

Varying left ventricular outflow obstruction due to atrio-ventricular dyssynchrony in a patient with hypertrophic obstructive cardiomyopathy

Variabilní obstrukce výtokového traktu levé komory srdeční při atrioventrikulární dyssynchronii u pacienta s hypertrofickou obstrukční kardiomyopatií

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Abstract. Alcohol septal ablation (ASA) is an established non-surgical treatment of left ventricular outflow tract obstruction in patients with highly symptomatic hypertrophic obstructive cardiomyopathy (HOCM). The most frequent major complication associated with ASA is the mostly self-terminating complete heart block that occurs in 20–50% of patients and requires permanent pacemaker implantation in 9–20% of all ASA patients. We report a case of varying left ventricular outflow gradient due to transient complete heart block in a patient after ASA for HOCM. The hemodynamic study illustrated the importance of atrial systole for left ventricular filling in patients with HOCM and the hemodynamic mechanisms of AV delay optimization by DDD pacing. Fig. 1, Ref. 8, Online full text (Free, PDF) www.cardiology.sk

Key words: hypertrophic cardiomyopathy – alcohol septal ablation – atrio-ventricular dyssynchrony – left ventricular outflow obstruction

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Abstrakt. Alkoholová septální ablace (ASA) je zavedenou nechirurgickou metodou léčby obstrukce výtokového traktu levé komory srdeční u vysoce symptomatických pacientů s hypertrofickou obstrukční kardiomyopatií (HOCM). Nejčastější závažnou komplikací tohoto výkonu je vznik převážně transientní kompletní atrioventrikulární (AV) blokády u 20 – 50 % pacientů. U 9 – 20 % pacientů je indikována trvalá kardiostimulace. Prezentujeme kazuistiku pacienta, u kterého po ASA došlo k rozvoji kompletní AV blokády provázené variabilní obstrukcí výtokového traktu levé komory. Tato kazuistika ilustruje význam systoly síní pro plnění komor u pacientů s HOCM a mechanismus optimalizace AV zpoždění při DDD stimulaci. Obr. 1, Lit. 8, Online full text (Free, PDF) www.cardiology.sk

Klíčová slova: hypertrofická kardiomyopatie – alkoholová septální ablace – atrioventrikulární dyssynchronie – obstrukce výtokového traktu levé komory

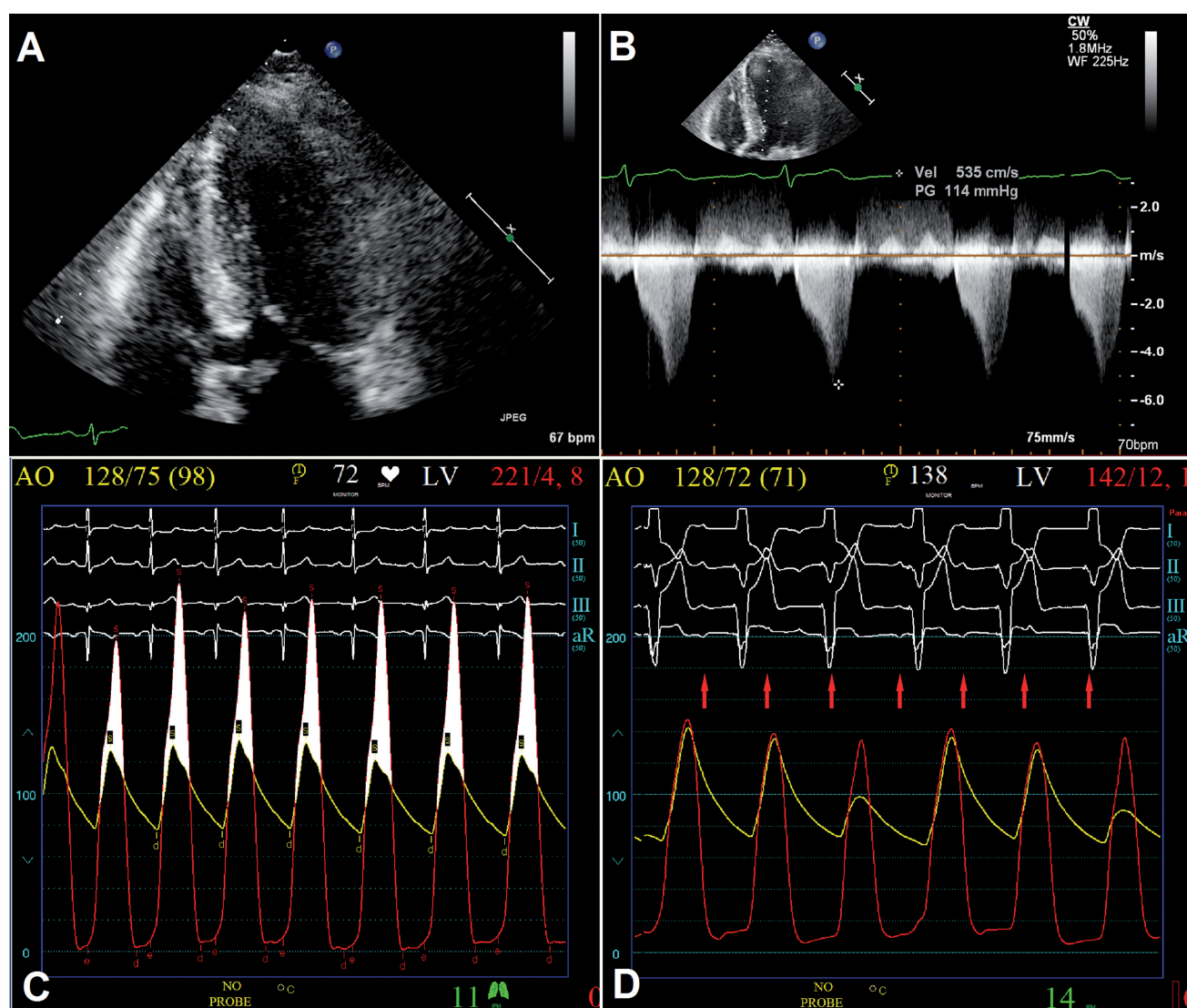


Figure 1 Transthoracic echocardiography prior to ASA revealed septal hypertrophy and systolic anterior motion of the mitral valve (A); A resting LVOG of 114 mmHg detected with Doppler echocardiography (B); A hemodynamic study confirmed LVOG of 141 mmHg (C); After ASA a transient complete heart block occurred with varying LVOG due to AV dyssynchrony, P waves are indicated with arrows (D).

Alcohol septal ablation (ASA) is an established non-surgical treatment for left ventricular outflow tract obstruction in patients with highly symptomatic hypertrophic obstructive cardiomyopathy (HOCM) (1). The most frequent major complication associated with ASA is the mostly self-terminating complete heart block that occurs in 20–50% of patients and requires permanent pacemaker implantation in 9–20% of all ASA patients (2, 3). Atrial systole plays an important role in left ventricular filling in patients with HOCM and therefore its absence in atrio-ventricular dyssynchrony may theoretically increase the left ventricular outflow gradient (LVOG). We report a case of varying left ventricular outflow

gradient due to transient complete heart block in a patient after ASA for HOCM.

Case report

A 61-year-old woman with HOCM had been referred to our institution for ASA. She suffered from severe drug-refractory chest pain and dyspnea of NYHA class III. On physical examination, vital signs were normal with clear lungs; there was a 3/6 systolic murmur with its maximum heard over the apex. ECG showed sinus rhythm with signs of left ventricu-

lar hypertrophy. Echocardiography revealed hypertrophy of interventricular septum with systolic anterior motion of the mitral valve (**Figure 1A**), the resting left ventricular outflow gradient (LVOG) was 114 mmHg (**Figure 1B**).

Coronary angiography, performed in the beginning of the procedure, revealed no abnormalities. Subsequently, a temporary transvenous pacemaker was inserted into the right ventricular apex. A hemodynamic study was performed prior to ASA; simultaneous pressure measurements were obtained from the left ventricle and the aorta. The hemodynamic study confirmed high LVOG of 146 mmHg prior to ASA (**Figure 1C**). A suitable septal branch was selected and engaged with a coronary wire and an over-the-wire balloon. The perfusion area of the target vessel was visualized using transthoracic myocardial contrast echocardiography (4). A slow injection of 1.5 ml of 96% ethanol in the selected septal branch was performed. Subsequently, a complete heart block developed and persisted for approximately 10 minutes. The temporary pacemaker was set in VVI mode at 75 bpm. The sinus node frequency was 100 bpm, and thus for every three stimulated QRS complexes four P waves occurred. During this time we observed varying LVOG. A low LVOG (5-10 mmHg) occurred always in two consecutive beats, where the PQ interval was between 100-300 ms. In every third beat a higher LVOG (40-60 mmHg) was observed, when the last P wave coincided with the T wave of the previous beat and the following P wave with the next QRS complex (**Figure 1D**).

The patient was monitored for 6 days post-procedure (5). No further conduction abnormalities occurred, and therefore permanent pacemaker implantation was not indicated (6, 7).

Discussion

ASA is an established nonsurgical treatment of left ventricular outflow obstruction in HOCM. The procedure is indicated in patients with severe drug refractory symptoms. Complete heart block is the most frequent complication of ASA (2). It has been demonstrated that a prolonged in-hospital monitoring of minimally 5 days is warranted due to delayed manifestation in some patients (6). Importantly, recent data show that long-term survival did not differ between patients with and without a post-ASA implanted permanent pacemaker for procedure-related complete heart block (3). Moreover, it was recently documented that long-term survival of patients after ASA was similar that of the general population (8).

In this case a transient complete heart block occurred immediately after ASA and was accompanied by varying LVOG.

This case illustrates the important role of atrial systole in left ventricular filling in patients with HOCM. The absence of the atrial load, when the P wave coincided with the QRS complex, led to increased LVOG. Diminished LVOG was observed when the PQ interval was between 100-300 ms. This also illustrates the hemodynamic mechanisms of AV delay optimization in HOCM patients treated by DDD pacing.

Disclosures

The authors disclaim any commercial, proprietary, or financial interest in any products or companies described in this article.

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