg as low molecular weight heparin (LMWH) were used, as well as parenteral proton-pump inhibitor and clopidogrel 75mg as antiplatelet agent. Multifocal and bilateral consolidations were revealed on the chest X-ray. Similarly, the chest computed tomography (CT) with contrast registered peripheral bilateral progressive

organizing consolidations without evidence of pleural effusion. All these findings suggested a COVID-19 bilateral pneumonia.

Thirteen days after admission the patient presented with severe lower abdominal pain radiating to the left inguinal region. Therefore additional fluids and pain medications were administered that mildly relieved the pain. Later that day due to reappearance of the pain, palpable tender mass located to the left of the umbilicus, a decrease in the blood pressure, a reduction in hemoglobin (Hb) 87 g/l and red blood cell count (RBC) of $2860 \times 10^3/\mu\text{L}$ the patient underwent an abdominal CT scan with contrast. The CT scan confirmed $17 \times 6 \times 5$ centimeter rectus sheath hematoma (RSH) with colliquation and extravasation of contrast, and an indication for embolization was set. (Figure 1)

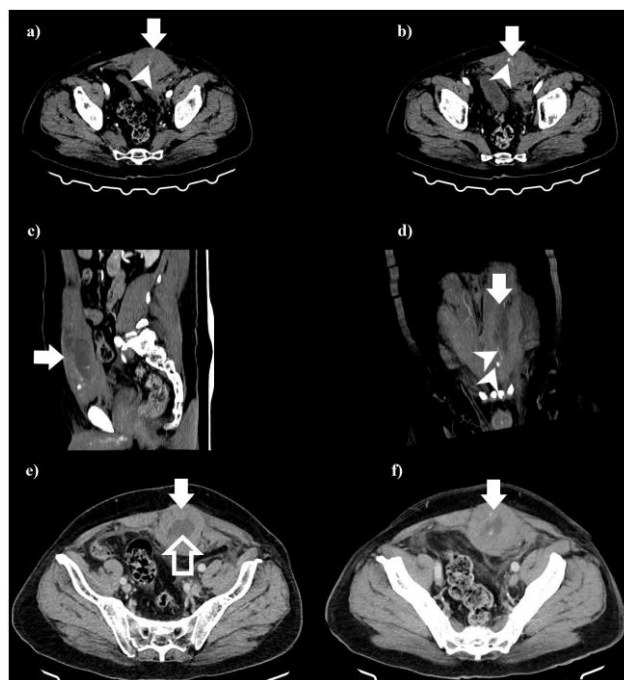


Fig. 1 Abdominal CT scan with contrast showing the hematoma (white arrows) in the left rectus abdominis muscle, extravasation of contrast (white arrowheads) and the colliquation (unfilled white arrow, the darker area inside the hematoma): a) to d) arterial phase; e) and f) venous phase

The trend of blood investigation at admission, during the hospital stay, at discharge and at follow-up is shown in Table 1. During the evening hours in collaboration with the team from the radiology clinic the patient underwent a CT angiography with embolization of the left inferior epigastric artery. (Figure 2)

Table 1. The trend of blood investigation on admission, during hospital stay, at discharge and at follow-up

	On admission	13 th day	14 th day	At discharge	At follow-up
Hb	117	87	91	92	114
RBC	3910	2860	2970	3060	3910
PLT	393	231	451	247	210
D-Dimer	16760	1492	/	2095	1132
LDH	604	451	/	291	278
CRP	225	6	/	48	8
Urea	10.6	10.6	15.7	4.1	4.8

Hb, hemoglobin; RBC, red blood cells; PLT, platelets; LDH, lactate dehydrogenase; CRP, C-reactive protein

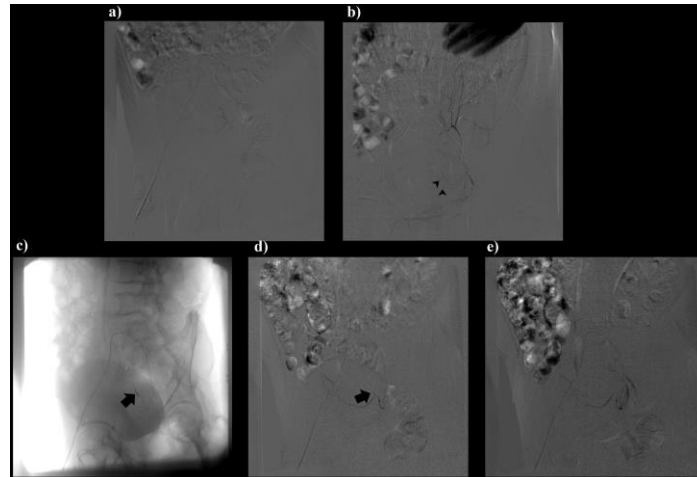


Fig. 2 CT angiography and superselective catheterization of the left inferior epigastric artery showing the points of bleeding (arrowheads), the inserted hydrophilic coils (black arrows) and the progressive occlusion; a) and b) are pre-embolization; c), d) and e) are after embolization

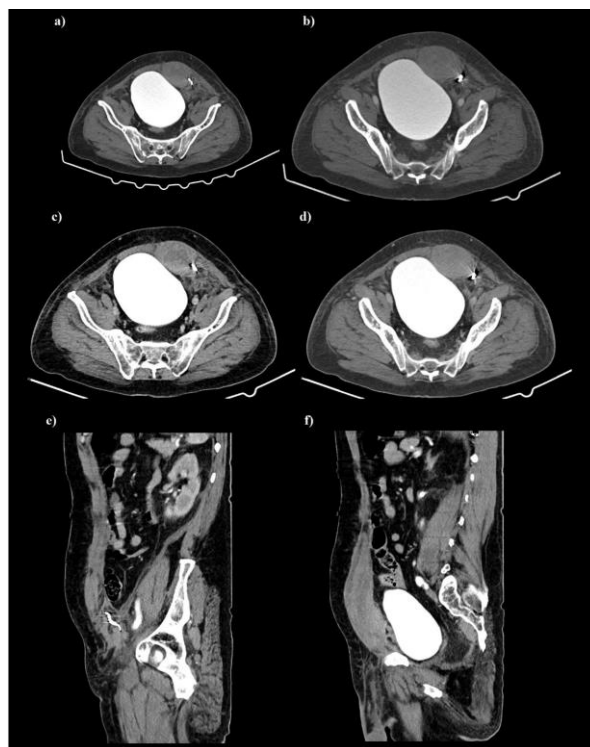


Fig. 3 The control abdominal CT with contrast demonstrates the placement of the coils, downsized hematoma, but also a distended bladder filled with contrast: a) and b) represent the arterial phase; c) and d) represent the venous phase; e) and f) represent the saggital reconstruction

Multiple hydrophilic coils were inserted, which led to progressive occlusion of the possible points of bleeding. The next day, a control abdominal CT scan with contrast was performed which demonstrated the placement of the coils in the left inferior epigastric artery, no more active hemorrhage and extravasation of contrast in both the arterial and venous phase, as well as 1.5 cm downsized hematoma. (Figure 3)

The anticoagulation therapy was ceased for two days and prophylactic doses of low molecular weight heparin (LMWH) were used afterwards until the end of the hospitalization. Ten days after the embolization the patient recovered completely and was discharged. Due to high levels of d-dimer (2095 ng/ml) at discharge we recommended direct-acting oral anticoagulant (DOAC) and oral proton-pump inhibitor for the next two weeks. At the follow-up the patient was feeling well and the laboratory findings showed improvement in hemoglobin (Hb) 114 g/l, red blood cell count (RBC) of $3910 \times 103/\mu\text{L}$ and still mildly elevated d-dimer values 1132 ng/ml.

Discussion

The infection with SARS-CoV-2 is associated with coagulopathy, hence the anticoagulant therapy in the COVID-19 protocols in order to decrease the risk for thromboembolism. Although COVID-19 carries risk for coagulopathy, patients with severe COVID-19 pneumonia are bedridden and require anticoagulant therapy. [2] The most used anticoagulant agents in inpatient settings are the different forms of low molecular weight heparin (LMWH) like enoxaparin or nadroparin. In this setting an increased risk of bleeding is their main side effect. [3] Prophylactic dosing of LMWH is recommended for patients who are critically ill rather than therapeutic dosing, because the risk of bleeding is higher in therapeutic dosing of LMWH. [4] The rectus sheath hematoma (RSH) is a relatively rare complication of anticoagulant therapy that can be life-threatening. [5] On the other side, the anticoagulant therapy is the most frequent cause for spontaneous rectus sheath hematoma. Most of the cases of RSH in which the patients died are associated with the use of anticoagulant therapy. [6] Even though the pathogenesis of anticoagulation-associated rectus sheath hematoma is not fully understood, it is assumed that heparin-induced microangiopathy or preexisting diffuse arteriosclerosis of the small vessels are one of the main reasons. Additional factors that can contribute in the pathogenesis of RSH are the older age, minor trauma, such as rapid change in position, twisting, Valsalva maneuvers, intraabdominal injections and especially sneezing or coughing. [7-8] A lot of muscles contract during cough, including the abdominal muscles that can cause tearing of the superior or inferior epigastric artery and their branches, and resulting in concomitant bleeding. [9] Rectus sheath hematoma occurs

after injury of either superior or inferior epigastric artery which leads to hemorrhage into the rectus sheath. [10]

The increased levels of d-dimer can predict the thrombotic complications, severe course and illness, as well as death in COVID-19 patients. [11] Pulmonary thromboembolism is associated with high levels of d-dimer, which is why the anticoagulant therapy is very important to reduce this complication of COVID-19. The optimal dose of the anticoagulant agents for preventing thrombotic complications in COVID-19 is still not known, but in cases of severe pneumonia clinicians almost always use therapeutic doses. There are reports of rectus sheath hematoma in COVID-19 patients with severe pneumonia and therapeutic doses of anticoagulant agents. [12] Using antiplatelet agents in individuals hospitalized with COVID-19 is associated with small increase in bleeding. [4] Individuals who are already receiving antiplatelet therapy for another indication do not require ceasing of the therapy.

The clinical presentation of RSH is characterized with pain in the lower abdomen (usually sudden and can mimic acute abdomen) and abdominal wall tender mass on examination. [8,10] Obtaining information from the patient and examination of the patient are the first steps to diagnose rectus sheath hematoma (RSH). Laboratory findings are of more importance for deciding whether the patient needs blood transfusion or not.

The treatment is usually conservative with intravenous fluids, pain medication, and discontinuation of anticoagulant therapy. Blood transfusions are necessary in cases of severe anemia. Surgical ligation of the vessels is another option for treatment of rectus sheath hematoma, especially when the hematoma is large enough to make compression of internal organs and/or vessels. A case report published in 2020 in the *International Journal of Surgery Case Reports* showed a urinary obstruction by rectus sheath hematoma and compression of the left external iliac artery. [13]

A study at Mayo Clinic in 2006 found that the computed tomography (CT) of abdomen and pelvis is by far the most common method to establish or confirm the diagnosis of RSH (in 76% of 126 patients). The CT of abdomen and pelvis also reduces the need of unnecessary laparotomy, as RSH can present with strong abdominal pain like in acute abdomen. [10] The injury of vessels is presented on CT with contrast as an active extravasation of contrast, which means escaping of contrast from the injured vessel to the surrounding tissue. Embolization of suspected bleeding vessels can be performed in large rectus sheath hematoma with hemodynamic instability and/or with evidence of active bleeding, as in our case report. Embolization is a minimal invasive radiologic procedure with a great success in ceasing the active bleeding. According to a study in 2007 by Jordi Rimola published in the *American Journal of Roentgenology*, the rate of hemostasis after

embolization is 100% and suggests that the procedure should be considered as first-option treatment for rectus sheath hematoma that cannot be controlled with supportive care. [7]

Conclusion

The protocols for inpatient treatment of SARS-CoV-2 infection and COVID-19 pneumonia include anticoagulant agents such as low molecular weight heparin. Clinicians must carefully monitor possible side effects of the anticoagulant therapy, suspect a rectus sheath hematoma in patients with acute abdominal pain and a palpable mass in the abdominal wall and order a CT scan to evaluate and confirm the suspicion. Patients with clinically relevant rectus sheath hematoma can be successfully treated using embolization, thus avoiding invasive surgical approach.

Conflict of interest statement. None declared.

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