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Case Report

Adaptation of the Healthcare Team as the Key to Tavi Implantation

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Abstract

We present the case of a 79 year old female patient with a history of ischemic heart disease revascularized with stents, and severe aortic stenosis, recently included in the surgical waiting list for treatment. She consulted for syncope and humerus fracture, preceded by chest pain with electrocardiographic changes. During the sequence of diagnostic tests indicated in this context, she suffered a severe clinical worsening, complicating to the point of acute pulmonary edema, cardiogenic shock and requiring mechanical ventilation.

The underlying cause was severe aortic stenosis and, therefore, the ideal treatment was urgent percutaneous aortic valve implantation, as the patient had a peak peak gradient of 64 mmHg.

The resolution of the case was not simple, since it required the transfer of a hemodynamically unstable patient from her hospital to the center specialized in TAVI implantation, located only 2 km away.

The novel and exceptional aspect was the adaptation of the usual treatment strategy (transfer of the patient to the referral center and scheduled implantation) to a patient-centered strategy, which required the transfer of the TAVI expert team (nurses and physicians) together with the implantation kit to the hospital where the patient was admitted.

Key words: syncope ; gradient; tavi, severe aortic stenosis

Introduction

- Aortic stenosis is one of the most common heart valve diseases, occurring most frequently in people over 75 years of age. When the aortic valve area is ≤ 1 cm2, it is considered serious and has a poor prognosis when the patient presents symptoms. Currently, there are no medical therapies to prevent or delay the progression of the disease. Transcatheter aortic valve implantation (TAVI) turns out to be an alternative to SVAo for symptomatic patients with high or intermediate surgical risk. Valve replacement has been proposed as the definitive treatment even for patients with severe non-symptomatic AS. [1,2]

- A large percentage of patients with severe aortic stenosis have coronary artery disease, due, in part, to the similar pathogenesis of both. Angina is a common symptom in cases with severe aortic stenosis. The patient's cardiovascular risk profile will determine the severity of coronary heart disease, the greater the number of risk factors. To reduce the risk of cardiovascular death in patients with severe and complex coronary artery disease who undergo TAVI, it is ideal to resolve both aortic stenosis and coronary artery disease. [3]

- Cardiogenic shock is known as the primary cardiac disorder characterized by a state of low cardiac output and circulatory failure that triggers hypoperfusion of target organs and tissue hypoxia. Acute myocardial infarction is the most common cause of cardiogenic shock. There are other disorders that cause deterioration of the myocardium such as: the valves, the pericardium or the conduction system. Morbidity and mortality among patients with cardiogenic shock remain high despite advances in mechanical circulatory support treatments. [4]

Clinical observation:

The case of a patient, a 79-year-old woman, who went to the hospital's emergency department on 7/27/2021 due to chest pain radiating to the left upper extremity, dyspnea and syncope, which led to a head fracture, is presented. of the left humerus.

The physical examination revealed: BP: 62/31, HR: 78 pm, Oxygen Saturation: 95% with a face mask with reservoir, poor general condition, diaphoresis and lip cyanosis.

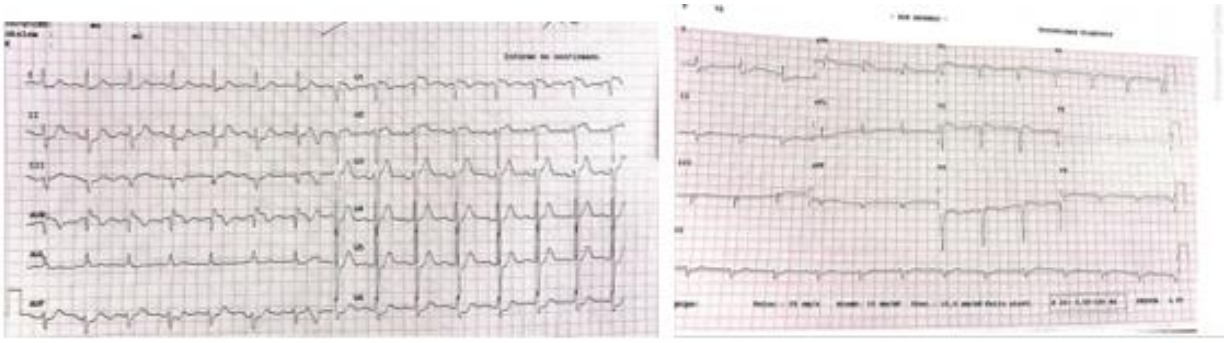
Diagnostic impression of ST Elevation Acute Coronary Syndrome (STEACS)/cardiogenic shock.

Infarction Code is activated through 061 for transfer to the hospital with a hemodynamics unit.

Clinical history of: pulmonary hypertension, dyslipidemia, hypothyroidism, chronic ischemic heart disease with percutaneous revascularization (stents in the middle and distal LAD, distal CD with proximal PD, PTCA on OCT of the ostial CX, moderate lesion at the level of the distal LCT), degenerative aortic valve disease with severe stenosis and hyperuricemia.

- **Supplementary tests:**

*ECG: ST segment elevation in V1-V3 and AvR and generalized ST segment depression suggestive of ischemia in the context of critical AS . (Figure 1 and 2)



*RX: Cardiomegaly. Signs of heart failure.

*Blood analysis: Ultrasensitive Troponin (TnT us) from 220 to 4000 and D-Dimer of 15000.

*Echocardioscopy: hypertrophic left ventricle with mildly-moderately depressed LVEF (40%). Severe aortic stenosis, moderate mitral regurgitation.

Figure 1Figure 2

*Coronary angiography: Upon arrival at the Hemodynamics unit, a diagnostic study is performed through the right radial artery. in which TIMI 3 flow was observed throughout the coronary tree with no obstructive lesions in the coronary arteries. Good late results of Everolimus-eluting stents previously implanted in the mid LAD, distal LAD and ostial LAD. Good result of PTCA on OCT of ostial CX with moderate caliber distal bed. Moderate injury at the distal CT level (assessed by IVUS). (Figure 3 and 4)

Figure 3Figure 4: Given the result of the coronary angiography and the presence of D-Dimer of 15,000, it is important to rule out PE using pulmonary CT angiography, the conclusion of which was:

*Pulmonary CT angiography: No signs of PE. Signs of HTP. Signs of hemodynamic decompensation with probable perihilar cardiogenic edema, bilateral pleural effusion and cardiomegaly. (Figure 5 and 6)

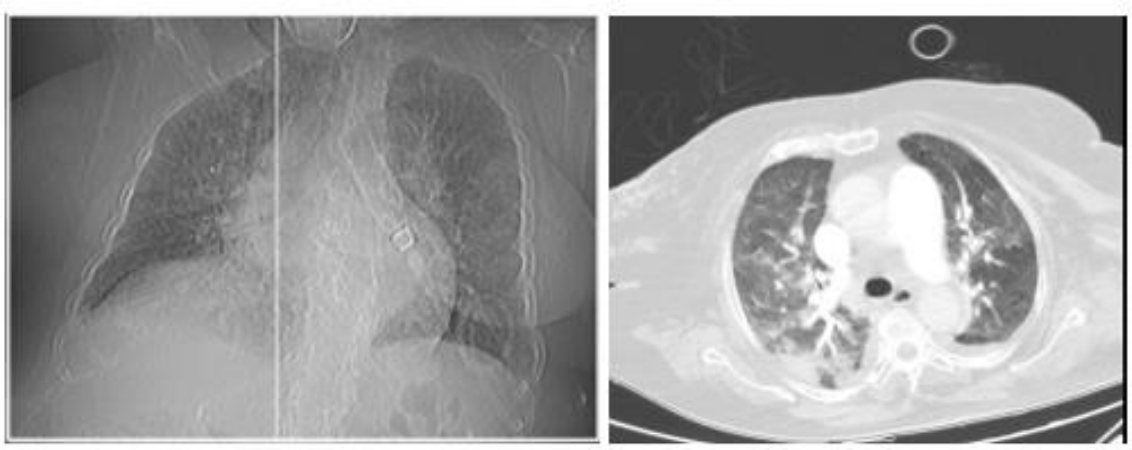


Figure 5 Figure 6: After going to the cardiology ward, the patient worsens with acute lung edema, with symptoms of sudden onset of dyspnea, tachypnea, tachycardia of 120 bpm, sweating, bilateral crackles up to the middle fields and significant respiratory work, which is resolved with pharmacological treatment of Furosemide 40 mg, Morphic Chloride 3.3 mg and O2 in reservoir.

The next day and in the morning shift he presented hemodynamic stability but with a tendency towards arterial hypotension, O2 saturation 98% with reservoir and a diuresis of 400cc.

The case is discussed with the referral hospital to schedule the TAVI implant in the next 24 hours.

In the afternoon shift, hypotension and onset of oliguria persist despite diuretic treatment. Dopamine perfusion pump is started at a dose of 0.5 mcgr/kg/min. O2 saturation of 92%, nervous state, but without dyspnea or pain.

Finally, he was transferred to the ICU due to worsening general condition with oliguria, anginal chest pain, profuse sweating, tachypnea, hypotension of 65/38 mmHg, HR 100 bpm; where orotracheal intubation and mechanical ventilation are carried out.

Relatives are notified given the patient's serious condition and poor prognosis.

Given the sudden development of the symptoms, and after once again ruling out coronary artery disease, the implantation of TAVI was prioritized as the treatment of choice.

Due to the patient's poor condition, her transfer to the hospital specialized in the technique was ruled out. Therefore, it was decided to move the health team of hemodynamicists, anesthetist, scrub nurse, nurse expert in valve assembly, and the necessary material for the implant.

Communication between the units responsible for the patient, ICU and hemodynamics was continuous, since it varied as the patient's condition worsened. Therefore, the information that reached the hemodynamics unit specialized in the implant was disparate, going from having the procedure scheduled for the day after the notification, to having to do it immediately on the same day, until ending with the transfer of the personnel and material to the hospital where the patient was.

Likewise, the nursing team from both centers coordinated the preparation of the necessary material for the successful implant.

The transfer approach was uncertain, since no means of transportation was available for this situation. Making the decision to do it in several taxis, with the drawback that the valve kit did not fit in any vehicle.

Finally, and carrying the voluminous box of the valve kit, we arrived at the unit where the implant would proceed. There the health team was waiting for us with great expectation with everything prepared.

The first intention was to perform a palliative aortic valvuloplasty, but after measuring gradients and assessing the patient's situation, the decision was made to permanently implement TAVI.

- **TAVI implant**

Patient included in the surgical demand list for TAVI implantation since 07/22/2021.

In the previous study it seemed that the origin of the left main artery could be compromised by the TAVI stent, so it was decided to perform protection of the left coronary artery with a 3.5 (6F) EBU catheter, Asahi Sion angioplasty guide and NC balloon. angioplasty through the right brachial artery.

Therapeutic percutaneous access through the right femoral artery, successful implantation of the Sapien 3 valve, no. 26 (Edwards). (Figure 7 and 8)

Managing to go from an initial gradient of 64 mmHg to 0 mmHg, without regurgitation. The hemodynamic improvement was evident from the first moment. (Figure 9 and 10)

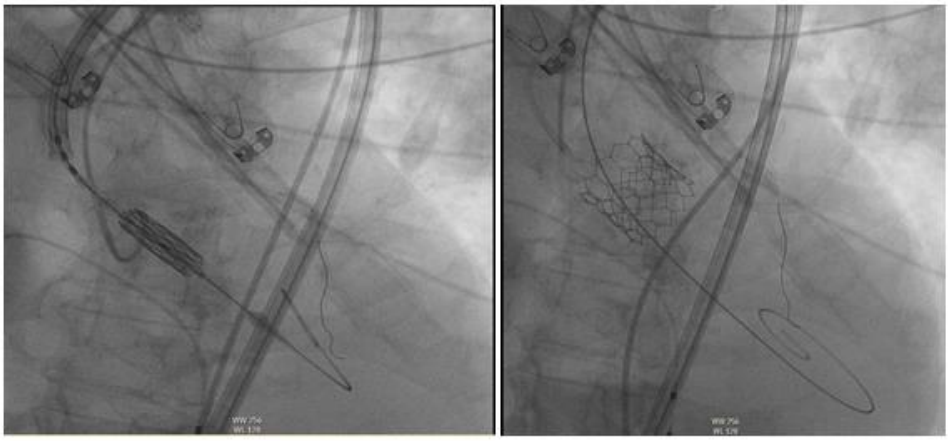


Figure 7 Figure 8

Figure 9 Figure 10

- **Nursing care plan:**

The care plan was made from an assessment framework based on the Virginia Henderson model and NANDA, NIC, NOC Taxonomy. (5)

NURSING DIAGNOSES	RELATED FACTORS	NOC	NIC	ACTIVITIES
Risk of body temperature imbalance 00005	Sedative drugs and low operating room temperature	Thermoregulation 000800	Temperature regulation: intraoperative 3902	• Check the ambient temperature • Prepare and regulate the corresponding heating devices. • Heat or cool all irrigation solutions, iv . and skin preparation • Cover the patient with reflective blankets
Risk of Infection 00004	invasive procedures	Knowledge: infection control 1842 Immune status 0702	Infection control: intraoperative 6545	• Limit and control the entry and exit of people in the operating room. • Ensure that surgical staff wear appropriate equipment • Verify the antibiotic prophylaxis administered • Apply antiseptic as prescribed

NURSING DIAGNOSES	RELATED FACTORS	NOC	NIC	ACTIVITIES
				• Wash hands before and after each patient care activity. • Open sterile supplies and instruments using aseptic techniques • Check sterilization indicators • Brushing hands and nails, gowns and gloves, according to center standards • Inspect the skin/tissues around the surgical site • Keep the room clean and disinfected
Risk of bleeding 0206	Interventionism Use of anticoagulant medication	Risk control 4160	Prevention of bleeding 4010	• Perform coagulation studies • Monitor the patient closely • Observe signs and symptoms
Risk of urinary retention 00023	Volume Management Immobility on the stretcher	Urinary elimination 0508	Bladder catheterization 0580 Urinary catheter care 1876	•Do the probing in a sterile manner •Management of the catheter with asepsis •Check the correct placement of the balloon
Fluid volume deficit 00027	Active fluid volume loss	Water balance 0601	Liquid Handling 4120	•Monitor hydration status (moist mucous membranes, adequate pulse and blood pressure) • Monitor blood pressure, frequency cardiac and respiratory status •Administer IV fluids at room temperature
Ineffective breathing pattern 00032	hypoventilation syndrome, anxiety, decreased energy, and respiratory muscle fatigue	Respiratory status: airway patency 0410 Respiratory status: ventilation 0403 Vital signs status 0802	Airway Management 3140 Ventilation aid 3390 Vital Signs Monitoring 6680 Respiratory monitoring 3350 Airway aspiration 3270	• Assess the state of consciousness of the patient • Assess the color of the skin and filling capillary • Assess the respiratory dynamics and expansion thoracic • Place in position semifowler • Assess the Need to administration of ventilation mechanics • Participate in the intubation orotracheal

* Likert scale: 1: Severely compromised; 2: Substantially compromised; 3: Moderately engaged; 4: Slight deviation from the normal range; 5: Normal

Discussion:

Severe aortic stenosis can present with symptoms of angina along with ST segment elevation on the ECG which, as in our case, required certain diagnostic tests to be performed that made our patient's condition worse.

Severe aortic stenosis requires immediate treatment when symptoms (syncope, angina, and heart failure) occur. Otherwise, the evolution of the clinic leads to cardiogenic shock, multiple organ failure and, therefore, death.

We have to emphasize the importance of the work carried out by the multidisciplinary team involved in the care and treatment of the patient. It is essential for making correct decisions and in our case the intervention of TAVI implantation in an emergent manner was the key to success.

Clearly, the nursing team has a fundamental role in the management of this type of patient who is so unstable and, at the same time, so fragile. It must be specialized in very versatile techniques, of great precision and in continuous updating. Giving special importance to the role of the expert nurse in the assembly of the TAVI, it is essential that she have correct training to assume such responsibility, since without her the implantation of the valve prosthesis could not have been carried out and, therefore, we would be facing a fatal outcome.

The nurse will ensure the well-being of the patient at all times, attending to the vital needs intrinsic to this type of surgery and will work together with the rest of the professionals to ensure that the procedure is successful.

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