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Vascular Interventions *Case Report*

Transjugular intrahepatic portosystemic shunt in coronavirus patient: A case report

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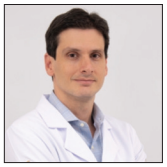

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ABSTRACT

Transjugular intrahepatic portosystemic shunt should be considered in all liver transplant candidates, in addition to being a life-saving procedure in bleeding from esophageal or gastric varices. In this case, we describe the management of a patient diagnosed with coronavirus with bleeding from varicose veins in an emergency situation with worsening of his lung function.

Keywords: Orotracheal intubation, Severe acute respiratory syndrome coronavirus 2 (coronavirus), Transjugular intrahepatic portosystemic shunt

INTRODUCTION

Transjugular intrahepatic portosystemic shunt (TIPS) should be considered in all liver transplant candidates, in addition to being a life-saving procedure in bleeding from esophageal or gastric varices. In this context of a global pandemic, personalized medicine grows more and more in the routine of hospitals, bringing clinical staff, and patients closer together toward treatment decisions. Factors such as potentially fatal hemorrhagic condition, in addition to severe respiratory condition, should be put into multidisciplinary discussion, especially in view of the coronavirus pathology that is still not fully understood.

CASE REPORT

A 57-year-old diabetic and cirrhotic male patient, listed for liver transplantation, was admitted to the hospital emergency room with general malaise and dyspnea. After the collection of laboratory tests, leukocytosis (17,525 cells/mm^3) and increased C-reactive protein (34.8 mg/dL) were identified, thus antibiotic therapy with piperacillin and tazobactam was performed as the initial therapeutic approach. The patient developed renal dysfunction (creatine = 5.5 mg/dL) with hyperkalemia (k = 5.8 mEq/L) and acidosis (PH = 7.31), in addition to hyponatremia (Na = 119 mEq/L), being referred to the intensive care unit with a fluctuating level of consciousness, in addition to massive ascites and worsening of ventilatory patterns, although hemodynamically stable. The patient evolved with the need for orotracheal intubation (OTI) 5 days after admission and the diagnosis of coronavirus (COVID-19) was confirmed by RT-PCR test, in addition to acute venous thrombosis in both popliteal and tibial

veins, requiring anticoagulant therapy (heparin 5000 U twice a day).

The general condition worsened, with the patient presenting upper gastrointestinal bleeding 7 days after OTI, requiring red blood cell transfusion and cryoprecipitate, in addition to the introduction of vasoactive drugs. Terlipressin (1 mg 4/4 h) was started and the patient was referred for CT angiography, being identified large gastric and esophageal varices, which were treated with endoscopic band ligation. The patient showed improvement in ventilatory patterns, but continued with subsequent bleeding, with a drop of 24% in hematocrit. Despite endoscopic treatment, TIPS was indicated to control the recurrence of upper digestive bleeding. Liver function was consistent with Child C 10, MELD 30, bilirubin was 3.1 mg/dl, platelets 30,000/mm^3, INR 2.4, and albumin 2.1 mg/dl.

Before and after the procedure, all safety measures recommended by the World Health Organization were adopted. For all the staff in angiosuite, the mandatory individual equipment consists of the use of PPE appropriate for standard contact and air precautions: N95/PFF2 masks or equivalent, gloves, eye protection, aprons, and shoe covers. The number of people inside the room was reduced to two interventionists, one anesthetist, and one nursing technician. The operating room has its own ultrasound machine, and the multimodal environment was decontaminated after the case with disinfectants composed of ethyl alcohol, sodium hypochlorite, and ammonia compounds, besides correctly despising individuals equipment. These control measures described are important to minimize the intrainstitutional spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and COVID-19, and should not be underestimated.[1] Due to the angiosuite does not have a negative pressure ventilation system, extra precautions performed by the anesthetic team involved were as follows: Turning off the air conditioning during intubation, keeping the cuff raised to minimize aerosolization, and connecting a filter to the endotracheal tube connections and the mechanical ventilator.

Standard TIPS access has started from the right internal jugular vein, guided by ultrasound and fluoroscopy, followed by the implantation of a 12 French introducer. The right hepatic vein was catheterized using a multipurpose catheter and an indirect portogram was performed. The access to the right portal vein branch was performed with RUPS-100 (Cook Medical – Indiana/USA) [Figure 1], followed by catheterization with hydrophilic guidewire and introduction of a pigtail catheter to measure the stent and then perform a pre-dilation of the transhepatic path. The IVC pressure was 17 mmHg and the indirect pressure of the portal vein measured 38 mmHg.

Stent implantation was performed with VIATORR 10 mm × 8 cm (Gore – Delaware/EUA), followed by dilatation of the TIPS stent with Mustang 10 mm balloon (Boston Scientific – Massachusetts/EUA). A post-venoplasty portogram [Figure 2] showed improvement in IVC pressure (29 mmHg) and direct portal vein pressure (21 mmHg). The portosystemic gradient was 21 mmHg and drop to 8 mmHg.

There were no immediate complications with the procedure. Technical success was considered with the shunt patency in the Doppler ultrasound 24 h and 1 week after. At 2-week follow-up, the patient reported no symptoms of portal hypertension, including no further episodes of bleeding, and achieved a significant improvement in lung function, as well as in 1 month follow-up in computed tomographic pattern [Figure 3], resulting in orotracheal extubation.

DISCUSSION

Faced with the SARS-CoV-2 pandemic, new dilemmas have arisen in medical practice, including in interventional

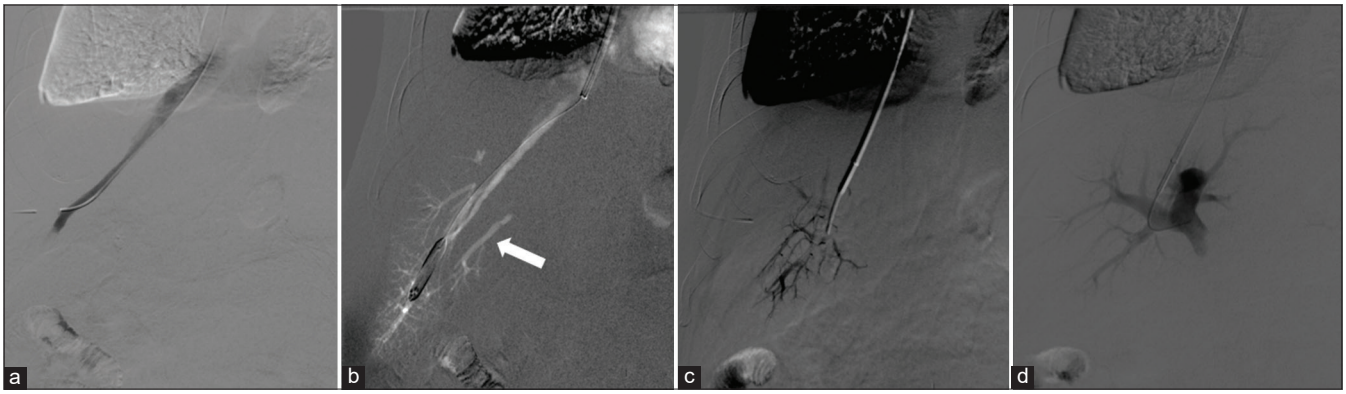

Figure 1: A 57-year-old male diabetic and alcoholic cirrhotic patient, on transplant list, with diagnosis of coronavirus, presented with variceal bleeding. Hepatic angiography shows the right hepatic vein being catheterized through an MP catheter (a) and performing a portogram (b), in which the target portal branch is visualized (arrow). The access of the right portal vein branch was performed with RUPS-100 (c), followed by catheterization with hydrophilic guidewire (d).

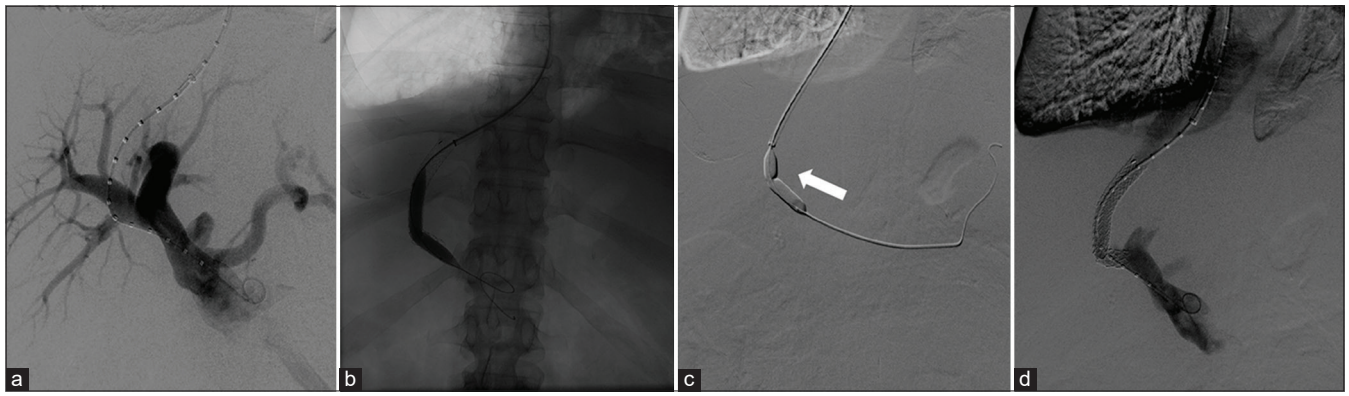

Figure 2: A 57-year-old male diabetic and alcoholic cirrhotic patient, on transplant list, with diagnosis of coronavirus, presented with variceal bleeding. Hepatic angiography shows the introduction of pigtail catheter to measure the stent (a) and a pre-dilatation of the transhepatic path (b). Stent implantation was performed, followed by dilatation of the TIPS stent with 10 mm balloons (arrow) (c). Post-venoplasty showed improvement in portosystemic gradient (d).

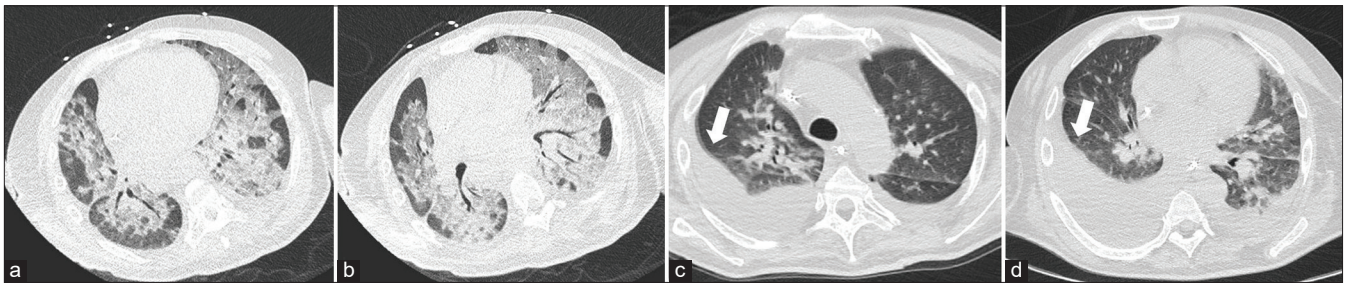

Figure 3: A 57-year-old male diabetic and alcoholic cirrhotic patient, on transplant list, with diagnosis of coronavirus (COVID-19), presented with variceal bleeding. Pre-TIPS computed tomography with lung window demonstrating a pattern of severe involvement of the lung parenchyma compatible with COVID-19, presenting opaque opacification in bilateral ground-glass diffuse (a and b). Post-TIPS computed tomography with lung window after 2 weeks demonstrating decreasing of lung involvement, with less ground-glass opacification, but bilateral pleural effusion (arrows) (c and d).

radiology.[2-4] Discussions about the indications and the timing for medical procedures have surfaced with the current pandemic. In this case, the patient had alcoholic cirrhosis, presenting hemorrhagic bleeding with severe hemodynamic repercussions, and most of all, with a poor respiratory condition due to COVID-19 infection (mechanical ventilation and unfavorable evolution).

In a multidisciplinary discussion, TIPS was chosen as the therapy to control the digestive bleeding, in view of the lack of endoscopic control. Several factors were listed at the discussion: Potentially fatal acute hemorrhagic condition; severe respiratory condition; current knowledge of the new COVID-19 pathology; patient at list of transplant with potential evolution of final cure; and suitable conditions of intensive care for patient and the local population.[5]

Recent reports describe that COVID-19 infection causes laboratory alterations such as leukocytosis, thrombocytopenia, enlargement of prothrombin time, activated partial thromboplastin time, thrombin-antithrombin complex, fibrin degradation products an D-dimers, and clinically manifesting as disseminated intravascular coagulopathy, events also seen in other viral infections including human immunodeficiency, Ebola, Zika, and chikungunya viruses.[3]

Among the main established TIPS indications, the following stand out: Refractory ascites, varicose bleeding refractory to endoscopic treatment, and prevention of bleeding secondary to varicose veins.[6,7] In the scope of refractory variceal bleeding, endoscopic therapy aims at a portal gradient level less than 12 mmHg, associated with the searching of systemic shunts, which were not present in the case.[6,8]

It is not uncommon in the practice of interventional radiology, especially in acute cases, to perform TIPS in patients with associated pulmonary conditions, however due to COVID-19 infection, especially with unfavorable evolution, is a novelty.

There was a successful attempt to resolve the patient's hemorrhagic condition. However, we do not have sufficient knowledge of the new virus, as well as its systemic implications and possible particular interactions with

interventional radiology procedures. The patient had not had previous episodes of upper gastrointestinal bleeding, but it is likely that the event will be due to his cirrhotic condition associated with the use of anticoagulants.

SARS-CoV-2 involves an increased risk of venous thromboembolism, because its pathophysiology is apparently related to an exacerbated inflammatory process and coagulopathy,[9] special attention should be paid to the patency of shunt during the follow-up, with time intervals shorter during Doppler ultrasound, in addition to discussing the possibility of anticoagulation.

CONCLUSION

There were multiple discussions about the review of indications and appropriate moments for carrying out the procedures. There is a need to customize each case and procedure, assessing their needs and possible repercussions. However, acute and potentially fatal clinical conditions are present as little altered and fundamentals indications. There is even a need to policing to avoid subindication, respecting the community context and moment at pandemic situation. This case serves to illustrate an unusual situation of TIPS indication, even more involving the complete lack of knowledge that SARS-CoV-2 may be associated with the episode, but reinforces that personalized medicine must be practiced after adequate communication between the medical teams involved and consent of the patient and his family.

Declaration of patient consent

Institutional Review Board permission obtained for the study.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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