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ORIGINAL ARTICLE

Percutaneous treatment of mitral valve regurgitation: Initial experience with the MitraClip device☆

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KEYWORDS
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Abstract
Introduction: Mitral regurgitation (MR) is the most common valvular disease and has recently been the target of a number of percutaneous approaches. The MitraClip is virtually the only device for which there is considerable experience, with more than 20 000 procedures performed worldwide.
Objective: To describe our initial experience of the percutaneous treatment of MR with the MitraClip device.
Methods: We describe the first six MitraClip cases performed in this institution (mean age 58.5±13.1 years), with functional MR grade 4+ and New York Heart Association (NYHA) heart failure class III or IV (n=3), with a mean follow-up of 290±145 days.
Results: Procedural success (MR ≤2+) was 100%. Total procedure time was 115.8±23.7 min, with no in-hospital adverse events and discharge between the fourth and eighth day, and consistent improvement in the six-minute walk test (329.8±98.42 vs. 385.33±106.95 m) and in NYHA class (three patients improved by two NYHA classes). During follow-up there were two deaths, in two of the four patients who had been initially considered for heart transplantation.
Conclusion: In patients with functional MR the MitraClip procedure is safe, with both a high implantation and immediate in-hospital success rate. A longer follow-up suggests that the clinical benefit decreases or disappears completely in patients with more advanced heart disease, namely those denied transplantation or on the heart transplant waiting list.

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PALAVRAS-CHAVE
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Terapêutica percutânea da insuficiência mitral: experiência inicial com o dispositivo MitraClip

Resumo
Introdução: A insuficiência valvular mitral (IM) é a valvulopatia mais comum e começa agora a ser alvo de abordagens percutâneas. O dispositivo MitraClip é virtualmente o único dispositivo com uma experiência considerável, ultrapassando atualmente as 20 000 implantações.
Objetivo: Descrever a experiência inicial da terapêutica percutânea da IM com o dispositivo MitraClip.
Métodos: Descrevem-se os primeiros seis casos de MitraClip realizados nesta instituição (idade 58,5 ± 13,1 anos), com IM 4+ de etiologia funcional e insuficiência cardíaca classe III ou IV (n = 3) da *New York Heart Association* (NYHA), sem indicação cirúrgica ou recusados para cirurgia, com um *follow-up* médio 290 ± 145 dias avaliado clinicamente pela sobrevivência, classe funcional, teste da marcha dos seis minutos, estudo ecocardiográfico e determinação do proBNP.
Resultados: O sucesso do procedimento (IM ≤2 +) foi de 100%, com um tempo de procedimento de 115,8 ± 23,7 mins, sem intercorrências intra-hospitalares, alta entre o 4.° e 8.° dia e uma melhoria consistente no teste da marcha dos seis minutos (329,8 ± 98,42 *versus* 385,3 ± 106,95 m) e da classe funcional (três dos pacientes com melhoria de duas classes funcionais NYHA). Na totalidade do *follow-up* (290 ± 145 dias) constatam-se dois óbitos, em dois dos quatro pacientes que tinham sido considerados para transplantação cardíaca.
Conclusões: O procedimento de implantação do dispositivo MitraClip é seguro, com uma alta taxa de sucesso imediato nos pacientes com IM funcional. A médio prazo o benefício clínico parece esbater-se ou anular-se nos pacientes com insuficiência cardíaca mais terminal, nomeadamente nos pacientes a aguardar ou recusados para transplante.

Introduction

Mitral regurgitation (MR), of varying severity, is the most common valvular disorder, with a prevalence of 1.7%, increasing to 10% in those aged over 75.[1] However, around half of patients with severe MR are not referred for surgery, mainly due to advanced age, comorbidities or severe left ventricular dysfunction.[2] Of those who do undergo surgery, only 34–53%[3] are treated by valvuloplasty rather than valve replacement.

There are two types of MR: anatomical, in which one of the elements of the valve apparatus (annulus, leaflets or chordae) is dysfunctional; and functional, in which there is a geometric and/or functional alteration in the left ventricle that changes the normal relationship between these elements.

Sooner or later, severe MI leads to left ventricular dysfunction and hence congestive heart failure. Although medical therapy can relieve symptoms, it does not alter progression of the disease, which is responsible for annual mortality of ≥5% in symptomatic individuals.[4,5] Another reason for the large number of patients with severe MR who are not referred for surgery is that its benefit in functional MR is unproven. Although functional MR is 5–10 times more prevalent than anatomical MR or aortic stenosis,[6] surgical treatment has only a class IIb recommendation in the European and American guidelines for chronic secondary MR unless coronary artery bypass grafting is also indicated.[7] Percutaneous procedures thus do not in fact compete with surgery for the treatment of functional MR.

Treatment of MR was until recently exclusively surgical, but in recent years a number of percutaneous approaches have been developed, of which the most widely used with consistent results involves implantation of a clip device, the MitraClip (Abbott Laboratories, Abbott Park, IL, USA).

There have been various approaches for the treatment of MR:

- Annulus: this D-shaped orifice, which is in fact the left atrioventricular junction,[1] is nonplanar, with elevated septal and lateral segments. The goal of surgical annuloplasty is to decrease the septal-to-lateral diameter by at least 8 mm.[8]
- Leaflets: the anterior leaflet is in fibrous continuity with the coronary and non-coronary leaflets of the aortic valve, and has a wider surface with a shorter base, guarding only one-third of the left atrioventricular junction, than the posterior leaflet. The surface area of both leaflets taken together is 2.5 times the area of the valvular orifice. In systole, the leaflets coapt over a height of, on average, 8 mm, giving a ''coaptation reserve'' in case of annular dilation.[1]
- Chordae tendineae: these connect the valve leaflets to the ventricular free wall via the papillary muscles or directly to the wall (basal cords).
- Ventricular geometry: changes in left ventricular geometry, whether due to ischemia or other processes, can severely disrupt the dynamics of mitral coaptation.[9] Dyskinesia can alter the orientation of the basal cords, leading to tethering of the posterior leaflet, and