A Case of Hypertrophic Obstructive Cardiomyopathy Treated Successfully by Transarterial Coil Embolization

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Abstract

Hypertrophic cardiomyopathy (HCM) is a common congenital disease which may cause left ventricular outflow tract (LVOT) obstruction, symptoms of heart failure and eventually sudden cardiac death. According to the guidelines of the European Society of Cardiology in 2014, interventions are indicated in patients with LVOT pressure gradient of at least 50 mmHg under resting or stress echocardiography. The main interventions are surgical myectomy and septal alcohol ablation. But several other interventional methods have also been reported. Here, we present a 74-year-old female patient with hypertrophic obstructive cardiomyopathy (HOCM) which was treated successfully by coil embolization.

Keywords: hypertrophic cardiomyopathy, left ventricular outflow tract obstruction, coil embolization

Introduction

Hypertrophic cardiomyopathy (HCM) is a common congenital disease which may cause left ventricular outflow tract (LVOT) obstruction, symptoms of heart failure and eventually sudden cardiac death.[1,2] According to the guidelines of the European Society of Cardiology in 2014, interventions are indicated in patients with LVOT pressure gradient of at least 50 mmHg under resting or stress echocardiography.[1] The main interventions are surgical myectomy and septal alcohol ablation. Several other interventional methods have also been reported in small numbers of patients, including non-alcohol septal embolisation techniques[1,3] and direct endocavitary ablation.[1,4] Here, we present a case of hypertrophic obstructive cardiomyopathy (HOCM) which was treated successfully by coil embolization.

Case presentation

The patient was a 74-year-old Taiwanese female with hypertension under stable medical control. She had a family history of HCM and had been diagnosed with HCM about five years prior to this episode. She presented to our outpatient department in August 2016 due to worsening

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chest tightness over 6 months, accompanied by exertional dyspnea. Symptoms did not improve despite medical therapy. Chest X-ray revealed cardiomegaly (Figure 1A).

Transthoracic echocardiography (TTE) revealed dilated left atrium and left ventricle, hypertrophic obstructive cardiomyopathy with septal thickness 18.5 mm, pressure gradient of 136 mmHg and left ventricle ejection fraction of 63% (Figure 1B to D).

She was thus impressed as HOCM. Surgery and alcohol septal ablation were suggested. However, she refused the operation and asked for a less painful and harmful intervention.

Therefore, after thorough discussion, coil embolization was performed.

On the day of the procedure in December 2016, coronary angiography was performed first, which revealed patent coronary arteries, and a pressure gradient between the left ventricle and ascending aorta of 88 mmHg. We selected the septal branch which is theoretically perfused to the myocardium at the basal septum (Figure 2A). Using a 6 French Launcher™ Extra BackUp 3.5 guiding catheter we then advanced an Excelsior SL-10 micro-catheter into that septal branch. We injected contrast via micro-catheter and performed TTE simultaneously (Figure 2B). The basal septum became hyper-echogenic during infusion of agitated saline mixed with microbubbles (Figure 2C). Subsequently, we inserted a Nester 2 mm x 3 cm embolization coil and MicroPlex 1.5 mm x 2 cm HyperSoft coil slowly under fluorography guidance in order to occlude the septal branch (Figure 2D). After the coils had been totally inserted into the septal branch, we injected contrast via micro-catheter, which confirmed the successful embolization of the septal branch (Figure 2E). The angiogram after micro-catheter removal still revealed complete occlusion of the

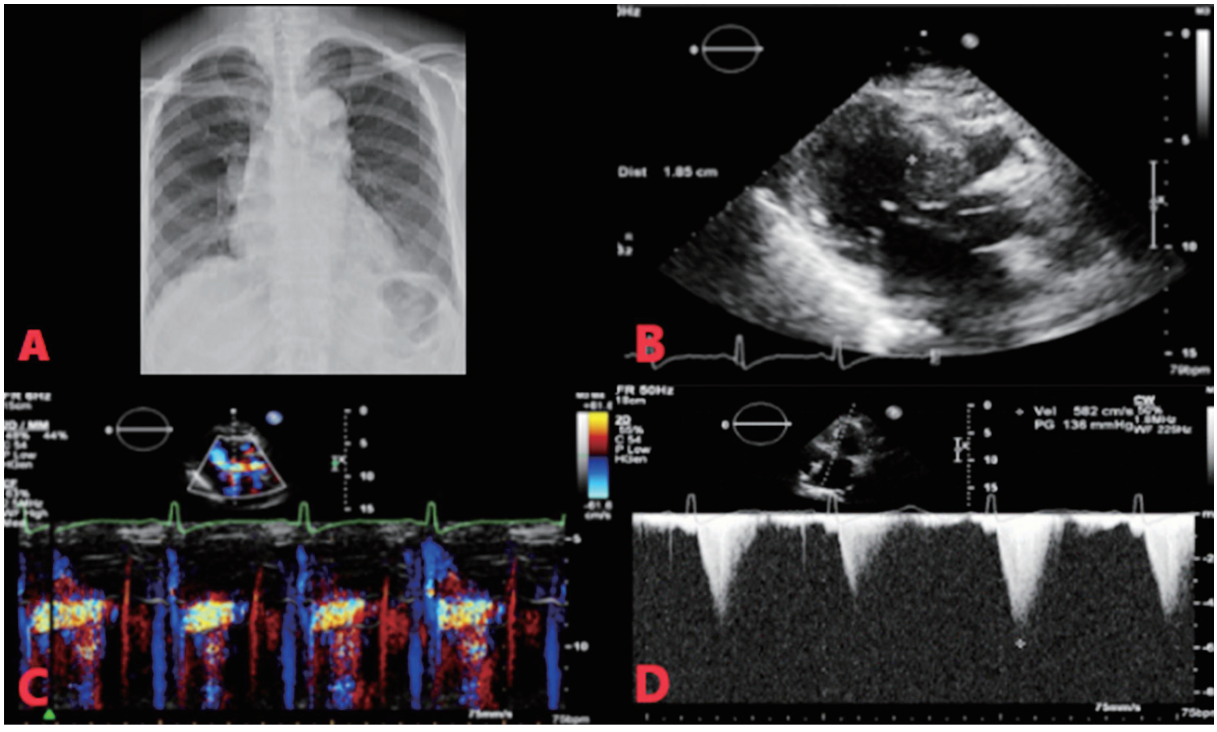

Figure 1A. Chest X ray reveals cardiomegaly.

Figure 1B to D. Transthoracic echocardiography reveals dilated left atrium and left ventricle, hypertrophic obstructive cardiomyopathy with septal thickness 18.5 mm, pressure gradient of 136mmHg and left ventricle ejection fraction of 63%.

septal branch by the coils (Figure 2F). Finally, we checked the pressure gradient between the left ventricle and ascending aorta, which had dropped to 68 mmHg. TTE one day after the procedure revealed a marked reduction of LVOT pressure gradient to 108 mmHg (Figure 2G). The patient was discharged from our ward under stable hemodynamics. Symptoms resolved during follow-up. TTE one year later showed that LVOT pressure gradient was further reduced to 30 mmHg (Figure 2H).

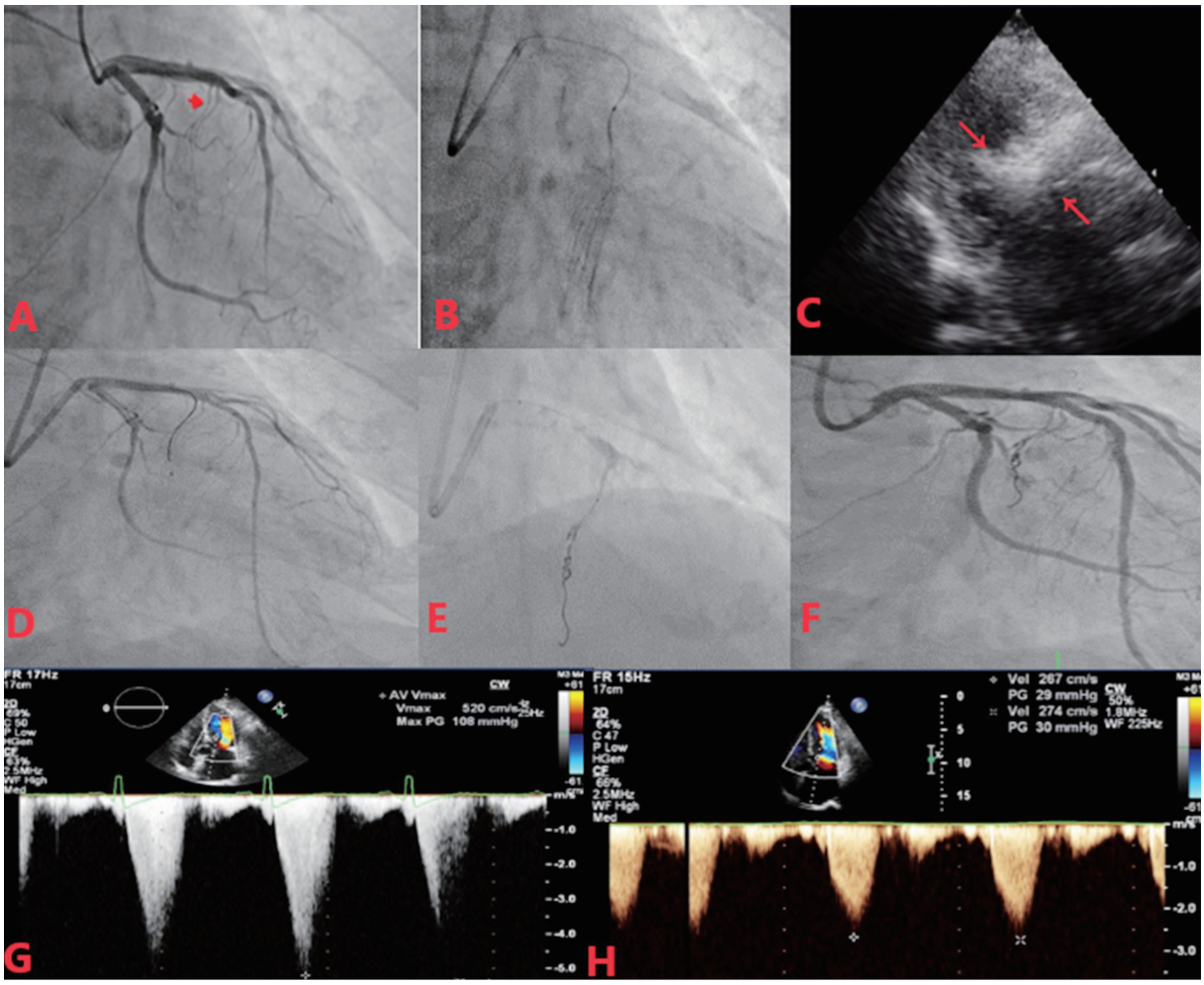

Figure 2A. Selection of the septal branch which is theoretically perfused to the myocardium of the basal septum, by fluorography

Figure 2B. Advancement of the micro-catheter into the septal branch, followed by contrast infusion via micro-catheter.

Figure 2C. Infusion of agitated saline mixed with microbubbles. Transthoracic echocardiography was performed simultaneously and hyper-echogenic enhancement was noted at the basal septum.

Figure 2D and 2E. Coil embolization under fluorography guidance and tested by contrast injection from guiding catheter.

Figure 2F. Final angiogram revealed complete occlusion of the septal branch by coils.

Figure 2G. Transthoracic echocardiography one day after the procedure revealed a marked reduction of left ventricle outflow tract pressure gradient to 108 mmHg.

Discussion

HCM is a relatively common hereditary disease transmitted most frequently as an autosomal dominant trait, which may cause chest pain, symptoms of heart failure and sudden cardiac death despite medical therapy.[1] Optimal medical therapy should be initiated in all patients, especially symptomatic ones. However, interventions are always indicated for those with LVOT pressure gradient higher than or equal to 50 mmHg. Our case was HCM with a definite family history and a significant LVOT obstruction with pressure gradient as high as 136 mmHg, which improved after coil embolization with minimal discomfort during the procedure.

Septal alcohol ablation or surgical myectomy should be the therapies of choice for HOCM, according to ESC guidelines,[1] with the 2018 review maintaining this as the first line of therapy despite a lack of further trials comparing their efficacy.[2] Besides, several techniques, including non-alcohol septal embolisation techniques using different materials and direct endocavitary ablation, have also been reported as alternative methods for HOCM.[1] Coil embolization is another method for HOCM therapy. Two recent studies have revealed that it is safe, effective, and durable, with smaller infarct sizes compared to septal alcohol ablation.[3,5] Also, coil embolization causes less discomfort to the patient during the procedure.

In conclusion, coil embolization is an alternative method for HOCM treatment. It is reported to be a safe, effective, comfortable and durable method. Compared to septal alcohol ablation, it reduces patients' discomfort, the need for analgesics and the incidence of atrioventricular block. Further larger clinical trials are needed in order to compare its efficacy with surgical myectomy and septal alcohol ablation.

References

1. Elliott PM, Anastasakis A, Borger MA, et al. 2014 ESC Guidelines on diagnosis and management of hypertrophic cardiomyopathy: the Task Force for the Diagnosis and Management of Hypertrophic Cardiomyopathy of the European Society of Cardiology (ESC). *Eur Heart J* 2014;35:2733-2779.
2. Geske JB, Ommen SR, Gersh BJ. Hypertrophic Cardiomyopathy: Clinical Update. *JACC Heart Fail* 2018;6:364-375.
3. Durand E, Mousseaux E, Coste P, et al. Non-surgical septal myocardial reduction by coil embolization for hypertrophic obstructive cardiomyopathy: early and 6 months follow-up. *Eur Heart J* 2008; 29:348-355.
4. Lawrenz T, Borchert B, Leuner C, et al. Endocardial radiofrequency ablation for hypertrophic obstructive cardiomyopathy: acute results and 6 months' follow-up in 19 patients. *J Am Coll Cardiol* 2011;57:572-576.
5. Guerrero I, Dhoble A, Fasulo M, et al. Safety and efficacy of coil embolization of the septal perforator for septal ablation in patients with hypertrophic obstructive cardiomyopathy. *Catheter Cardiovasc Interv* 2016;88: 971-977.