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Unnatural milieu: thrombus after transcatheter mitral valve replacement

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EDITORIAL

Eng et al. present a retrospective single center cohort study of transfemoral transseptal transcatheter mitral valve replacement and associated valve thrombosis (1). Eight patients underwent valve-in-valve and five underwent valve-in-ring transcatheter mitral valve replacement between 12/2013 and 12/2015 with Sapien, Sapien XT or Sapien 3 valves. Ten received warfarin for concomitant atrial fibrillation with no valve thrombosis. The remaining three were prescribed dual antiplatelet therapy, of whom two developed thrombotic valve failure and one developed reduced prosthetic leaflet motion from suspected subacute valve thrombosis. Interestingly, the two patients with overt valve thrombosis had significantly increased mitral gradients on day 1 after valve implantation. Prolonged low molecular weight heparin was tolerated in one patient, with resolution of thrombosis and improvement in mitral gradients. Notably, 6/13 patients had mitral gradients >5mmHg after valve implantation, giving an MVARC device success rate of only 54%. This perhaps highlights a key limitation of valve-in-valve and valve-in-ring procedures in the mitral position. There was one stroke in this study, but whether there was associated subclinical valve thrombosis with reduced leaflet motion is unknown.

While it is difficult to draw firm conclusions from this small retrospective study, the data on bioprosthetic valve thrombosis are accumulating. Data from the CT subgroup of the PORTICO IDE study suggest a 40% incidence of subclinical thrombosis of transcatheter aortic valves, associated with lack of therapeutic anticoagulation, and with recovery of normal leaflet motion associated with commencing anticoagulation (2). Data from the RESOLVE and SAVORY registries point to an association between reduced bioprosthetic aortic leaflet motion and stroke or transient ischemic attack (2). It is likely that bioprosthetic mitral valves have a higher incidence of thrombosis under lower flow conditions.

The causes for valve thrombosis are likely multi-factorial, and relate to transcatheter valve implantation into an unnatural milieu. Patient factors, including a propensity to thrombo-embolism, probably play a role. Anticoagulation regimen, including therapeutic level and

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CONFLICTS OF INTEREST
None

duration, appears important. Anatomy, including valve position in the mitral annulus and the surrounding valvular and subvalvular apparatus may contribute to thrombosis risk. A valve implanted more atrial may be more pre-disposed to thrombosis as more of the valve skirt and stent covering is in the relatively static left atrial blood pool. Retention of the native leaflets are likely to increase the risk of thrombosis. The surgical standard for mitral valve replacement is to preserve the subvalvular apparatus to promote left ventricular function but to resect the anterior mitral leaflet to prevent left ventricular outflow tract obstruction or prosthetic heart valve dysfunction (3). This may also reduce the incidence of valve thrombosis by reducing stasis around the valve. In a contemporary Israeli registry, mentioned in this paper by Eng et al, valve thrombosis only occurred when the native leaflets were preserved (4). This poses an interesting challenge for transcatheter mitral valve replacement. A novel transcatheter resection of the anterior leaflet designed to prevent left ventricular outflow tract obstruction (LAMPOON) (5), which is currently in clinical trial (NCT03015194), may reduce rates of valve thrombosis by promoting blood flow through and around the valve prosthesis.

Key questions remain – whether to anticoagulate in all patients, for how long, and with what regimen. Also, whether resection of the anterior mitral leaflet and a more ventricular valve deployment may reduce incidence of thrombosis. American Heart Association guidelines on valvular heart disease recommend 3 months of anticoagulation followed by single antiplatelet therapy. Although a class IIA recommendation, the level of evidence is C, and the applicability of this recommendation to transcatheter mitral implants is tenuous. These important issues need to be addressed further in prospective trials, and with the development of refined devices and implantation strategies. In the meantime, long-term anticoagulation appears a reasonable strategy in eligible patients after transcatheter mitral valve replacement.

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KEY POINTS**What the article teaches**

Transcatheter heart valve thrombosis in the mitral position causes increased valve gradients, valve dysfunction, and symptoms, and may be associated with lack of therapeutic anticoagulation.

How it will impact practice

Anticoagulation with a vitamin K antagonist should be considered in all patients undergoing transcatheter mitral valve replacement.

What new research/study would help answer the question posed

Efficacy, optimal duration, and safety of anticoagulation therapy, balancing reduced thrombosis against increased bleeding risk, needs to be assessed in larger cohort studies and prospective trials.