

Heartbeat: Predictors of left atrial thrombus in patient with atrial fibrillation

doi:10.1136/heartjnl-2019-315683

Catherine M Otto^{1B}

Currently, the CHA₂DS₂-VASc score is the primary tool for assessing thromboembolic risk in patients with atrial fibrillation (AF). However, other potentially relevant clinical variables have not been considered which might improve risk stratification in individual patients. In this issue of *Heart*, Kaplon-Cieślicka and colleagues¹ identified predictors of left atrial appendage (LAA) thrombus in 1033 patients undergoing transesophageal echocardiography prior to cardioversion or an ablation procedure, of whom 89% had received pre-procedure oral anti-coagulation. LAA thrombus was present in about 6% of subjects and two additional predictors were identified: type of AF (persistent/permanent vs paroxysmal) and renal dysfunction (defined as glomerular filtration rate (GFR) <57 mL/min/1.73 m²). The area under the receiver-operator curve increased from 0.70 with the CHA₂DS₂-VASc score alone to 0.81 with the addition of AF type and renal dysfunction, with similar findings in a separate validation cohort.

In an editorial, Floria and Tanase² point out that both AF type and renal dysfunction are related to the underlying structural pathology of atrial fibrosis in patients with AF. In addition, there are many other potential mechanisms that might explain the association of renal dysfunction with AF thromboembolic risk as detailed in *figure 1*. They suggest that “Both parameters seem to significantly improve CHA₂DS₂-VASc’s thromboembolic risk stratification and prognostic value in AF.” However, “An ideal thromboembolic risk assessment tool allowing clinicians accurate patient selection and appropriate risk stratification has yet to be created.”

Computed coronary angiography (CTA) and coronary artery calcification (CAC) scores now are standard diagnostic approaches in adults with symptoms suggestive of coronary artery disease (CAD). However, the potential value of CTA or CAC in risk assessment of patients undergoing non-cardiac surgery is less well defined.³ In a systematic review and

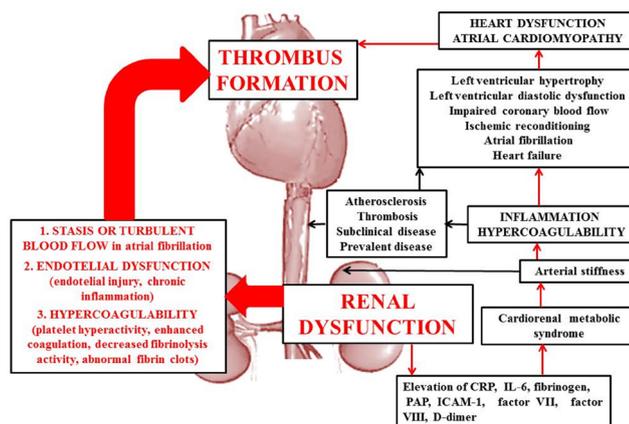


Figure 1 The interactions between renal dysfunction and thrombus formation pathways through heart dysfunction and atrial cardiomyopathy. CRP, C reactive protein; ICAM-1, intercellular adhesion molecule-1; IL-6, interleukin 6; Pap, plasmin-antiplasmin complex.

meta-analysis of 11 studies with a total of 3480 patients undergoing noncardiac surgery in whom pre-operative CTA or CAC was available, there was a stepwise increase in the risk of a major adverse cardiovascular event (MACE) with the severity and extent of CAD on CTA: 2.0% with no CAD, 4.1% with nonobstructive CAD, 7.3% with single-vessel CAD and 23.1% with multivessel CAD. (*figure 2*) The authors conclude that CTA now offers an alternate approach to risk stratification in patients undergoing non-cardiac surgery.

Bittencourt and Gualandro⁴ remind us that current guidelines recommend only clinical signs, symptoms and risk factors in pre-operative evaluation of patients undergoing noncardiac surgery, although patients at higher risk may benefit from additional testing such as a stress imaging study. This meta-analysis suggests that CTA also may have a role, although these studies mostly included older patients at higher risk and it remains unclear whether medical therapy or intervention will be effective in decreasing risk in these patients. Bittencourt

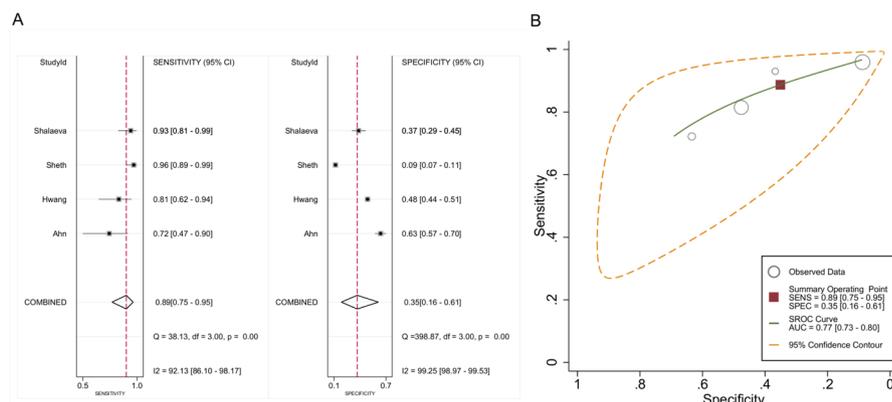


Figure 2 Testing parameters for CTA findings and perioperative MACE. (A) pooled sensitivity and specificity for any CAD on cta and perioperative mace. (B) hierarchical summary receiver-operating characteristic curve for any CAD on cta for the prediction of perioperative mace. the size of each circle indicates the weight of each study. AUC, area under the curve; CAD, coronary artery disease; cta, CT coronary angiography; mace, major cardiovascular events; sens, spec, sensitivity and specificity with 95% CIs.

Correspondence to Professor Catherine M Otto, Division of Cardiology, University of Washington, Seattle, WA 98195, USA; cmotto@uw.edu

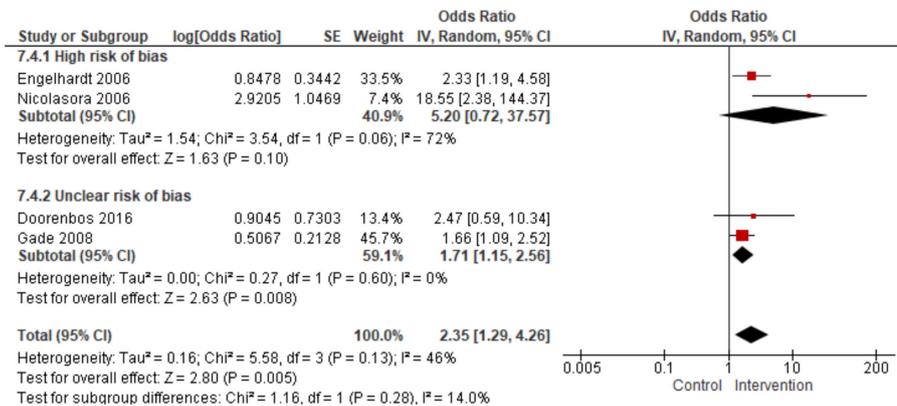


Figure 3 Effect of focused educational meetings compared with standard professional development on completion of an advance care planning document by physicians for patients with heart failure.

and Gualandro conclude that the optimal approach to whether and how CTA “can be incorporated in the routine preoperative risk stratification in order to improve outcomes at a reasonable cost and limited risk of adverse consequences, including delay in surgical procedures, needs to be evaluated in future studies.”

Cardiologists often fail to engage patients in advance care planning (ACP) even though heart failure is a major cause of death. In an effort to understand what approaches might be effective, Schichtel and colleagues⁵ performed a meta-analysis of 13 randomised controlled trials (RCTs) of intervention to improve ACP in patients with heart failure. The found that patient-mediated interventions (OR 5.23; 95% CI 2.36 to 11.61), reminder systems (OR 3.65; 95% CI 1.47 to 9.04) and educational meetings (OR 2.35; 95% CI 1.29 to

4.26) all were effective in improving ACP (figure 3)

Johnson and Janssen⁶ point out that medical costs for patients with heart failure are highest in the year after diagnosis and in the last 6 months of life. “While the first peak in costs following diagnosis is intuitively appropriate, the second peak at the end of life raises important concerns about inappropriate admissions and the use of invasive, burdensome and futile interventions.” Johnson and Janssen suggest the lack of advanced communication skills leads to a untenable situation for healthcare providers, raising the question: “How can clinicians, invested in the patient’s survival and personally distressed by challenging but honest conversations, be supported not to perpetuate a conspiracy of unqualified optimism?”

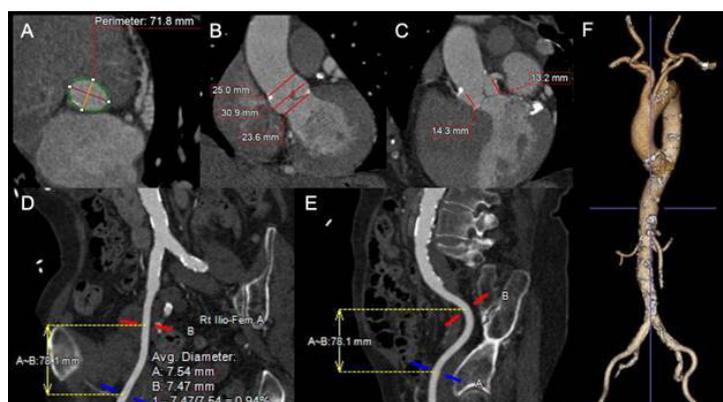


Figure 4 Preprocedural reconstructed images demonstrating accurate dimensions and morphology to guide transcatheter aortic valve implantation (TAVI). (A) aortic annulus, (B) aortic root, (C) distance from aortic annulus to ostia of coronary arteries, (D, E) orthogonal views of the iliofemoral arteries for access routes, (F) 3D volume rendered reconstruction of the entire arterial tree from aortic root to femoral arteries.

The *Education in Heart* article in this issue⁷ addresses mechanical circulatory support in patients with ischaemic cardiogenic shock, which complicates 5% to 10% of acute myocardial infarction presentations. Percutaneous coronary intervention of only the culprit vessel is advised because attempts to provide complete revascularisation may be harmful. Although there is no robust evidence supporting routine use of mechanical circulatory support, several options are available including an intra-aortic balloon pump (for mechanical complications such as acute mitral regurgitation), peripheral venous-arterial extracorporeal membrane oxygenation, and percutaneous left ventricular assist devices. Technical information about each type of device and current guideline recommendations are summarised.

The Cardiology in Focus article discusses the role of cardiologist in cardiac (computed tomographic (CT) imaging, with guidance for trainees and junior cardiologists considering advanced training in this imaging modality (figure 4).

Competing interests None declared.

Patient consent for publication Not required.

Provenance and peer review Commissioned; internally peer reviewed.

© Author(s) (or their employer(s)) 2019. No commercial re-use. See rights and permissions. Published by BMJ.



To cite Otto CM. *Heart* 2019;**105**:1293–1294.

Heart 2019;**105**:1293–1294.
doi:10.1136/heartjnl-2019-315683

REFERENCES

- Kaplon-Cieślicka A, Budnik M, Gawalko M, *et al*. Atrial fibrillation type and renal dysfunction as important predictors of left atrial thrombus. *Heart* 2019;**105**:1310–5.
- Floria M, Tanase DM. Atrial fibrillation type and renal dysfunction: new challenges in thromboembolic risk assessment. *Heart* 2019;**105**:1295–7.
- Koshy AN, Ha FJ, Gow PJ, *et al*. Computed tomographic coronary angiography in risk stratification prior to non-cardiac surgery: a systematic review and meta-analysis. *Heart* 2019;**105**:1335–42.
- Bittencourt MS, Gualandro DM. Coronary cta works for preoperative risk stratification, but do we know when and how to use it? *Heart* 2019;**105**:1300–1.
- Schichtel M, Wee B, Perera R, *et al*. Clinician-targeted interventions to improve advance care planning in heart failure: a systematic review and meta-analysis. *Heart* 2019;**105**:1316–24.
- Johnson M, Janssen D. Advance care planning: a ‘hard’ skill for cardiology clinicians? *Heart* 2019;**105**:1298–9.
- Maznyczka AM, Ford TJ, Oldroyd KG. Revascularisation and mechanical circulatory support in patients with ischaemic cardiogenic shock. *Heart* 2019;**105**:1364–74.
- Nazir MS, Nicol ED. Cardiovascular CT: the role of cardiologists. *Heart* 2019;**105**:1375–6.