Letters to the Editor

More on right atrial mobile thrombi

In an issue of the journal, the problem of right atrial mobile thrombi (RAMT) was brought to the attention of readers by two renowned groups of cardiologists. It is amazing how little has changed in our understanding of the optimal treatment of this dramatic clinical entity since the first systematic attempt to approach this problem a decade ago. While the group from Aachen supports thrombolytic therapy as the treatment of choice, available evidence favours the colleagues from Uxbridge, that existing options (heparin, thrombolysis and surgery) were similarly effective. The strong and rather arbitrary criticism of the surgical approach to RAMT, expressed by the group from Aachen is in clear contrast with the recent report of Chapoutot et al. On the other hand, deaths were reported during thrombolytic therapy in RAMT, even among patients haemodynamically stable prior to its introduction.

Obviously the thrombus, if it is mobile and yet remains in the right atrium, must be anchored somewhere. In the majority of cases the shape of the thrombus leaves little doubt that we are dealing with a venous embolus in transit through the right heart chambers. Even if one is unable to visualize it, a fragment of RAMT is probably either caught in the patent foramen ovale or entangled in the chordae tendinae or Chiari network. Obviously this anchoring fragment is under mechanical strain and even without thrombolysis it does not hold for long, as evidenced by the high early fatal reembolization rate if RAMT are left untreated. Thus, thrombolysis should be expected to increase the risk of dislodgement of RAMT or its fragments to the pulmonary arteries. It may be that aggressive front loading or bolus rt-PA regimens used by the Aachen group keeps pulmonary resistance low, due to rapid lysis of intra-pulmonary thromboemboli. However, in view of the intra-cerebral haemorrhage in one of their four patients, this approach could not be considered superior to that reported earlier by others.

Unfortunately, data from randomized studies are neither available nor expected. This is probably why, despite the dramatic clinical picture and 2-5% prevalence among patients with pulmonary embolism, RAMT is not mentioned in the recent AHA Statement for Healthcare Professional Management of Deep Vein Thrombosis and Pulmonary Embolism. A few years ago, the RAMT Outcome Registry was created jointly by the members of the Working Groups on Pulmonary Circulation and Echocardiography of the European Society of Cardiology. The Registry aimed at prospective collection of homogeneous data regarding the appearance of right atrial mobile thrombi and also clinical and echocardiographic presentation and applied treatment. Since that time, over 70 cases have been reported to the Steering Committee. The design and early results, which should lead to further developments, were presented at the recent Congress of the European Society of Cardiology, mostly with the aim of attracting the interest of additional centres. Though not ideal, this way of collecting data on RAMT may result in more evidence-based conclusions and recommendations than those from short single-centre series which continue to be both controversial and non-comparable.

The Registry is open to all interested centres. Information on the Registry and CRFs are available through the Working Group on Pulmonary Circulation and Right Ventricular Function FAX +48-22-6597506, E-mail: torbicki@amwaw.edu.pl. Please head your communication 'RAMT Outcome Registry'.

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References

distal to a bifurcation. It is not only the aforementioned principle but also the law of minimum energy loss for the transport of blood through the coronary arterial tree which governs the vascular caliber downstream relative to that upstream of a bifurcation.3-4 According to this law, there is a decrease in the average cross-sectional area of the vessel (A_D) distal to the bifurcation of 2^{0.6}=1.588 which translates into an increase in total vascular area per bifurcation of 1.26. Note that the decrease in flow velocity from proximal to distal is approximately equal to the increase in total cross-sectional area per bifurcation which in accordance with the law of mass conservation.

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A_M = \frac{A_D}{2^{0.6}}
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Total cross-sectional area increase per bifurcation = 1.26
Proximal to distal velocity ratio per bifurcation = 1.25

**Figure 4** Diagram showing a schematic variation of vascular diameter (ϕ, in mm), cross-sectional area (CSA, in mm²), flow (Q, in ml. s⁻¹) and mean flow velocity (V, in cm. s⁻¹) from proximal to distal in coronary arteries. In the example, the division between the mother artery (A_M) and the daughter artery is symmetrical and obeys the principle of minimum viscous energy loss and of limited adaptive vascular shear stress^3,4. According to this law, there is a decrease in the average cross-sectional area of the vessel (A_D) distal to the bifurcation of 2^{0.6}=1.588 which translates into an increase in total vascular area per bifurcation of 1.26. Note that the decrease in flow velocity from proximal to distal is approximately equal to the increase in total cross-sectional area per bifurcation which is in accordance with the law of mass conservation.

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**References**


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**A reply**

Thank you for your appreciation of our efforts to illustrate the rationale of the different indices of stenosis severity based on intracoronary Doppler measurements.

Figure 4 was largely based on the findings of your experimental and clinical work, quoted as references [3] and [4] in your letter. As you suggest, the reader will certainly benefit from direct knowledge of these articles which, although not reporting intracoronary velocity measurements, explain why and how much flow velocity decreases along the arterial coronary tree. To convey this rather complex physiological concept, we thought that a scheme was easier to understand and we appreciate your criticisms and suggestions to make the drawing and legends more clear.

At the time this manuscript was written (December 1993) the proximal-to-distal velocity ratio was claimed to be the most specific velocity parameter of stenosis severity^41. The anatomical variations in the three main coronary arteries (multiple bifurcations in the left anterior descending coronary artery, fewer, occasionally very large branches originating often very proximal from the left circumflex artery, no major branching points along the trunk of the right coronary artery) greatly affect the usefulness of this index when used in a large unselected patient population. The results obtained in 300 patients in the multicentre trial DEBATE have shown that the proximal-to-distal velocity ratio has no correlation with angiographic measurements of stenosis severity before angioplasty and is not predictive of the short- and long-term clinical outcome after PTCA^42. In clinical