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Non-alcoholic septal reduction in a case of hypertrophic cardiomyopathy with the use of coils

Redução septal não alcoólica em caso de cardiomiopatia hipertrófica com uso de coils

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ABSTRACT – In patients with the obstructive variant of hypertrophic cardiomyopathy, when symptomatic despite the medical therapy, septal reduction is a common treatment option. Among all the percutaneous approaches, therapeutic septal alcoholization is the most commonly used technique. Non-alcoholic septal reduction techniques have recently emerged as an additional treatment option, generating procedures with more predictable outcomes and lower complication rates. In this report, we describe a case of therapeutic septal reduction with embolization of the target branch using coils with excellent immediate results.

Keywords: Cardiomyopathy, hypertrophic; Ablation techniques; Catheter ablation/methods

RESUMO – A cardiomiopatia hipertrófica, em sua forma obstrutiva, quando sintomática e a despeito da terapia clínica, encontra na redução septal uma alternativa comum para seu tratamento. Do ponto de vista percutâneo, classicamente a alcoolização septal terapêutica é a técnica mais empregada. Técnicas de redução septal não alcoólicas foram recentemente incorporadas gerando procedimentos mais previsíveis e com menores taxas de complicações. Neste relato, descrevemos caso de redução septal terapêutica com embolização do ramo alvo com utilização de *coils* com excelente resultado imediato.

Descritores: Cardiomiopatia hipertrófica; Técnicas de ablação; Ablação por cateter/métodos

INTRODUCTION

Hypertrophic cardiomyopathy (HCM), the most common cardiovascular disorder of genetic origin, is diverse in presentation and natural history. When the disease is symptomatic, it can be manifested by the occurrence of sudden death, heart failure and ventricular arrhythmias and/or atrial fibrillation. In the obstructive variant, heart failure symptoms may appear during the course of the disease, and medical treatment is indicated. When refractory, strategies for septal reduction can be chosen, either by surgical or percutaneous route. Since it is less invasive and has similar safety and efficacy results, the percutaneous strategy — the classical therapeutic septal alcoholization — is increasingly being used in this scenario.

Alternative techniques with the use of coils, glue, microspheres, among others, are emerging, generating procedures with lower rates of complications, and they are attractive options in patients whose anatomy renders them feasible.¹ More recently, radiofrequency thermal ablation, a new percutaneous technique, has also been shown to be safe and effective.²

In this case, we describe the treatment of a patient with symptomatic obstructive HCM who was refractory to the medical treatment. Therapeutic septal embolization with the use of coils was chosen. Clinical and hemodynamic success was achieved, both immediately and in the short term. This is an extremely attractive technique and, so far, little used in our country.

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CASE REPORT

A 55-year-old male patient in outpatient follow-up, complaining of progressive dyspnea on exertion for 8 months. The patient evolved with worsening of heart failure functional class (New York Heart Association – NYHA III) after a significant episode of hemorrhoidal bleeding accompanied by a drop in hematologic values. The physical examination revealed a hyperdynamic precordium with a +3/+6 systolic murmur in the mitral area. The hemorrhoidal bleeding was controlled, and the clinical treatment was optimized using beta-blockers (atenolol 50mg per day), with clinical stabilization. The electrocardiogram showed sinus rhythm and criteria for left ventricular volume overload.

A transthoracic echocardiogram was performed, which showed patterns of asymmetric hypertrophic obstructive cardiomyopathy (septum: 15mm; posterior wall: 8mm; pressure gradient of 50mmHg at rest, and 135mmHg during Valsalva maneuver), and systolic anterior motion of the mitral valve, generating a moderate insufficiency.

A clinical stratification for complex ventricular arrhythmia and sudden death indicated a low risk. The patient continued with clinical follow-up and evolved with worsening of the functional class (New York Heart Association - NYHA III), even with beta-blocker use in an optimized dose. Due to refractoriness to the medical treatment, septal reduction therapy was proposed to relieve the obstructive component.

At the coronary angiography, there was no evidence of significant obstructive coronary disease and the septal branch had a good caliber, which was feasible for performing the septal ablation therapy (Figure 1; Video 1). Given this anatomical scenario and to make the procedure more predictable and safer, we opted to perform the septal ablative therapy as an alternative to septal alcoholization, using coil embolization.

The procedure was performed under general anesthesia and guided by transthoracic echocardiography. The right and left femoral arteries were punctured, followed by the insertion of a 6F introducer and a 5F introducer, respectively. Subsequently, a pacemaker lead was inserted through a puncture in the right femoral vein, with a low pacing threshold. After systemic heparinization with 100IU/kg of unfractionated heparin, left coronary catheterization was performed with an EBU 6F 3.5 catheter (Medtronic, Minneapolis, USA), followed by a 0.014" Whisper (Abbott) guidewire passage in the septal branch. A 5F Multipurpose catheter (Cordis, California, USA) was maintained in an intraventricular position for measuring the intraventricular pressure gradient.

Initially, a 2.5x12mm Emerge over the wire balloon test was performed (Boston Scientific, Massachusetts, USA) inflated to nominal pressure in the proximal portion of the septal branch, with an intraventricular gra-

dient fall greater than 50%, both by echocardiographic and invasive hemodynamic measurements (Figure 2; Video 2). Afterwards, it was decided to continue the procedure. The balloon was removed, and a MicroVention microcatheter (Terumo Corp., Tokyo, Japan) was placed

Figure 1. Coronary angiography shows left anterior descending artery territory with no atherosclerotic disease and a septal branch with a good caliber.

Video 1. Coronary angiography showing a large septal branch; anatomy rendered feasible the performance of a percutaneous embolization.

in the middle third of the septal branch. A sequential deployment of 4 Microcoil Platinum coils (Johnson & Johnson, New Jersey, USA) was performed under angiographic control (1.5x30mm, 2.0x80mm, 2.5x20mm, and 2.5x60mm). The control angiography showed adequate embolization of the septal branch, which was occluded with no distal flow, as well as an intact proximal stump, with no injury in the topography of the left anterior descending artery (Figure 3; Video 3).

During the procedure, no change in intraventricular conduction or ventricular arrhythmias were observed. The control manometry and echocardiography (Figure 4) showed a significant drop in the intraventricular pressure gradient (6mmHg) even after extrasystolic provocative maneuver (Figure 5). On echocardiography, the tapering of the middle-basal segment of the interventricular septum and the resolution of the systolic anterior motion of the mitral valve were also observed.

Figure 2. Test with a 2.5x12 mm over the wire balloon inflated to nominal pressure in the proximal portion of the septal branch.

Figure 3. Angiographic study showing complete occlusion of the septal branch and integrity of the left anterior descending artery.

Video 2. Angiography showing the insufflation of a pre-embolization over-the-wire balloon catheter.

Video 3. Final angiography after deployment of coils.

The patient had a good in-hospital clinical course. The transvenous pacemaker was removed in 24 hours, and the patient was discharged 48 hours after the procedure, totally asymptomatic. In the clinical follow-up at 1 and 3 months, the patient remained in NYHA functional class I, and with low intraventricular pressure gradients.

DISCUSSION

Patients with symptomatic hypertrophic obstructive cardiomyopathy who are refractory to medical therapy are generally managed with therapeutic septal reduction. Classically, surgical treatment is considered the gold standard in this setting. However, recent evidence has shown similar clinical results when comparing percutaneous to surgical techniques.³

The most used percutaneous technique consists of the therapeutic septal alcoholization. This is a well-established procedure. It has excellent clinical results with shorter length of hospital stay and recovery time. However, it has a higher permanent pacemaker implantation rate and occasionally poorer hemodynamic results.⁴

Alternatives to therapeutic septal alcoholization are being increasingly used, mainly because they often reduce complications, such as the need for permanent pacemaker implantation. The use of glue, cyanoacrylate and coils is described in the literature.^{1,5,6} This needs more robust analyses, but it has been pointed out as a promising alternative.

Another strategy that has generated great interest is the septal radiofrequency thermal ablation technique. A recent meta-analysis has shown that this is an effective technique to reduce intraventricular gradients, with low complication rates.²

Figure 4. Intraventricular pressure gradient at rest before (A) and after the procedure (B).

Figure 5. Intraventricular pressure curve showing a drop in the pressure gradient even after an extrasystolic provocative maneuver.

In this report, we describe a case in which septal ablation using coils was chosen as treatment option in a patient whose anatomy rendered it feasible. This is a safe technique, with low complication rates, and it provided excellent clinical and immediate hemodynamic results. To our knowledge, this is the first case described in the Brazilian literature.

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None.

DECLARATION OF CONFLICTS OF INTEREST

The authors declare there are no conflicts of interest.

CONTRIBUTION OF AUTHORS

Conception and design of the study: ESL; data collection: ESL, LCSC and CRS; data interpretation: ESL, AVGO, AHGP and LADM; text writing: ESL, LCSC and CRS; approval of the final version to be published: ESL, LCSC, CRS, AVGO, AHGP and LADM.

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