stimulation devices. Current experience reports that the use of MRI in this population is approximately 20-30% (2), very similar to the potential need for MRI in our cohort. Magnetic resonance imaging is the primary tool for the evaluation of patients with neurological and muscular diseases, tumors, and some cardiovascular disorders, and it is estimated that the probability of a patient being indicated an MRI after the implantation of an electronic device may reach 75%. (1)

The first pacemakers were devices with a large surface area and presented alterations when an MRI was performed, so the FDA and device manufacturers did not recommend its use in patients with implanted pacemakers. Further studies have demonstrated that MRI could be performed with no significant clinical effects and no differences in the type and number of complications in patients who had a pacemaker that was non-MRI-compatible compared with patients with MRI-compatible devices, taking the necessary precautions and applying a safety protocol. (3, 4)

This protocol consists in programming the pacemaker to an asynchronous pacing mode in pacing-dependent patients, or inhibiting it (turning it off) in non-pacing-dependent cases, and in the inhibition of tachycardia monitoring and deactivation of therapies in patients with defibrillators. (4)

The theoretical risks of MRI in non-compatible device carriers are lead heating, reprogramming with loss of capture, and sensing or developing arrhythmias. (5) However, two recently published studies that included more than 2,500 patients who received MRI with 1.5 T scanner showed no significant complications applying the safety protocol. (3, 4) It should be pointed out that devices implanted before certain dates (pacemakers prior to 1998 or defibrillators prior to 2000) were taken as contraindication in these studies.

In our experience, only 3 devices predated the year 2000. Fractured, epicardial, and abandoned leads seem to be very susceptible to heating. (6) In our experience, a patient with abandoned lead received an MRI with no adverse events.

The study limitations include its retrospective and single-center nature. There may be a selection bias, since a large proportion of the patients included had their device implanted in recent years; therefore, their follow-up period was shorter and the likelihood to require an MRI was lower. On the other hand, a possible explanation for the low utilization of MRI in this study could be that the Imaging Service in our center does not perform cardiac MRI, so there is little experience in managing cardiovascular conditions and having an implanted cardiac stimulation device is still considered a contraindication.

In conclusion, MRI utilization in a population with cardiac-stimulation devices is low. Knowing and disseminating safety protocols is important, since more MRIs could be performed without significant clinical effects.

Acknowledgments: We are particularly grateful to Dr. Andrés Caeiro and Dr. Alejandro Estrada, from the Department of Electrophysiology and Arrhythmia of Hospital Privado Universitario de Córdoba.

Conflicts of interest

None declared.

(See authors' conflicts of interest forms on the website/ Supplementary material).

Leandro Videla[1], Makarena Bibiloni[1], Sandy Posligua[1], Ricardo Venencia[1], Julieta Manattini[1], Alejandro Contreras[2]

[1] Instituto Universitario de Ciencias Biomédicas de Córdoba.
[2] Department of Cardiology.
Hospital Privado Universitario de Córdoba

Address for reprints: Alejandro Contreras. Department of Cardiology. Hospital Privado Universitario de Córdoba. Naciones Unidas 346. (5016) Córdoba. Argentina - e-mail: aletreras@hotmail.com

Rev Argent Cardiol 2019;87:164-165. http://dx.doi.org/10.7775/rac.v88.i2.17480

REFERENCES

1. Kalin R, Stanton MS. Current clinical issues for MRI scanning of pacemaker and defibrillator patients. PACE 2005;28:2878–91. https://doi.org/10.1111/j.1540-8159.2005.50024.x

2. Williamson BD, Gohn DC, Ramza BM, Singh B, Zhong Y, Li S, et al. Real-world evaluation of magnetic resonance imaging in patients with a magnetic resonance imaging conditional pacemaker system: results of 4-year prospective follow-up in 2629 patients. J Am Coll Cardiol Clin Electrophysiol 2017,3:1231-9. https://doi.org/10.1016/j.jacep.2017.05.011

3. Nazarian S, Hansford R, Rahsepar AA, Weltin V, McVeigh D, GucukIpek E, et al. Safety of magnetic resonance imaging in patients with cardiac devices. N Engl J Med 2017;377:2555-64. https://doi.org/10.1056/NEJMoa1604267

4. Russo RJ, Costa HS, Silva PD, Anderson JL, Arshad A, Biederman RWW, et al. Assessing the risks associated with MRI in patients with a pacemaker or defibrillator. N Engl J Med 2017;376:755-64. https://doi.org/10.1056/NEJMoa1603265

5. Miller JD, Nazarian S, Halperin HR. Implantable Electronic Cardiac Devices and Compatibility With Magnetic Resonance Imaging.J Am Coll Cardiol 2016;68:1590-8. https://doi.org/10.1016/j.jacc.2016.06.068

6. Langman DA1, Goldberg IB, Finn JP, Ennis DB. Pacemaker lead tip heating in abandoned and pacemaker-attached leads at 1.5 Tesla MRI. J Magn Reson Imaging 2011;33:426-31. https://doi.org/10.1002/jmri.22463

Transesophageal Echocardiography in the Era of COVID-19. Use of the Aerosol Box as an Additional Barrier

Coronavirus infection (COVID-19) is an acute -sometimes severe- respiratory disease caused by a new SARS-CoV-2 coronavirus. The rapid progression of this virus has collapsed first-world health systems. This leads us to act responsibly and swiftly in designing organization and action strategies to address this pandemic with as many resources as possible. (1)

Protecting healthcare personnel and preventing SARS-CoV-2 transmission should be a priority during this COVID-19 pandemic. Given the high infec-

tiousness of COVID-19 and the increasing lack of personal protective equipment (PPE) due to the collapse of health systems, healthcare professionals are more exposed to COVID-19 infection, with alarming rates of contagion and morbidity and mortality. (2, 3) The severe shortage of PPE has greatly increased the risk of infection for healthcare personnel, with disturbing rates of doctors and nurses infected in China, Italy, and Spain. (1-3)

Infected patients produce respiratory secretions and potentially transmit the disease when speaking, coughing, and sneezing, or when undergoing medical procedures that generate aerosols, such as orotracheal intubation or transesophageal echocardiography (TEE). (4)

The Aerosol Box device consists of an acrylic box that provides an additional barrier protection when performing procedures in the airway at risk of aerosolization (infected respiratory droplets). It was created by Lai Hsien-yung, an anesthesiologist from Taiwan, to provide additional protection to healthcare professionals in intensive care units.

With a low manufacturing cost, it consists of a transparent acrylic or polycarbonate box that covers the patient's head during endotracheal intubation, a necessary procedure for patients severely infected with COVID-19 who suffer from respiratory failure. The box has two holes on one side, through which doctors can insert their hands when performing the procedure, while shielding themselves from any aerosol particles that could be released from the patient's airway. (5) A third hole may be opened to develop negative pressure.

Fig. 1. Transesophageal echocardiography with Aerosol Box as an additional barrier to reduce the operator risk of COVID-19 infection. The operator should be at the patient's bedside. Right atrial-closure of the probe hole (adhesive film) –once positioned– can be added to reduce the risk of contact with secretion

The Aerosol Box design is registered under a Creative Commons license; it is free of charge to the public on condition that it is not used for commercial purposes and is properly attributed to the inventor. Recently, the Boston Medical Center group has published a simulation experience in which the use of the Aerosol Box was associated with less contamination from secretions produced by a simulated cough; this was restricted to the inner surface of the box, leading this group to suggest the use of the box as a complement to standard PPE. (6, 7)

In the context of the COVID-19 pandemic, the use of transesophageal echocardiography (TEE) has been reduced to a limited number of indications (mainly, infective endocarditis with valvular and perivalvular involvement, Stanford type-A aortic dissection, initiation of mechanical circulatory support, and prosthetic valve assessment due to suspected complications). (4)

Since TEE is a diagnostic study with possible direct transmission of respiratory droplets or viral aerosolization and inhalation during intubation, tube removal and coughing, our group analyzed the feasibility of performing TEE –only if it is essential– using the Aerosol Box. In this case, the operator should be at the patient's bedside, similar to the usual position during heart surgery. The hand holes in the Aerosol Box allow the operator to comfortably insert his hands and the probe. The probe is then placed in one of the holes and can be easily manipulated with a comfortable bend for the operator (Figure 1).

We recommend that the working teams in centers where TEE is performed be trained in placing and removing PPE according to current indications, and in using the Aerosol Box to reduce the risk of infection during the study, limiting its performance to necessary indications, as explained.

While it is not currently a validated method, some groups have reported that they have successfully used it in orotracheal intubation and, given the magnitude of the emergency and the infectiousness of the disease, we consider it is convenient to add this protective barrier, without complications for the patient, to airway management.

Conflicts of interest

None declared.

(See authors' conflicts of interest forms on the website/ Supplementary material).

María Celeste Carrero , Iván Constantin, Raúl Pérez Etchepare Carla Pessio, Pablo G Stutzbach
Clinical Echocardiography Section,
Instituto Cardiovascular San Isidro. Sanatorio Las Lomas.
e-mail: dra.celestecarrero@gmail.com

Rev Argent Cardiol 2020;88:165-167. http://dx.doi.org/10.7775/rac.v88.i2.17762

REFERENCES

1. Caputo KM, Byrick R, Chapan MG, Orser BJ, Orser BA. Intubation of SARS patients: infection and perspectives of healthcare workers. Can J Anaesth 2006;53:122-9. https://doi.org/10.1007/BF03021815

2. Zhang Z, Liu S, Xiang M, Li S, Zhao D, Huang C, et al. Protecting healthcare personnel from 2019-nCoV infection risks: lessons and suggestions. Front Med 2020; Mar 23. https://doi.org/ 10.1007/s11684-020-0765-x. [Epub ahead of print].

3. Ranney ML, Griffeth V, Jha AK. Critical Supply Shortages — The Need for Ventilators and Personal Protective Equipment during the Covid-19 Pandemic. N Engl J Med 2020 https://doi.org/10.1056/nejmp2006141

4. Nicoara A, Maldonado Y, Kort S, Swaminathan M, Mackensen B, et al. Specific Considerations for the Protection of Patients and Echocardiography Service Providers When Performing Perioperative or Periprocedural Transesophageal Echocardiography During the 2019 Novel Coronavirus Outbreak: Council on Perioperative Echocardiography Supplement to the Statement of the American Society of Echocardiography Endorsed by the Society of Cardiovascular Anesthesiologists- J Am Soc Echocardiogr 2020;April 11 https://doi.org/10.1016/j.echo.2020.04.008 [Epub ahead of print].

5. Everington K. Taiwanese doctor invents device to protect US doctors against coronavirus. Taiwan News 2020; March 23. https://www.taiwannews.com.tw/en/news/3902435

6. Canelli R, Connor CW, Gonzalez M, Nozari A, Ortega R. Barrier Enclosure during EndoTracheal Intubation. N Engl J Med 2020; Apr 3. https://doi.org/10.1056/NEJMc2007589. [Epub ahead of print].

7. Lockhart SL, Duggan LV, Wax RS, Saad S, Grocott HP. Personal protective equipment (PPE) for both anesthesiologists and other airway managers: principles and practice during the COVID-19 pandemic.). Can J Anaesth 2020; Apr 23. https://doi.org/10.1007/s12630-020-01673-w

Cardiac Reintervention and Hemi-Commando Procedure in Double-Valve Endocarditis

Aortic and mitral double-valve infective endocarditis affecting the fibrous skeleton of the heart is a complex condition that requires a challenging surgical management. Extensive debridement of necrotic and infective tissue with removal of all the prosthetic material must be performed to achieve healing results.

A difficult reconstruction is usually required, particularly in cases of aortic root abscess also involving the fibrous skeleton and the mitral valve. The "commando procedure" is the reconstruction of the aortomitral fibrous body for invasive double-valve endocarditis. It is a technically challenging procedure that includes root and aortic valve replacement and mitral valve replacement, along with reconstruction of the aortomitral fibrous body.

The hemi-commando procedure is a suitable and less complex treatment option than the "commando surgery" for invasive double-valve endocarditis not involving the mitral valve anterior leaflet free edge. Its advantage is that most of the mitral valve and subvalvular apparatus are preserved.

We present the case of an asymptomatic 38-year-old male patient, with history of severe aortic regurgitation and bicuspid valve, requiring mechanical aortic valve replacement. Two months after the procedure, the patient progressed to an early prosthetic aortic valve endocarditis, requiring a second valve replacement (both procedures were performed at another center).

The patient was admitted to our center with persistent fever. The admission transesophageal echocardiography showed images consistent with prosthetic aortic valve endocarditis with 15 mm vegetation. Protrusion of a periannular abscess through the vegetation with mitral-aortic membrane and anterior leaflet of the mitral valve involvement were observed (Figure 1 A, B), and blood cultures of samples isolated from the center of origin revealed non-fermenting Gram-negative bacilli. An empirical therapy was initiated with piperacillin-tazobactam, levofloxacin and trimethoprim-sulfamethoxazole.

A brain CT scan showed no evidence of anatomical alterations (Figure 1 C), as opposed to the abdominal CT scan, which exhibited images consistent with splenic embolic foci (Figure 1 D).

Sepsis progressed, non-responsive to antibiotics; consequently, surgical treatment was decided. Considering anatomical involvement in the images, cardiac reoperation using the hemi-commando procedure was proposed, which consists of the extensive resection of the infected tissue (Figure 2. B), homograft implantation with mitral valve repair, preservation of first- and second-order cords, and reconstruction of the mitral-aortic membrane (Figure 2 C, D). Also, the roof of the left atrium was reconstructed using a bovine pericardial patch, with 120 minutes of cross-clamping time and 150 minutes of total cardiopulmonary bypass time.

The course was favorable, without complications in the postoperative period. Only low doses of vasoconstrictor and inotropic drugs were necessary due to

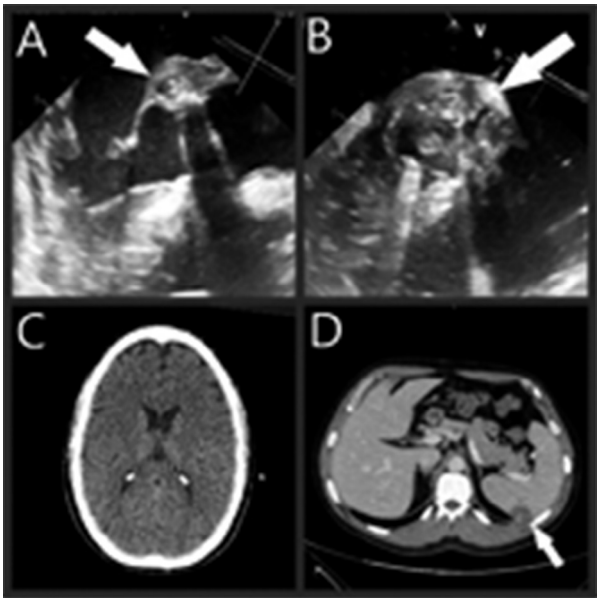

Fig. 1. Preoperative images. **A, B:** Transesophageal echocardiography with prosthetic, periannular, and mitral valve involvement. **C:** Normal brain CT scan. **D:** Splenic embolism.