CASE REPORT

Aortic and mitral valve infective endocarditis with intervalvular fibrous body abscess: a case study of the UFO procedure.

Francisco González-Díaz, David Roldán-Morales, Elvira León-García, and Carlos Riera-Kinkel.

Division of Cardiothoracic Surgery, Hospital of Cardiology, Centro Médico Nacional Siglo XXI. IMSS. Mexico City. MEXICO.

Active infective endocarditis is a disease with high a mortality rate which increases in cases where the Intervalvular Fibrous Body (IVFB) is involved. The Unidentified Flying Object (UFO) Technique is a viable procedure for complex IVFB reconstruction.
We present the case of a 25-year-old with mitral and aortic valve active infective endocarditis and IVFB abscess underwent mechanical mitral and aortic valve replacement and IVFB reconstruction with a single patch using the UFO technique.

Key words: **Infective Endocarditis; Intervalvular Fibrous Body Abscess; UFO Technique.**

La endocarditis infecciosa activa es una enfermedad que presenta una alta tasa de mortalidad, la cual a su vez incrementa en los casos en los cuales el cuerpo fibroso intervalvular (IVFB) o fibrosa mitroaórtica está involucrada. La técnica Unidentified Flying Object (UFO) ie un procedimiento viable para una reconstucción compleja de la IVFB.
Presentamos aquí el caso de un paciente de 25 años de edad, con endocarditis infecciosa activa mitroaórtica y un absceso de la IVFB, el cual se sometió a reemplazo valvular mecánico mitral y aórtico, así como reconstrucción de la IVFB con un solo parche utiizando la técnica UFO.

***Palabras clave*: Endocarditis infecciosa; Absceso de la fibrosa mitroaórtica; Técnica UFO.**

Cir Card Mex 2022; 7(2): 37-39.

Infective endocarditis is a disease defined as an infection within the heart. It affects around 3-10 people per 100,000 each year globally with an increased percentage of cases in developing countries. In the US alone, 40,000 to 50,000 new cases are reported each year [1]. Nowadays, the associated risk factors are prosthetic valve replacement, intravascular catheters and IV drugs. Intervalvular fibrous body (IVFB) abscess is a rare complication in patients with infective endocarditis but results in an increase in mortality relating to persistent infection, destruction of surrounding tissue and the extent of the disease [1-4].

Extensive involvement of the aortic root secondary to endocarditis can affect IVFB often needs extensive tissue resection with consequent complex reconstruction involving aortic and mitral valves, left atrium and aortic root [2-4]. The Unidentified Flying Object (UFO) technique, also known as "Commando operation" or the "Combat Procedure" has shown good results with a 3-year survival rate above 55% and freedom of reintervention of 85%, although its use has not been widely adopted due to technical complexity [2]. It was firstly described in 1976 by David et al. and the technique includes aortic and mitral valve replacement with reconstruction of left ventricular outflow tract using either natural or synthetic patches [2-5]. Depending on the extension of the disease, a homograft or an allograft may be needed to reconstruct the ascending aorta. The UFO procedure is associated with prolonged cardiopulmonary bypass (CPB) and cross-clamp times [2].

The UFO technique has a high early mortality rate of 16.2% as 30-day mortality (range, 7.14%-28.6%) [6]. Early mortality is associated with technical problems during the surgical procedure, low ejection fraction (≤ 35%), redo surgery and refractory septic shock at the moment of the intervention [6,7]. Five-year survival is similar to patients with infective endocarditis treated with conventional surgery averaging 60-70% [6].

This work was presented at the 2019 Congreso de la Sociedad Mexicana de Cirugia Cardiaca.

Corresponding author: Dr. Francisco González-Díaz.
email: pacogd89@gmail.com

CLINICAL CASE

A 25-year-old male with chronic kidney disease secondary to kidney hypoplasia on hemodialysis was diagnosed with fever of unknown origin and signs of bacteremia in each hemodialysis session. The patient was admitted to the emergency department at our institution, a third level performing 1,000 heart surgeries a year. After discovery of systolic and diastolic murmurs, a transthoracic echocardiogram was completed, identifying vegetations on both mitral and aortic valves, severe regurgitation of the aortic and mitral valves and an abscess in the mitro-aortic continuity. Staphylococcus epidermidis was isolated in the blood cultures. The patient was accepted for an emergent surgical procedure.

A bi-caval canulation approach was done, aortic cannula was placed in the aortic arch and cross-clamp placed below the brachiocephalic artery. A "J" shaped aortotomy was done, extending to the left atrial roof. Multiple vegetations were found on the anterior leaflet of the mitral valve, destroying it completely and causing severe regurgitation; also, multiple vegetations were noted on the aortic valve, mainly on the right coronary leaflet wrecking it ending with severe regurgitation. A 10mL abscess was drained from the mitro-aortic continuity which destroyed the fibrous skeleton, extending into the left atrial roof and wreaking havoc in the aortic wall between the right coronary and non-coronary sinuses. All infected and necrotic tissue was resected. (**Fig. 1**) (**Fig. 2**)

The repair was performed using the UFO technique. A 27 mm St. Jude (St. Jude Medical, Inc., St. Paul, Minn.) mitral mechanical prosthesis, and 21 mm St. Jude Medical aortic mechanical prosthesis were implanted. The procedure was chosen after resecting all the infected tissue. As there was no involvement of the coronary sinuses, the use of an aortic allograft and anastomosis of the coronary arteries was not considered. An oval shaped synthetic patch was used to reconstruct the mitro-aortic continuity and posterior repair of the left atrial roof and aortic wall. First, the patch was fixed to the anterior and posterior fibrous trigones using interrupted stitches of 2-0 polyester. Stitches were placed on the posterior ring of the mitral valve using 2-0 polyester. The prosthetic mitral valve was placed and then fixed to the patch using 2-0 polyester. (**Fig. 3**) For the aortic valve, the stitches were placed starting from the left and right coronary sinuses, the prosthesis was descended and finally fixed to the patch and mitral valve prosthesis with 2-0 polyester stitches. Finally, the left atrium and aortic wall were rebuilt using uninterrupted prolene 5-0 (**Fig. 4**).

After the aortic cross-clamp release, the patient had a third-degree AV block, and a temporary epicardial pacemaker was placed. The patient was weaned of cardiopulmonary bypass (CPB) on the

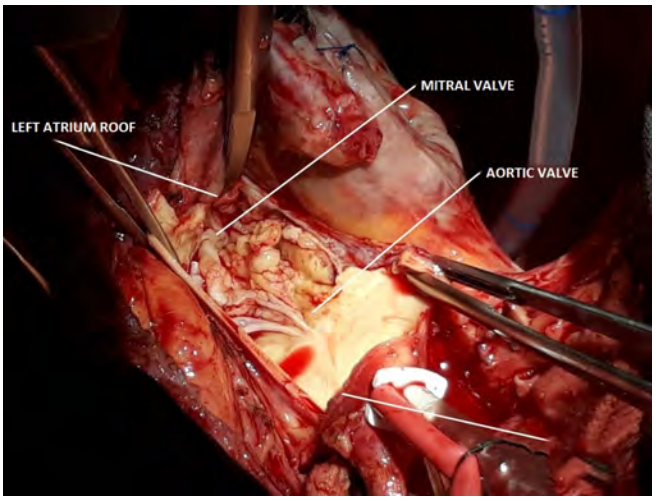

Figure 2. After resection of the infected tissue, the destruction of mitro-aortic continuity involving the anterior leaflet of the mitral leaflet and noncoronary cusp of the aortic valve can be observed. Is also important loss of left atrial and aorta wall tissue.

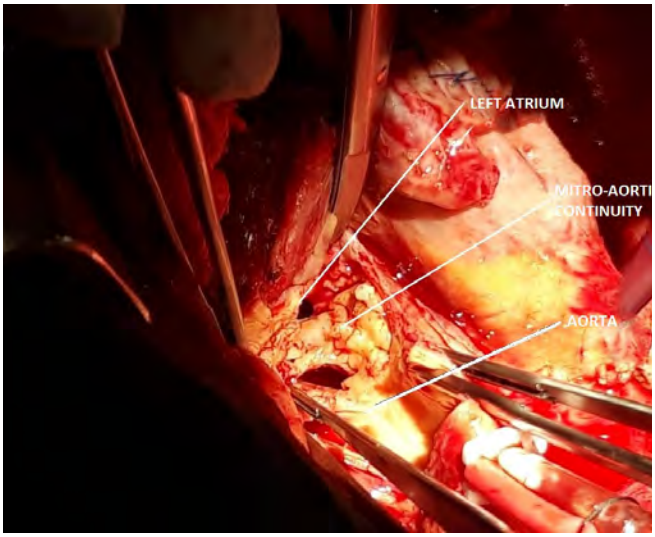

Figure 1. Both aorta and left atrium are opened longitudinally. Aortic, mitral valve and mitro-aortic continuity are fully exposed through this incision. Important tissue loss can be observed.

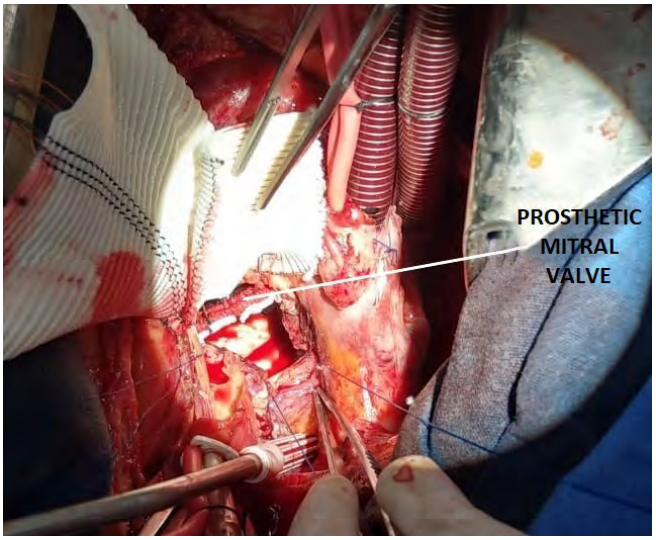

Figure 3. An oval shaped synthethic patch is fixed to the anterior and posterior trigones. The prostethic mitral valve is placed using polyester 2-0 "U" stitches, starting from the posterior mitral annulus.

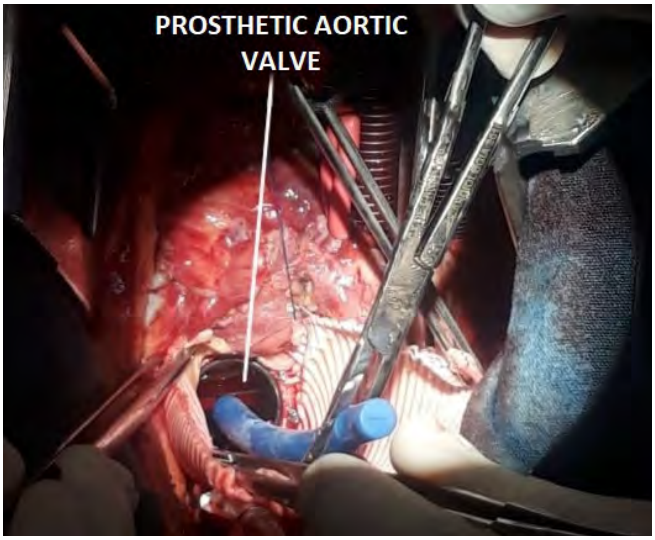

Figure 4. The prosthetic aortic valve is placed using polyester 2-0 U stitches, starting from the left and right coronary sinuses and finally to the patch and mitral valve cuff.

first attempt. The patient presented significant bleeding due to prolonged CPB and ineffective platelet aggregation secondary to uremia reported by prolonged R and K times and decreased angle; so, packing and open chest was decided. The patient wad reoperated two days later for definitive closure without bleeding. After closure an intraoperative echocardiogram was completed, confirming adequate heart function and functional prosthetic valves.

The patient was extubated on the third post-operative day without any complications. On the fifth day after surgery, the patient's blood pressure decreased and exhibited sudden onset of dyspnoea, requiring an increased dose of vasopressor. A thoracic CT scan with contrast was completed on the fifth post-surgical day, showing both valves with normal function, no paravalvular leaks and without patch dehiscence; but multiple lung consolidations and small lung abscesses were identified. Patient died due to septic shock secondary to a complicated pneumoniae. During hospitalization no other procedure was required.

COMMENT

Infective endocarditis continues to be a highly fatal disease, with an increase in the mortality rate when IVFB is affected. The disease entails surgical challenges due to the technical difficulty of repair and extensive loss of tissue [1]. Technical difficulties we encountered were related to fixing the patch to the aortic wall. Reconstructing the left atrium roof was complicated because the extension of the dissection on the left atrium.

Although the IVFB reconstruction technique was described in mid-80's by David et al, it is not dated and is currently used with minimal modifications for cases of infective endocarditis affecting both left valves and mitro-aortic continuity. Still, this procedure is not widely used because of high mortality rate, and related complications. Is normally associated with long CPB and aortic cross-clamping times. At the same time, it requires advanced knowledge of the anatomy and developed surgical skills. Preoperative management is important, because most patients arrive in critical state, may have multiple comorbidities, and many of them may have had a previous cardiac surgery. Postoperative management is challenging because most patients will have mixed shock (septic and cardiogenic), acute renal failure, and multiple organ affection [6-8].

Even though UFO technique is a complex surgery with a high mortality rate, it should be considered as last resource for patients that otherwise will be considered inoperable. It is important to continue developing the technique and consider modifications to reduce surgical time. Considering it is an uncommon complication of infective endocarditis which complicates achieving the learning curve necessary for the procedure. It should be taught and could be practiced in wet lab fashion, to improve surgical results.

FUNDING: None

DISCLOSURE: The authors have no conflicts of interest to disclose.

REFERENCES

1. Cahill TJ, Baddour LM, Habib G, et al. Challenges in Infective Endocarditis. J Am Coll Cardiol. 2017;69(3):325-344. doi: 10.1016/j.jacc.2016.10.066.
2. Lima B, Chamogeorgakis T, MacHannaford JC, Rafael A, Gonzalez-Stawinski GV, Lima Md B. How to Do It: The Commando Operation for Reconstruction of the Fibrous Skeleton with Double Valve Replacement. Heart Surg Forum. 2016;19(6):E308-E310. doi: 10.1532/hsf.1514.
3. Misfeld M, Davierwala PM, Borger MA, Bakhtiary F. The "UFO" procedure. Ann Cardiothorac Surg. 2019;8(6):691-698. doi: 10.21037/acs.2019.11.05.
4. Davierwala PM, Binner C, Subramanian S, et al. Double valve replacement and reconstruction of the intervalvular fibrous body in patients with active infective endocarditis. Eur J Cardiothorac Surg. 2014;45(1):146-152. doi: 10.1093/ejcts/ezt226.
5. Forteza A, Centeno J, Ospina V, et al. Outcomes in aortic and mitral valve replacement with intervalvular fibrous body reconstruction. Ann Thorac Surg. 2015 Mar;99(3):838-845. doi: 10.1016/j.athoracsur.2014.09.052.
6. Giambuzzi I, Bonalumi G, Di Mauro M, et al.Surgical Aortic Mitral Curtain Replacement: Systematic Review and Metanalysis of Early and Long-Term Results. J Clin Med. 2021; 10(14): 3163. doi: 10.3390/jcm10143163.
7. Sartor L, Ramírez Valdiris U, Blázquez JA, Al Razzo O, Mesa García JM. Evaluación de los resultados de la cirugía reconstructiva del esqueleto mitroaórtico en la endocarditis infecciosa activa. Rev Colomb Cardiol 2017;24 (2): 140-145. doi: 10.1016/j.rccar.2016.07.007.
8. Pettersson GB, Hussain ST, Ramankutty RM, Lytle BW, Blackstone EH. Reconstruction of fibrous skeleton: technique, pitfalls and results. Multimed Man Cardiothorac Surg. 2014;2014:mmu004. doi: 10.1093/mmcts/mmu004.