

SUCCESSFUL THROMBOLYTIC TREATMENT OF CLINICAL VALVE THROMBOSIS AFTER TRANSCATHETER AORTIC VALVE REPLACEMENT

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УСПЕШНО ТРОМБОЛИТИЧНО ЛЕЧЕНИЕ НА КЛИНИЧНА КЛАПНА ТРОМБОЗА СЛЕД ТРАНСКАТЕТЪРНО АОРТНО КЛАПНО ПРОТЕЗИРАНЕ

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Abstract.

Transcatheter aortic valve replacement (TAVR) is an effective therapeutic option for patients with severe symptomatic aortic stenosis who are at high surgical risk. Although generally safe, one of its rare but serious complications is clinical valve thrombosis, occurring in approximately 0.5% of cases. This condition can lead to prosthetic valve dysfunction, worsening heart failure, or thromboembolic events. Diagnosis usually begins with transthoracic echocardiography (TTE), while transoesophageal echocardiography (TOE) and multi-slice computed tomography (MSCT) are often required for more precise assessment. Since standardized treatment protocols are not yet established, management must be individualized according to clinical presentation and the degree of valve obstruction. Therapeutic approaches include oral anticoagulation, intravenous heparin, or, in severe cases with hemodynamic compromise, thrombolytic therapy. If conservative management fails, redo-TAVR or surgical valve explantation may be necessary. We present the case of a 78-year-old Bulgarian woman who developed progressive heart failure 12 days after TAVR. Imaging confirmed bioprosthetic valve thrombosis. Intravenous heparin was ineffective, but thrombolytic therapy followed by oral anticoagulation led to complete thrombus resolution and restoration of valve function without bleeding complications. Clinical valve thrombosis after TAVR, though uncommon, is potentially fatal. MSCT remains the most accurate diagnostic tool, while TOE is valuable for its accessibility. Thrombolysis combined with vitamin K antagonist therapy can be an effective treatment option.

Key words:

Transcatheter aortic valve replacement (TAVR); valve thrombosis; thrombolysis; case report

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Резюме.

Транскатетърната подмяна на аортната клапа (TAVR) е ефективен терапевтичен подход при пациенти с тежка симптоматична аортна стеноза и висок оперативен риск. Въпреки че процедурата се счита за безопасна, едно от редките, но сериозни усложнения е клиничната тромбоза на клапата, която се наблюдава приблизително при 0.5% от случаите. Това състояние може да доведе до дисфункция на биопротезната клапа, прогресираща сърдечна недостатъчност или тромбоемболични инциденти. Диагностиката обикновено започва с трансторакална ехокардиография (ТТЕ), като за по-прецизна оценка често се налага използване на трансезофагеална ехокардиография (ТОЕ) и мултисрезова компютърна томография (МССТ). Поради липса на стандартизирани терапевтични протоколи, лечението трябва да е индивидуализирано според клиничната картина и степента на обструкция на клапата. Терапевтичните възможности включват перорална антикоагулантна терапия, интравенозен хепарин или при тежки случаи с хемодинамична нестабилност – тромболиза. При неуспех на консервативното лечение може да се наложи.

повторна TAVR или хирургично отстраняване на клапата. Представяме случай на 78-годишна пациентка, развила прогресираща сърдечна недостатъчност 12 дни след TAVR. Образните изследвания потвърждават тромбоза на биопротезната клапа. Интравенозният хепарин е неефективен, но тромболитичната терапия, последвана от перорална антикоагулация, води до пълно резорбиране на тромба и до възстановяване на клапната функция без хеморагични усложнения. Клиничната тромбоза на клапата след TAVR е рядко, но потенциално фатално усложнение. MSCT остава най-точният диагностичен метод, докато TOE е ценен поради своята достъпност. Тромболитизата, комбинирана с терапия с антагонист на витамин К, може да е ефективен терапевтичен подход

Ключови думи: транскатетърна смяна на аортна клапа (TAVR); тромбоза на клапна протеза; тромболитиза; клиничен случай

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BACKGROUND

Transcatheter aortic valve replacement (TAVR) represents an established therapeutic alternative for patients with severe symptomatic aortic stenosis who are considered to be at high surgical risk. Although uncommon, clinical valve thrombosis occurs in approximately 0.5% of TAVR recipients and may result in prosthetic valve dysfunction, heart failure, or thromboembolic complications [1-3]. The diagnostic process typically begins with transthoracic echocardiography (TTE), while transoesophageal echocardiography (TOE) and multi-slice computed tomography (MSCT) are often required to provide detailed visualization and confirm the diagnosis. Currently, no standardized management algorithm exists, and treatment decisions must be individualized based on the patient's clinical status and the degree of valve obstruction. Available therapeutic options include oral anticoagulation, continuous intravenous heparin infusion, and, in cases of significant symptoms or acute hemodynamic instability, thrombolytic therapy. When conservative medical management proves ineffective, repeat transcatheter valve implantation or surgical valve explantation may be necessary [4].



Fig. 1

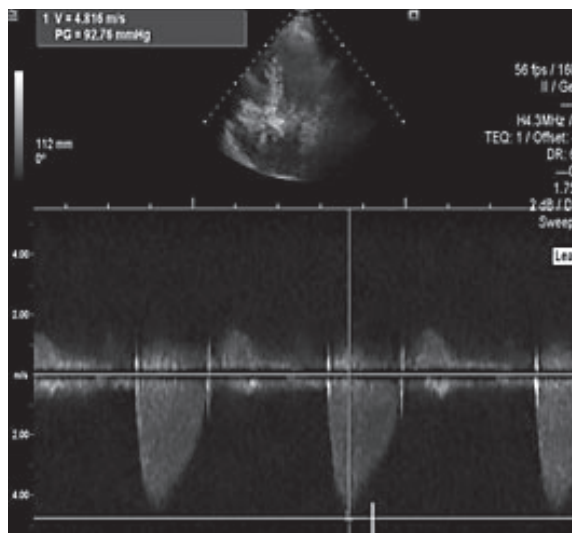


Fig. 2

We present the case of a patient who developed clinical valve thrombosis following TAVR and was successfully managed with thrombolytic therapy followed by oral anticoagulation.

CASE PRESENTATION

A 78-year-old white Caucasian woman from Bulgaria with a history of arterial hypertension, obesity, and anaemia underwent TAVR using a balloon-expandable prosthesis (Myval THV, Meril Life Sciences Pvt. Ltd.) for the treatment of severe symptomatic aortic stenosis (Fig. 1). The procedure was uneventful, and post-implant TTE confirmed normal prosthetic valve function (Table 1). The patient was discharged three days after the intervention in stable condition, without clinical or echocardiographic evidence of heart failure. Because of pre-existing iron deficiency anaemia (haemoglobin 114 g/L) and an increased bleeding risk, she was prescribed single antiplatelet therapy consisting of clopidogrel 75 mg once daily.

Nine days later the patient presented with dyspnoea at rest and admitted to not taking the antiplatelet agent as prescribed. On physical examination aortic steno-

sis murmur was detected. Vital signs were normal, and electrocardiogram (ECG) showed normal sinus rhythm with left ventricular hypertrophy as in previous ECGs. TTE revealed increase in the peak and average aortic valve gradients – 92,8 mmHg and 42,6 mmHg respectively and transvalvular peak velocity (Vmax) of 4.82 m/s (Fig. 2). There was evidence of moderate aortic regurgitation with suspected prosthetic valve thrombosis.

MSCT revealed a thrombus (size 4,2 mm x 6,9 mm) adjacent to the left aortic leaflet, with no evidence of para-prosthetic leak (Fig. 3).

Treatment

Initial therapy consisted of continuous intravenous heparin infusion at a rate of 1000 IU per hour, titrated to maintain an activated partial thromboplastin time (APTT) between 60 and 90 seconds. After seven days of anticoagulation, significant aortic regurgitation persisted and transvalvular pressure gradients remained elevated (Table 1). TOE demonstrated a thrombus adjacent to the left aortic cusp, prompting the decision to proceed with thrombolytic therapy. The patient received a total of 90 mg of alteplase administered over 24 hours, followed by the reintroduction of heparin infusion adjusted to the same APTT target range. Oral an-

ticoagulation with acenocoumarol was initiated simultaneously, aiming for an international normalized ratio (INR) between 2.0 and 3.0. A follow-up TOE performed 14 days after admission showed partial dissolution of the thrombus, improvement to only mild aortic regurgitation, though residual aortic stenosis persisted (Fig. 4, Table 1). The patient was subsequently discharged on maintenance therapy with acenocoumarol (target INR 2.0-3.0) in combination with clopidogrel 75 mg daily.

Outcome and Follow-up: For the following 3 months the patient was followed up with TTE every 2 to 4 weeks. A gradual decrease in transvalvular gradients and Vmax was noted. At 3 months TTE showed only mild aortic stenosis with no evidence of aortic regurgitation. MSCT revealed normal structure of the biological prosthesis with complete resolution of the thrombus formation (Fig. 5).

No bleeding events were registered over the course of follow up.

DISCUSSION AND CONCLUSIONS

We report the case of a patient who developed clinical valve thrombosis following TAVR. Due to the infrequency of this complication, there are currently no

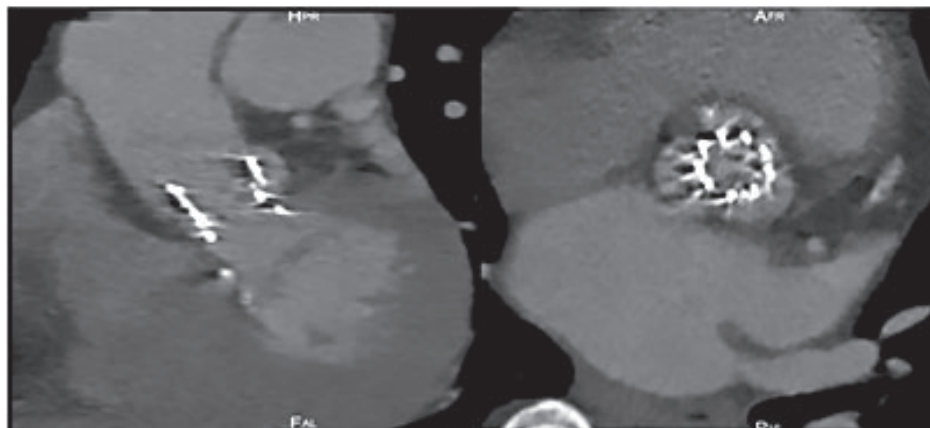


Fig. 3

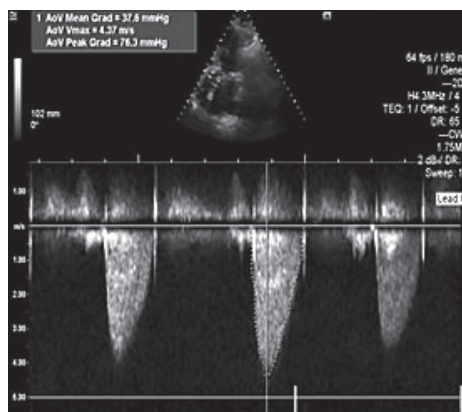


Fig. 4

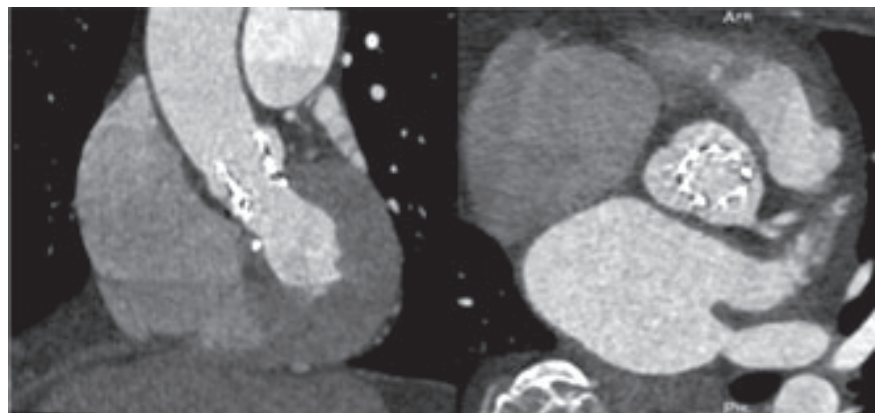


Fig. 5

Table 1. TTE parameters after TAVR, at initial presentation, over the course of in-hospital treatment and during follow-up with corresponding heart failure symptom class (NYHA) and medication

	After TAVR	At initial presentation (Day 0)	Day 7	Day 14	At 1 month	At 3 months
Ejection fraction [%]	52.0	58.0	54.0	55.0	55.0	56.0
Pericardial effusion [+/-]	-	-	-	-	-	-
Peak aortic valve gradient [mmHg]	27.1	92.8	90.9	76.3	59.6	48.2
Mean aortic valve gradient [mmHg]	9.0	42.6	38.8	37.6	28.2	25.2
Vmax [m/s]	1.4	4.82	4.71	4.37	3.86	3.47
Aortic regurgitation	None	moderate	moderate	mild	none	none
Leaflet thrombosis [+/-]	-	+	+	Partial resolution	-	-
Medication	Clopidogrel (not taken)	Heparin	Alteplase + heparin	Acenocumarol + clopidogrel	Acenocumarol + clopidogrel	Acenocumarol + clopidogrel
NYHA* class	I	III	II	I	I	I

*NYHA – New York Heart Association

standardized, evidence-based recommendations for its management, and therapy must be tailored to each individual case. Routine echocardiographic monitoring is recommended before discharge, at 30 days, 6 months, 12 months, and annually thereafter, or sooner if symptoms occur [5]. When valve thrombosis is suspected MSCT remains the imaging method of choice [5, 6]. In the present case, TTE was performed both at discharge and at readmission for heart failure, while the diagnosis was confirmed with MSCT. TOE provided additional value through its superior spatial resolution, allowing detailed visualization of valve structure and assessment of therapeutic response. Owing to its accessibility and safety, TOE represents a practical complement to MSCT in such scenarios.

Oral anticoagulation is generally considered the first-line therapy, although heparin and thrombolytic agents may be indicated in severe or refractory cases [4]. Our patient was hemodynamically stable but presented with acute symptoms and marked valve dysfunction; therefore, we initiated intravenous unfractionated heparin (UFH) due to its controllable anticoagulant effect and the availability of a reversal agent. Thrombolysis was subsequently employed as a rescue strategy after UFH failed to improve valve performance. Although full recovery of prosthetic function was not achieved, thrombus resolution and elimination of aortic regurgitation were observed.

Previous studies have shown that vitamin K antagonists alone or in combination with antiplatelet therapy effectively promote thrombus regression, while enabling close monitoring of anticoagulation intensity [7, 8]. In this case, long-term therapy with acenocumarol led to further improvement in valve function. Follow-up

was performed monthly using TTE to monitor prosthetic performance. Although MSCT offers superior imaging precision, its use for routine follow-up is limited by radiation exposure and contrast-related toxicity. To mitigate bleeding risk, proton pump inhibitors were added, and renal and hepatic function were closely monitored. No hemorrhagic complications occurred during the follow-up period.

No conflict of interest was declared

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