CASE REPORT

Endovascular Treatment of Superior Vena Cava Syndrome in the Immediate Postoperative Period of Heart Transplantation

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SUMMARY

Heart transplantation is indicated in patients with end-stage heart failure who have no options with medical, interventional or surgical treatment. Among the three techniques available, the bicaval technique is the one most frequently used due to its hemodynamic and clinical benefits. However, it is technically more demanding and may have some consequences, as vena caval anastomotic stenosis.
We describe the case of a patient who developed superior vena cava syndrome at postoperative day one of orthotopic heart transplantation with bicaval technique. At the second day symptoms progressed and, despite having initiated anticoagulation therapy, the patient underwent a diagnostic phlebography followed by endovascular treatment.
After dilatation of the superior vena cava three self-expandable stents were implanted producing patent anastomosis between the donor and receptor venae cavae, the superior vena cava and the right subclavian vena.
The patient had favorable outcomes with immediate symptoms relief and was discharged without complications.

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Key words > Transplantation - Superior Vena Cava Syndrome

BACKGROUND

Heart transplantation is indicated in patients with terminal heart failure with no option of medical, interventional or surgical treatment and it can be performed using three different techniques. (1-3) Several communications expressed disadvantages of the classical technique, which consists of the anastomosis between left and right atrium of the donor heart with the respective auricular chambers of the recipient, regarding the most modern variants that keep the integrity of the right atrium and the venous return of the transplanted heart is achieved with the anastomosis of both donor's cava veins to the recipient's cava veins.

The benefit of the bicaval technique in terms of hemodynamic and clinical parameters (4) has situated it as the most used, although it is more demanding and may present some consequences, as stenosis in the anastomosis of cava veins. (5) In this presentation a clinical case of thrombosis of symptomatic superior vena cava in the postoperative of heart transplantation and the therapeutical conduct used is described.

CLINICAL CASE

Male patient, age 44, with diagnosis of idiopathic dilated cardiomyophaty in terminal phase. Antecedents: implantation of cardioveter 7 years before the transplantation.

The patient underwent an orthotopic heart transplantation with bicava anastomosis with no complications. Once he left extracorporeal circulation he required moderated doses of isoproterenol and milrinone in order to keep adequate hemodynamic parameters.

Defibrillator's catheters were removed during the procedure and a Swan-Ganz catheter was inserted after the implantation.

During the first 24 hours the patient was extubated and the doses of inotropics were reduced, not been able to suspend them, but cape oedema, cephalea,

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confusion and dyspnoea appeared.

A venous Doppler echo of neck vessels was performed showing important dilatation of jugular veins with signs of incipient thrombosis in its distal areas. Swan-Ganz catheter was removed and the patient started anticoagulation with sodium heparin, with diagnosis of superior vena cava syndrome (SVCS).

Inotropics were administered through peripheral via and perioperative treatment was made according to clinical parameters.

During the 2nd postoperative day symptomatology got worse despite the medical treatment so a digital phlebography was performed in order to confirm the diagnosis, assess thrombosis extension and eventually treat the pathology via endovascular. Under local anaesthesia catheterism of the right basilica vein, through which a 5 Fr introducer was inserted and then a diagnostic catheter, was performed. The phlebography showed thrombosis of the superior vena cava as well as of the large brachiocephalic veins (Figure 1). The superior vena cava was recanalized until reaching the right atrium with a Terumo® 0.035 hydrophilic guidewire and, once replaced it by a rigid guidewire, the treatment of occlusion was completed with the implantation of three self-expandable nitinol stents (SMART®, Ø 14 mm) making the axis permeable again from the right atrium to the right subclavian (Figure 2). After 6 hours of stents implantation, anticoagulation was resumed.

Symptomatic improvement could be seen during the following 24 hours. The sample for the endomyocardial biopsy was taken from the femoral. The patient evolved with no complications and was discharged the 17th postoperative day. Now, after one year of monitoring, the patient is asymptomatic, under anticoagulation.

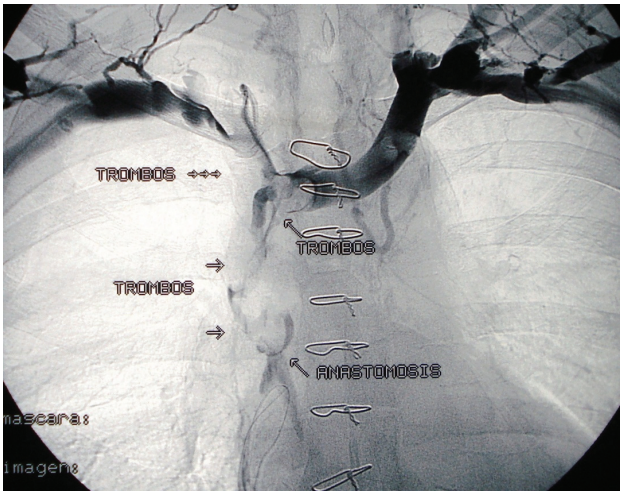

Fig. 1. Occlusion of the superior vena cava with thrombosis extended to brachiocephalic veins. Stenosis at the level of the anastomosis between the superior vena cava of the donor heart and the receptor and the contrast passage to the right atrium is observed.

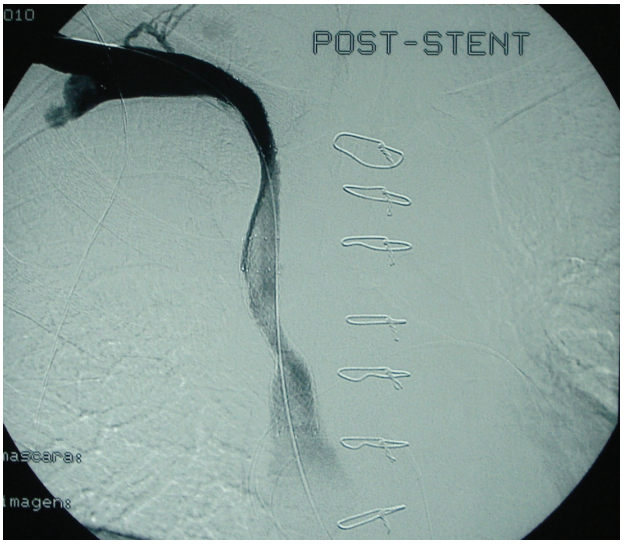

Fig. 2. Recanalization of the superior vena cava and the right braciocephalic axis with implantation of three self-expandable stents. Final result.

DISCUSSION

Superior vena cava syndrome (SVCS) is caused by two great groups of diseases; malign and benign.

SVCS of malign or neoplastic cause is the most frequent; while the benign one may be caused due to multiple factors, among which we can mention: central venous catheters, pacemaker catheters, defibrillators and resynchronizations, mediastinal fibrosis due to granulomatous diseases or radiation, intrathoracic goiter, ventriculoatrial shunts, etc. Some cases of SVCS after the orthotopic heart transplantation generated due to stenosis in the anastomosis of the superior vena cava were described. These cases were treated through surgical and endovascular methods. (6-9)

The incidence of this complication is of 1.3% in those patients who underwent heart transplantation. (6) The most important causal factor in the development of this complication is the disproportion of the diameters between the donor vena cava and the recipient one. (6, 7, 9)

In the current practice it is frequent to find other predisposing causes of thrombosis of the vena cava in heart recipients, as the presence of defibrillators and resynchronizations that, due to the great impact of mortality in this group of patients are used as a routine in the treatment of advanced heart failure. Our patient had a defibrillator implanted 7 years before the transplantation.

In paediatric population, to all what was mentioned as predisposing factor for the development of post transplantation SVCS we must add the small diameter of vascular structures and the frequent antecedent of previous heart interventions. (10, 11)

We did not find references of thrombosis of superior vena cava developed in the first 24 hours post

transplantation.

In some works the time between the transplantation and the development of SVCS was not defined; (10, 11) in those that it was mentioned, the complication occurred after the first week postoperative (6) or more lately. (19) SVCS treatment has evolved in the last years and nowadays endovascular therapeutic is the first choice, (12) unless extensive chronic occlusions, failed attempts of endovascular interventions or absolute contraindications for thrombosis or anticoagulation appear. Studies regarding endovascular treatment of acute or recent occlusions of the superior vena cava suggest reducing the thrombotic load through a thrombolysis as a first therapeutic step or a percutaneous mechanical thrombectomy. (13, 14) Posterior stenting, even in presence of benign pathology, has an acceptable permeability rate.

Our patient developed SVCS on the 1st postoperative heart transplantation day and due to the nature of the intervention he was in a critical medical situation still receiving inotropic. In such circumstance, we tried 24 hours of conservative treatment with the removal of the invasive hemodynamic monitoring catheter and we started anticoagulation, with no success. We decided to perform a phlebography and decide the therapeutic during the angiographic study. We considered that a surgical reexploration would involve a higher risk than an endovascular procedure and we discarded thrombolysis due to the contraindication of this procedure as the patient was in his second postoperative day.

On the other hand, in previous communications of cases where thrombolysis were performed (even during the second post transplantation week) bleeding complications were informed. (6) We did not aspirate the thrombus percutaneously for fear of producing anastomotic disruption.

By the above, we proceeded to recanalize the superior vena cava through the implantation of self-expanding endoprostheses catching the thrombi between the stent and the wall without dilating the lesion in order to avoid the detachment of the thrombi and subsequent pulmonary embolism.

Likewise, we avoided the dilatation of the suture, as we were concerned about its rupture during the procedure. We must not forget that those patients with heart surgery antecedent were more likely to have complications (vena cava rupture), even when the implantation of a stent was performed lately after the surgery. (11)

In order to obtain an adequate angiographic result we implanted three self-expandable stents to recanalize the brachiocephalic veins of the right side.

In patients with bilateral occlusion of brachiocephalic veins, unilateral recanalization gives an adequate symptomatic relief (15) and we could see it in our patient. Also, unilateral recanalization is associated with greater permeability and a lower rate of complications than the bilateral placement of stents, (16, 17) among other advantages. (18)

With this clinical case, we would like to show the resolution, with initial clinical success, of a non frequent complication but of certain severity after a heart transplantation that was performed in a critical moment of the postoperative. There are no previous communications of superior vena cava stenting 48 hours post heart transplantation with the implantation of a transanastomotic stent.

RESUMEN

Síndrome de la vena cava superior en el posoperatorio inmediato de trasplante cardíaco: tratamiento endovascular

El trasplante cardíaco está indicado en pacientes con insuficiencia cardíaca terminal sin opción de tratamiento médico, intervencionista o quirúrgico y puede realizarse utilizando fundamentalmente tres variantes técnicas. El beneficio de la técnica bicava en términos de parámetros hemodinámicos y clínicos la ha convertido en la más utilizada, aunque es técnicamente más demandante y puede tener algunas consecuencias, como estenosis en las anastomosis de las venas cavas.

En esta presentación se describe el caso de un paciente sometido a trasplante cardíaco ortotópico con técnica bicava que en el primer día del posoperatorio desarrolló el síndrome de la vena cava superior. Durante el segundo día posoperatorio y ante sintomatología progresiva, a pesar de haberse administrado anticoagulación, se decidió realizar una flebografía diagnóstica y al mismo tiempo tratamiento endovascular.

En ese procedimiento se recanalizó la vena cava superior y se implantaron tres stents autoexpandibles, con lo que se logró permeabilidad de la anastomosis entre las venas cavas donante y receptora, la vena cava superior y la subclavia derecha.

La evolución fue favorable con alivio inmediato de la sintomatología. El paciente fue dado de alta sin complicaciones.

Palabras clave > Trasplante - Síndrome de la vena cava superior cardíaca

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