An infection-oriented approach for thoracic endovascular aortic repair in a SARS-CoV-2 positive patient. A case report.

Ann. Ital. Chir., 2020 91, 3: 273-276
pii: S0003469X20033916

Giovanni Rossi, Stefano Aldo Ferrari, Simona Sommaruga, Lorenzo Muzzarelli, Stefania Piconi*

Ospedale Alessandro Manzoni ASST Lecco, Italy
Division of Vascular Surgery
**Division of Infectious Diseases*

An infection-oriented approach for thoracic endovascular aortic repair in a SARS-CoV-2 positive patient. A case report.

CASE REPORT: *A 64-year-old woman presented to our emergency department during the outbreak of the covid-19 emergency in Italy with syncope, anosmia, mild dyspnoea and atypical chest and dorsal pain. A chest CT scan showed an acute type B aortic dissection (ATBAD) and bilateral lung involvement with ground-glass opacity, compatible with interstitial pneumonia. Nasopharyngeal swabs resulted positive for SARS-CoV-2. For the persistence of chest pain, despite the analgesic therapy, we decided to treat her with a TEVAR. Patient's chest and back pain resolved during the first few days after the procedure. No surgical or respiratory complications occurred and the patient was discharged 14 days after surgery.*
DISCUSSION: *By performing the operation under local anesthesia, it was possible to limit both the staff inside the operatory room and droplet/aerosol release. Since we had to perform the operation in a hemodynamics room, thanks to the limited extension of the endoprosthesis and the good caliber of the right vertebral artery we were able to reduce the risk of spinal cord ischemia despite the lack of a revascularization of the left subclavian artery.*
CONCLUSIONS: *A minimally invasive total endovascular approach allows, through local anesthesia and percutaneous access, to avoid surgical cut down and orotracheal intubation. This, combined with a defined management protocol for infected patients, seems to be a reasonable way to perform endovascular aortic procedures in urgent setting, even in a SARS-CoV-2 positive patient.*

KEY WORDS: COVID-19, Dissection, TEVAR

Introduction

Since the identification of a new betacoronavirus (known as SARS-CoV-2) as the cause of an epidemic of coronavirus disease (COVID-19) in Wuhan (China) in December 2019 [1], a great number of cases were reported in China and many other Countries, constituting a serious public health problem. As of May 15, 2020, more than 4 300 000 COVID-19 cases have been identified worldwide according to the WHO reports [2], with more than 290 000 deaths.
We report our experience with a patient affected by an acute type B aortic dissection (ATBAD) and a SARS-CoV-2 infection. In this particular condition, we had to adopt an infection-oriented surgical approach in order to guarantee the highest standard of care, preserving patient and staff safety.

Case Report

In March 2020 a Caucasian 64-year-old woman with a medical history of diabetes mellitus, hypertension, coro-

Pervenuto in Redazione Giugno 2020. Accettato per la pubblicazione Giugno 2020
Correspondence to: Giovanni Rossi, Division Vascular Surgery "Alessandro Manzoni" Hospital; Via dell'Eremo 9/11, Lecco, Italy (e-mail: g.rossi@asst-lecco.it)

nary artery disease (previous acute myocardial infarction and angioplasty) and left carotid endarterectomy, presented to our emergency department with syncope, anosmia, mild dyspnea and atypical chest and dorsal pain. She reported also that she had had a fever the week before (maximum 37,5°C) but at the time of admission was afebrile and her room-air oxygen saturation was 93%.

Blood tests showed only a moderate lymphopenia and a slight increase in fibrinogen and C-reactive protein (CRP); PaO2/FiO2 ratio at arterial blood gas analysis was > 300 mmHg.

To rule out a pulmonary thromboembolism, a chest CT scan was performed. It showed an ATBAD with a bulging of the aortic wall (Fig. 1) and bilateral lung involvement with ground-glass opacity, compatible with interstitial pneumonia (Figs. 2, 3). The aortic dissection was extended longitudinally for about 6 cm, with the entry tear located immediately distal to the origin of the left subclavian artery (LSA); the caliber of the vertebral artery of the two sides was similar, and no alteration of the intracranial vascularization was detected. Nasal and pharyngeal swabs were immediately collected for viral search through RT-PCR, resulting positive for SARS-CoV-2. A 7 days darunavir + ritonavir + hydroxychloroquine therapy and an antibiotic prophylaxis with ceftriaxone was established by the infectious disease specialist according to the internal protocol and on the basis of the patient's age and clinical and radiological conditions. Statin therapy was discontinued for known interactions with antiviral drugs and strict glycemic monitoring and thromboprophylaxis were established. Oxygen administration through nasal cannula (2 L/min) was sufficient to maintain a saturation > 94%. As for all acute aortic syndromes (AAS), the patient was transferred to the intensive care unit with invasive pressure monitoring; in this case a single room with contact and droplet precautions was planned.

A CT scan after 24 hours showed no change in the extension of the ATBAD, but the patient continued to report chest and back pain despite the analgesic therapy, so endovascular correction was needed. Since our operating rooms were inaccessible due to their transformation into an additional intensive care unit for COVID-19 patients, it was necessary to use the hemodynamics room. In local anesthesia a thoracic endovas-

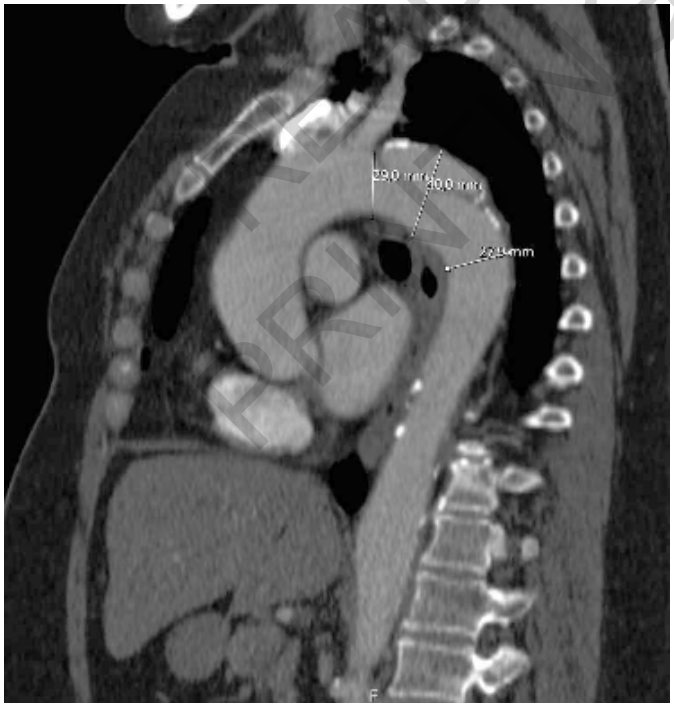

Fig. 1: CT scan showing the acute type B aortic dissection

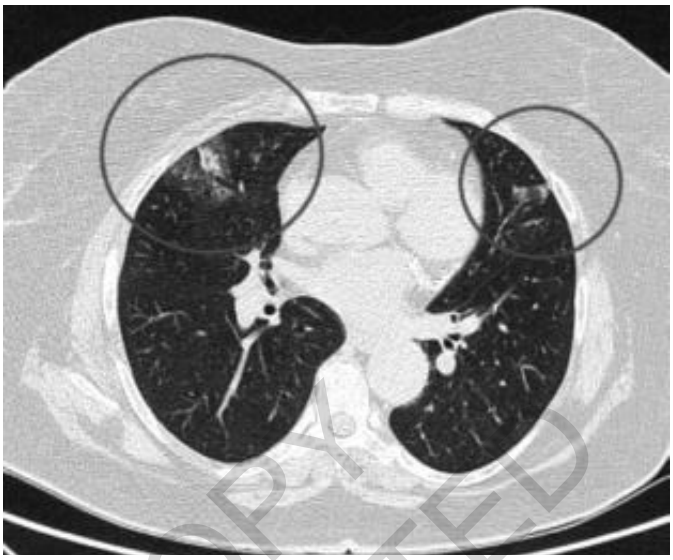

Fig. 2: bilateral lung involvement with ground-glass opacity

Fig. 3: lung involvement with ground-glass opacity

cular aortic repair (TEVAR) with a Zenith Alpha ZTA-P-34-161 (Cook Medical, Bloomington, Ind) with intentional coverage of the LSA origin without revascularization was performed. Given the infectious condition and the length of endoprosthesis (less than 200 mm) we did not place a catheter for cerebrospinal fluid drainage [3,4]. The final angiography showed complete coverage of the dissection and the absence of endoleaks. The procedure was performed through bilateral percutaneous femoral access (5 F on the right and 18 F on the left), with a stand-by anesthesiologist outside the room. According to our infective protocol, a surgical mask was applied to the patient for the entire duration of the surgery in order to limit droplet diffusion and oxygen was administered through nasal cannula. The staff in the operatory room has been reduced to a minimum because of the infectious risk and to minimize the use of personal protective equipment (PPE) [5]: three vascular surgeons (one of whom also acting as a scrub nurse) and one unscrubbed nurse. In addition to the uniform and X-ray apron and glasses, the staff acting in the room was equipped with a double surgical gown, two pairs of gloves, protective visor, FFP2 mask, cap and shoe cover. The procedure was uneventful and about 6 hours after its end the patient was transferred from the intensive care unit to the infectious disease department. Patient's chest and back pain resolved during the first few days after the procedure. Due to a post-operative increase in D-dimer, an intermediate dose of enoxaparin (80 units / kg divided into two doses) has been established following the internal protocol, after ultrasound check of haemostasis of percutaneous femoral accesses. As soon as the D-dimer values fell under 2000 ng/mL, the dosage of enoxaparin has been reduced to the thromboprophylactic one. No surgical or respiratory complications occurred; the patient was discharged 14 days after surgery.
A CT scan has not been acquired during the hospitalization in order to limit patient's mobilization outside the department and it was scheduled about six months after the intervention.

Discussion

During the COVID-19 emergency, Italy was one of the most affected countries in the European region, and Lombardia appears to have been the epicenter of the Italian outbreak [6], requiring the transformation of numerous health centers into COVID-19-centers, including the A. Manzoni Hospital in Lecco.
This is, as far as we know, the first case reported in Literature of a TEVAR for an ATBAD in a patient affected by COVID-19 in Europe. We have chosen to treat the patient because of chest pain (despite the analgesic therapy) and syncope [7]. The latter, in our opinion, is more easily explained by a vagal stimulus caused by aortic dissection than by viral pneumonia (saturation has always been >90% and the patient was essentially asymptomatic).
By performing the operation under local anesthesia, it was possible to limit both the staff inside the operatory room (only 3 surgeons and a nurse, with a stand-by anesthesiologist outside the room), and droplet and aerosol release (absence of intubation and other invasive maneuvers).
From the surgical point of view, we had to perform the operation in a hemodynamics room, not equipped for a carotid-subclavian bypass that we usually perform before a TEVAR with LSA coverage. In this case, however, we were able to avoid this surgical step thanks to the limited extension of the endoprosthesis (<200 mm) and the good caliber of the right vertebral artery.

Conclusions

Since the pandemic spreading of SARS-CoV-2 infection and the unknown number of positive patients, the medical community is facing the challenging opportunity to define an infection-oriented surgical approach in order to provide the highest standard of care without sacrificing the protection of staff. As in our case, a minimally invasive total endovascular approach allows, through local anesthesia and percutaneous access, to avoid surgical cut down and orotracheal intubation. This, combined with a defined management protocol for infected patients, seems to be a reasonable way to perform endovascular aortic procedures in urgent setting, even in a SARS-CoV-2 positive patient.

Riassunto

Nel marzo 2020 una donna di 64 anni si è presentata presso il nostro pronto soccorso con sincope, anosmia, lieve dispnea e dolore toracico. Riferiva inoltre febbricola nei giorni precedenti, ma al momento del ricovero era apiretica e la sua saturazione di ossigeno in aria ambiente era 93%.
Una TC del torace (eseguita per escludere una tromboembolia polmonare) ha evidenziato una dissezione aortica acuta di tipo B e una polmonite interstiziale bilaterale, con successiva positività del tampone naso-faringeo per SARS-CoV-2. La dissezione aortica era estesa longitudinalmente per circa 6 cm, con un tear di entrata situato subito distalmente rispetto all'origine dell'arteria succlavia sinistra. Come per tutte le sindromi aortiche acute, la paziente è stata trasferita in terapia intensiva per monitoraggio invasivo della pressione arteriosa; in questo caso è stata pianificata una stanza singola con isolamento da contatto e per droplets.
Secondo il protocollo interno è stata impostata una terapia antivirale ed una profilassi antibiotica ed antitrombotica. La somministrazione di ossigeno a basso flusso

attraverso occhialini nasali era sufficiente per mantenere una saturazione > 94%. Una scansione TC dopo 24 ore non ha mostrato cambiamenti nell'estensione della dissezione, ma la paziente continuava a riferire dolore toracico nonostante la terapia analgesica per cui è stato deciso di sottoporla a trattamento chirurgico. In anestesia locale (senza intubazione oro-tracheale e con un anestesista in stand-by fuori dalla stanza) ed utilizzando una sala di emodinamica (per la indisponibilità delle sale operatorie, trasformate in terapia intensiva per i pazienti COVID-19) la lesione è stata esclusa mediante il posizionamento di una endoprotesi toracica con copertura intenzionale dell'origine della succlavia di sinistra senza rivascolarizzazione. L'angiografia finale ha mostrato la completa esclusione della dissezione e l'assenza di endoleak. In base al nostro protocollo infettivologico, per l'intera durata della procedura alla paziente è stata applicata una mascherina chirurgica al fine di limitare la diffusione di droplets e l'ossigenoterapia è stata somministrata tramite occhialini nasali. Il personale presente all'interno della sala di emodinamica è stato ridotto al minimo (tre chirurghi vascolari ed un infermiere di sala operatoria) per abbattere il rischio infettivo e l'impiego di dispositivi di protezione individuale. Oltre alla divisa, al camice piombato ed agli occhiali schermati, il personale presente nella stanza era dotato di un doppio camice chirurgico, due paia di guanti, visiera protettiva, maschera FFP2 e copri scarpe. La procedura si è svolta regolarmente e circa 6 ore dopo il termine la paziente è stata trasferita nel reparto di malattie infettive. Non si sono verificate complicanze chirurgiche né respiratorie e la paziente è stata dimessa in quattordicesima giornata post-operatoria.

Al fine di evitare la mobilizzazione della paziente al di fuori del reparto di malattie infettive e data la risoluzione delle algie toraciche ed il decorso post-operatorio favorevole, il controllo angio-TC non è stato eseguito durante il ricovero ma è stato programmato a distanza di circa sei mesi dall'intervento.

References

1. Lai CC, Shih TP, Ko WC, Tang HJ, Hsueh PR: *Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease-2019 (COVID-19): The epidemic and the challenges.* Int J Antimicrob Agents. 2020; 55(3):105924. doi:10.1016/j.ijantimicag.2020.105924

2. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports

3. Riambau V, Böckler D, Brunkwall J, et al.: *Editor's choice - Management of descending thoracic aorta diseases: clinical practice guidelines of the european society for vascular surgery (esvs).* Eur J Vasc Endovasc Surg, 2017; 53(1):4-52. doi:10.1016/j.ejvs.2016.06.005

4. Nano G, Muzzarelli L, Malacrida G, Righini PC, Marrocco-Trischitta MM, Mazzaccaro D: *Endovascular repair of thoracic and thoraco-abdominal aortic lesions.* Ann Ital Chir, 2019; 90:191-200.

5. Welt FGP, Shah PB, Aronow HD, et al.: *Catheterization Laboratory Considerations During the Coronavirus (COVID-19) Pandemic: From ACC's Interventional Council and SCAI.* [published online ahead of print, 2020 Mar 16]. J Am Coll Cardiol. 2020;S0735-1097(20)34566-6. doi:10.1016/j.jacc.2020.03.021

6. Porcheddu R, Serra C, Kelvin D, Kelvin N, Rubino S: *Similarity in Case Fatality Rates (CFR) of COVID-19/SARS-COV-2 in Italy and China.* J Infect Dev Ctries, 2020; 14(2):125–128. Published 2020 Feb 29. doi:10.3855/jidc.12600.

7. Orend KH, Liewald F, Kirchdorfer B, Sunder-Plassmann L: *Management of descending aortic dissection.* Ann Ital Chir, 1995; 66(6):821-24.