

Valvular and Subvalvular Left Ventricular Outflow Tract Obstructions

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ABSTRACT

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Aortic stenosis is a cardiac malformation with a steadily increasing incidence, undoubtedly related to the increased longevity of patients and the availability of echocardiography, where this malformation is often detected incidentally. The presence of scanty patients and the coexistence of valvular and subvalvular stenosis may pose some diagnostic and therapeutic difficulties.

Keywords: Aortic stenosis, left ventricular outflow tract obstruction, echocardiography, Morrow procedure

STRESZCZENIE

Zastawkowe i podzastawkowe zwężenia w drodze odpływu z lewej komory serca

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Stenoza aortalna to wada serca, której częstość występowania stale rośnie, co niewątpliwie wiąże się z wydłużającą się długością życia pacjentów oraz dostępnością echokardiografii, podczas której wada ta często jest wykrywana przypadkowo. Niewielka liczba pacjentów i współistnienie zwężeń zastawkowych i podzastawkowych może stwarzać pewne trudności diagnostyczne i terapeutyczne.

Słowa kluczowe: Stenoza aortalna, zwężenie drogi odpływu lewej komory serca, echokardiografia, procedura „Morrow”

Introduction

Aortic stenosis (AS) and hypertrophic cardiomyopathy (HCM) are two conditions that cause obstruction to blood flow leaving the heart. The simultaneous existence of both conditions in the same patients has

been documented, although it is uncommon [1,2]. A similar example has not been described yet in the Polish literature. Few cases are documented in the literature, partly because some patients were not accurately diagnosed with concomitant hypertrophic cardiomyopathy.

Case study

Aortic stenosis (AS) is the most common acquired heart disease, estimated to range from 0.7% in the European population over 45 years of age to as much as 13% in those over 75 years of age. In recent decades, we have observed an increasing prevalence of degenerative forms of stenosis, while simultaneously witnessing the rapid development of transcatheter aortic valve implantation (TAVI) techniques [1]. The left ventricular outflow obstruction into the aorta is caused by a decrease in the aortic outlet area developing over time. The increase in left ventricular pressure correlates with wall hypertrophy, which is compensatory in nature [2].

Aortic stenosis (AS) and hypertrophic cardiomyopathy (HCM) are two conditions that cause obstruction to blood flow leaving the left ventricle. The coexistence of both in the same patients has been documented, however, it is rare [1,2]. An example of similar pathology

or even procedure has not been described yet in the Polish literature.

A 74-year-old female patient was admitted to the Department of Cardiac Surgery, because of symptomatic aortic stenosis and obstruction of the left ventricular outflow tract as well as exacerbation of New York Heart Association (NYHA) class III heart failure symptoms. The symptoms of heart failure had been gradually worsening for several months.

The patient had a history of hypertension and ischemic disease since 2005. She was previously hospitalized in 1995 for endocarditis. Additionally, the patient had been on steroid therapy for many years due to asthma, rheumatoid arthritis, and osteoporosis.

Her heart rhythm was sinus at 80/min. Echocardiography revealed a narrow left ventricular outflow tract, which begins at the level of the papillary muscles.

The interventricular septum measured 17 mm in the subaortic part and 15 mm in the middle part.

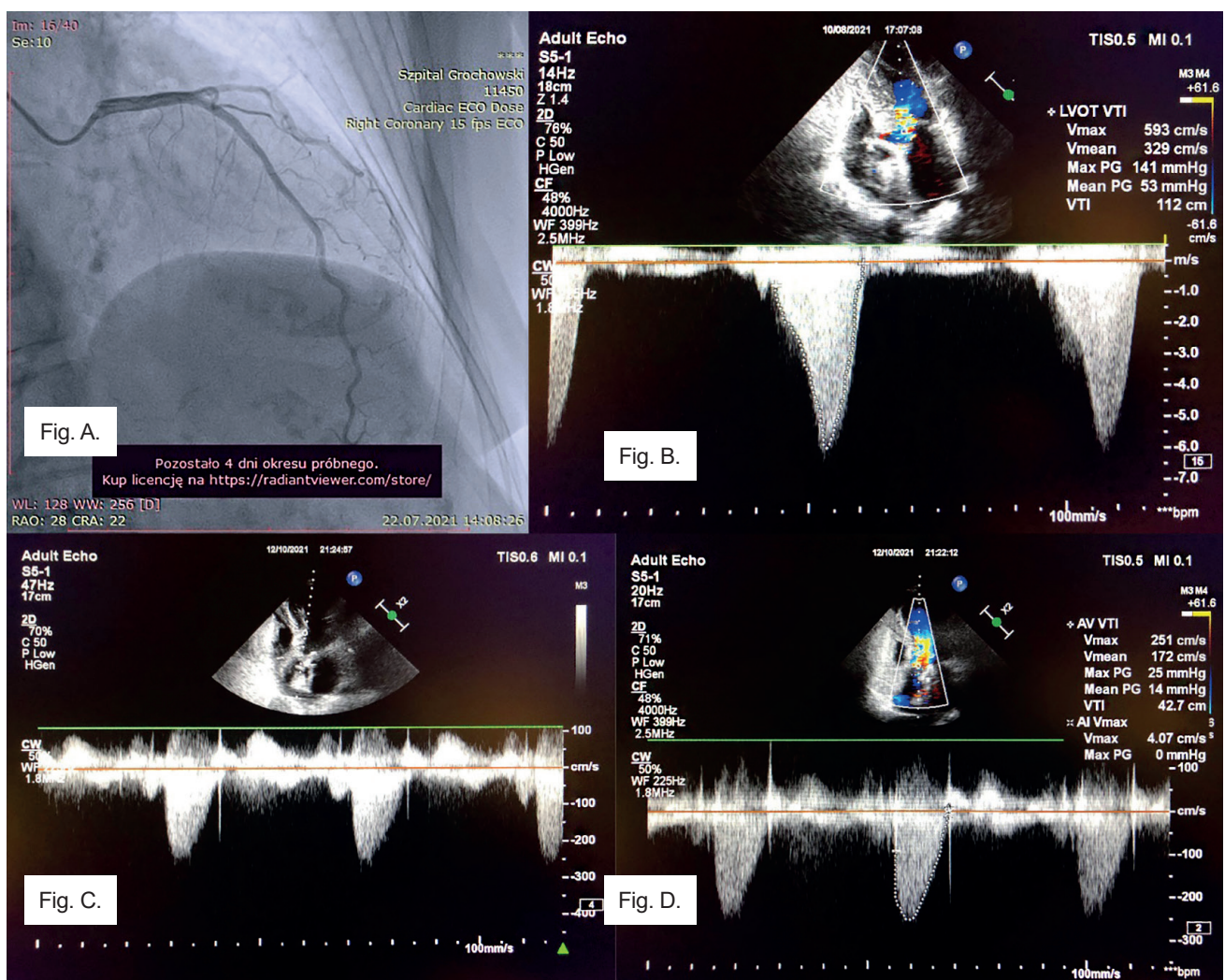


Figure A. Coronary angiography without significant septal branch

Figure B. Transthoracic echocardiography (TTE) before procedure showing significant gradient across LVOT and aortic valve

Figure C. and Figure D. Postoperative TTE with marked improvement of flow in LVOT and decreased gradient

The peak gradient was 140 mmHg and the mean gradient was 90 mmHg. Left ventricular volume was approximately 35 ml. Ejection fraction was 75-80%. Coronary angiography showed no significant changes.

During the procedure, the fibrotic and massively calcified aortic valve was removed. Excess left ventricular muscle was excised from the outflow tract up to the level of the papillary muscles (Morrow procedure). The Morrow procedure involves creating a rectangular trough that extends from the base of the aortic valve to a point beyond where the anterior mitral leaflet contacts the septum (the SAM contact point).

This procedure is the preferred treatment for symptomatic, drug-resistant hypertrophic obstructive cardiomyopathy (HOCM), as long as it is carried out in centers with the necessary expertise. It is particularly effective in reducing ventricular septal hypertrophy. In our patient, a biological 21 mm Perimount valve was implanted.

The postoperative TTE revealed normal function with a gradient of 26/12 mmHg.

At a 30-day postoperative follow-up visit, the patient had no limitations of exertion (NYHA I).

Discussion

The coexistence of aortic stenosis and hypertrophic cardiomyopathy is quite rare. This double defect is difficult to diagnose and therefore requires accurate imaging by Doppler echocardiography [1,2,3]. Diagnosing valvular and subvalvular stenosis in the left ventricular outflow tract using echocardiography presents several challenges. These include differentiating between the obstructive lesions at the valve and subvalvular levels, accurately assessing the severity and extent of stenosis, and distinguishing these conditions from other cardiac abnormalities. The overlapping anatomical structures and turbulent blood flow patterns can complicate the interpretation of echocardiographic images, making it difficult to obtain clear and precise measurements. Additionally, the presence of hypertrophic cardiomyopathy or other coexisting cardiac conditions can further obscure the diagnosis, necessitating advanced imaging techniques and expertise.

Accurate diagnosis of patients with coexisting advanced aortic stenosis and left ventricular hypertrophy, particularly in the region of the interventricular septum, poses a significant challenge in daily echocardiographic diagnostics. Proper echocardiographic diagnosis facilitates the correct classification of patients for further treatment and allows the selection of the most appropriate therapeutic method, especially the best and most effective surgical approach.

In the case we have described, there was a degenerative process with fibrosis and calcification of the valves and their limited mobility.

Surgical myectomy was therefore the best choice in this case[4]. This treatment is safe and effective and is associated with a low risk of complications [5].

The alternative method could be TAVI treatment followed by alcohol ablation in the second stage. However, we did not consider it due to the less predictable ablation results [4].

Conclusion

The coexistence of valvular and subvalvular stenosis, as in the case described above, may complicate the diagnosis, and failure to recognize and address subvalvular stenosis may compromise surgical outcomes. Appropriate diagnostics, optimal timing, and individual choice of invasive procedure have a real impact on patient prognosis. The above case shows that the combination of myectomy with surgical valve replacement can yield a good clinical and electrographic effect in an elderly patient. The advantage of this method is that it can be performed during one operation [4]. Accurate diagnostics enabled the planning and execution of an effective and safe cardiac surgery. This is a crucial consideration, as the success of cardiac surgical treatment largely depends on proper preoperative diagnostics.

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The authors declare no conflict of interest.

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