Mitral valve replacement following a failed MitraClip procedure

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Abstract

While mitral valve surgery remains the gold standard for mitral regurgitation (MR), recent innovative and less invasive procedures like percutaneous MitraClip insertion make treatment options open to patients with end-stage dilated cardiomyopathy and poor left ventricular function, since such a cohort of patients invariably represents a high surgical risk. Enthusiasts of this procedure advocate the use of MitraClip as a primary procedure for patients with Type 1 MR and end-stage cardiomyopathy. Valve repair could be reserved for those patients with ongoing regurgitation following MitraClip insertion. We describe a patient treated by MitraClip insertion in whom the unsuccessful mid-term result necessitated surgery. In this patient, damage to the mitral valve from the MitraClip insertion produced a central leaflet perforation, which precluded repair, and thereby, the patient received a mechanical valve replacement. The enthusiasm for a less invasive initial approach in such patients must be balanced against the risk of failure of the primary procedure so that the patient is not denied the prospect of repair in the first instance.

Keywords: Mitral valve • Dilated cardiomyopathy • Valve replacement

INTRODUCTION

The pathology involving the mitral valve in dilated cardiomyopathy is that of functional regurgitation of either an idiopathic or ischaemic origin. The role of edge-to-edge repair also known as the Alfieri Stitch is well established in such situations. In essence, the operation involves placing a suture to secure the middle scallop of the posterior leaflet to a corresponding position in the anterior leaflet. This results in a creation of a point of permanent coaptation and creation of the double orifice [1]. Such a repair has results comparable with more complex repairs with reference to reduction in mitral regurgitation (MR) or freedom from operation [2]. The edge-to-edge technique, however, has a high failure rate without the simultaneous use of a complete annuloplasty ring [3].

The MitraClip system is a catheter-based delivery of a percutaneous device, which deploys the clip to achieve such a permanent area of coaptation through the trans-septal route. Early trials suggested that percutaneous valve repair with the MitraClip system is feasible and safe. About 60% of patients discharged with a clip had mild or little MR [4].

CASE REPORT

We describe such a case of a 52-year-old retired police officer presented to us with severe MR and end-stage dilated cardiomyopathy in the background of failed MitraClip procedure. His medical history included prolonged and poorly controlled hypertension, which eventually resulted in dilated cardiomyopathy. Initial management of his heart failure symptoms included insertion of biventricular internal defibrillator in 2008. He also had a history of obstructive sleep apnoea and required nocturnal positive pressure ventilation (NIPPV). Incidentally, with better medical management of his heart failure, his NIPPV requirements diminished. He underwent a MitraClip insertion in our institution in 2010. A subsequent serial echocardiogram (both trans-thoracic and transoesophageal) confirmed the presence of severe MR. On presentation to us 18 months post-MitraClip procedure, he had three-pillow orthopnoea and NYHA class IV symptoms. Auscultation of the precordium revealed a loud pan systolic murmur. Surprisingly, he remained in normal sinus rhythm throughout. His preoperative blood reports revealed moderate renal dysfunction with a creatinine of around 140 and an estimated glomerular filtration rate of 47 ml/min. His preoperative echocardiogram revealed severely dilated left ventricle end-diastolic dimension of 7.3 cm with a severe eccentric MR and an estimated ejection fraction of <20%. There was evidence of bi-atrial enlargement with trival aortic and tricuspid insufficiency. His right ventricular systolic pressure was measured at 37 mmHg confirming pulmonary hypertension. The rest of his investigations including coronary angiogram was normal.

He was admitted to our institution for elective conventional mitral valve replacement. A standard median sternotomy was performed and following systemic heparinization, cardiopulmonary bypass was instituted using routine aortic and bi-caval cannulation. The heart was initially arrested using antegrade cold blood cardioplegia given through the aortic root. Subsequent myocardial protection was with intermittent retrograde cardioplegia, after insertion of the cannula under direct vision. The temperature was maintained at 32°C throughout the procedure.
The left atrium was approached via the trans-septal or Guiraudon incision. The mitral valve was inspected and found to have torn at the site of the previous MitraClip insertion, which precluded any repair procedures (Figs 1 and 2). A 33-mm ONYX mechanical mitral valve prosthesis was implanted using interrupted mattress Ethibond sutures. The procedure was uneventful and after a routine closure of the atrial suture line, the heart was de-aired and the cross-clamp was removed. The heart regained normal sinus function spontaneously and was easily separated from cardiopulmonary bypass with the help of low-dose dobutamine support. Postoperative recovery was uneventful and the patient was gradually warfarinized for his mechanical prosthesis. He was discharged home on the 8th postoperative day and continues to recover well.

Inspection of the valve demonstrated that the MitraClip had been deployed in an ideal position at the apex of the appropriate segments of the valve, A2 and P2. The posterior leaflet had subsequently torn in a radial fashion for the apposition point to midway down the centre of P2 leaving a large regurgitant gap in the posterior leaflet. The resultant fibrosis and retraction of the posterior leaflet now precluded useful repair of the valve.

**DISCUSSION**

The MitraClip offers an attractive alternative treatment for patients with Type 1 annular dilatation of the mitral valve. Deployment is capable of producing apposition of the mitral leaflets with a reasonable chance of mid-term competence. Proponents of the MitraClip report that the use and subsequent failure of the Clip do not prejudice further surgical repair and the patient incurs a little penalty for failure. The use of the MitraClip to produce the Alfieri effect fails, however, to address the ongoing forces producing annular dilatation that are likely to produce substantial tension on the leaflet repair and predispose to leaflet tears, as in our case, and later regurgitation secondary to ongoing annular dilatation or valve disruption due to unsupported distracting forces on the leaflets. In the surgical setting, this would have been addressed by the addition of an appropriate supporting annuloplasty to mitigate such failure, this is not possible with MitraClip deployment alone.

Surgical repair, including annuloplasty, remains a satisfactory option for many of these patients and it is important that the initial enthusiasm for the use of the MitraClip does not result in patients experiencing premature valve disruption and failure that precludes them being offered surgical repair, as had happened with our patient.

**Conflict of interest:** none declared.

**REFERENCES**