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IMAGES IN CV APPLICATIONS

Basal leaflet thickening and color paucity in the echocardiographic evaluation of subclinical leaflet thrombosis after transcatheter aortic valve replacement

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Since the first published study in 2015 by Makkar et al. [1], clinical and subclinical thrombosis of leaflets following transcatheter aortic valve replacement (TAVR) have gained substantial attention [2]. Taking many limitations of routine post TAVR high-resolution 4D-CT into consideration, transesophageal echocardiography (TEE) seems to remain an attractive alternative. However, there is paucity of published data on the role of echocardiography in the evaluation of subclinical valve thrombosis [3].

A retrospective analysis was conducted in 124 consecutive patients who underwent TAVR from August 2016 to October 2017 at our institution. All patients underwent routine transthoracic echocardiographic evaluation before TAVR, at discharge and 4–8 weeks thereafter. High-resolution 4D-CT was performed in 84 patients and echocardiographic data were reviewed and correlated with 4D-CT data. TEE was subsequently done. An increase of mean pressure gradients (MPG) of > 20 mmHg and/or more than 50% increase in MPG compared to basal transthoracic echocardiography were considered as leaflet thrombosis.

The overall incidence of valve thrombosis was 10 out of 84 patients (11.9%; 8 Edwards SAPIEN 3, 2 CoreValve Evolute R). Clinical symptoms such as dyspnea, angina and syncope occurred in only one patient. Characteristics of the ten patients are given in Table 1.

Basal leaflet thickening seen in TEE was the most frequent finding in almost 80% of cases and correlated very well with the CT findings. Further, color paucity sign (filling defect in color Doppler flow signal at the site of thrombotic thickening) was noted in 60% of cases but with a 100% correlation to 4D-CT. We here propose that a combination of these two echocardiographic abnormalities along with other Doppler data would significantly enhance the accuracy of non-radiological diagnosis of subclinical leaflet thrombosis. We have also shown that these subtle changes will resolve after successful anticoagulation and normalization of leaflet motions and trans-prosthetic gradients. Figure 1 shows representative images of color paucity sign (a), basal leaflet thickening (b), resolved basal leaflet thickening after successful anticoagulation therapy (e) and CT evidence of thrombosis (c and d).

TEE evaluation of leaflet morphology seems to be promising with a reasonable correlation to the gold standard of 4D-CT. Our data also suggest that echocardiographers should remain vigilant to these two subtle signs of valve thrombosis even when the gradients are within normal limits. This small observational study could serve as an impetus for further research and investigation in this field.

Table 1 Characteristics of the patients with valve thrombosis (n = 10)

Age/gender	81.5 ± 4.3 years, 40% male
STS score	4.1 ± 1.3%
Prosthesis size	
Edwards-Sapien-3	23 mm (50%), 26 mm (10%), 29 mm (20%)
CoreValveEvolut R	23 mm (10%), 26 mm (10%)
Initial treatment after TAVR	
Aspirin + Clopidogrel	90%
Aspirin + Clopidogrel + Oral AC	10%
Time to diagnosis	10.9 ± 0.1 months
Mean pressure gradient	28.6 ± 17.6 mmHg
Clinical symptoms	One patient

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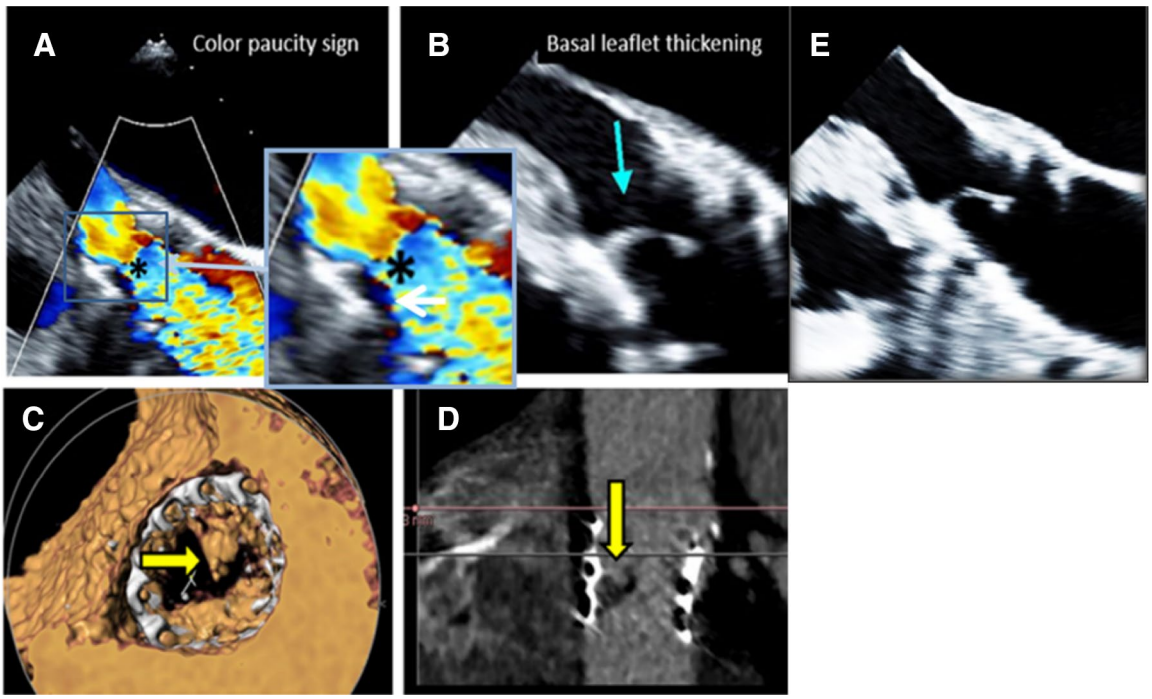

Fig. 1 Representative images of color paucity sign (**a**), basal leaflet thickening (**b**), resolved basal leaflet thickening after successful anticoagulation therapy (**e**) and CT evidence of thrombosis (**c** and **d**)

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