2 Fisher CM. The ascendancy of diastolic blood pressure over systolic. *Lancet* 1985; **14:** 1349–50.

Thrombus aspiration during percutaneous coronary intervention

Pieter Vlaar and colleagues' TAPAS study (June 7, p 1915)[1] is the first to suggest that thromboaspiration in patients with ST-elevation myocardial infarction (STEMI) has an effect on mortality. However, we would like to raise a cautionary note about a major limitation in the study's methods, which might have affected the results.

This study compared a strategy of aspiration plus direct stenting versus balloon predilatation followed by stenting. The use of balloon predilatation only in the control group, including patients with thrombosis in myocardial infarction (TIMI) grade 2 and 3 flow before percutaneous coronary intervention, is a flaw because previous studies have shown that direct stenting alone is superior to balloon predilatation followed by stenting in STEMI patients, irrespective of aspiration. Loubeyre and colleagues[2] showed that direct stenting decreases the rate of no-reflow and improves microvascular reperfusion compared with balloon predilatation followed by stenting. As confirmed by the TAPAS study,[3] these surrogates of flow are strong predictors of short-term and long-term clinical outcome. Therefore, whether the mortality differences between the two groups can be attributed solely to thromboaspiration remains unanswered since the difference in outcome could be explained by the differences in the rate of direct stenting.

Although we believe and have published on the fact that aspiration or thrombus removal is beneficial in the setting of STEMI,[4] we would like to emphasise that the results of the TAPAS study cannot be attributed to aspiration alone; a well designed, randomised study with equal use of direct stenting in both groups is warranted to determine the role of aspiration in the reduction of mortality in patients with STEMI.

We declare that we have no conflict of interest.

*L Bonello, A De Labriolle, D Steinberg, *R Waksman*
ron.waksman@medstar.net
Washington Hospital Center, 110 Irving Street NW, Suite 4B-1, Washington, DC 20010, USA

1 Vlaar PJ, Svilaas T, van der Horst IC, et al. Cardiac death and reinfarction after 1 year in the Thrombus Aspiration during Percutaneous coronary intervention in Acute myocardial infarction Study (TAPAS): a 1-year follow-up study. *Lancet* 2008; **371:** 1915–20.
2 Loubeyre C, Morice MC, Lefèvre T, Piéchaud JF, Louvard Y, Dumas P. A randomized comparison of direct stenting with conventional stent implantation in selected patients with acute myocardial infarction. *J Am Coll Cardiol* 2002; **39:** 15–21.
3 Svilaas T, Vlaar PJ, van der Horst IC, et al. Thrombus aspiration during primary percutaneous coronary intervention. *N Engl J Med* 2008; **358:** 557–67.
4 Javaid A, Sidiqi NH, Steinberg DH, et al. Adjunct thrombus aspiration reduces mortality in patients undergoing percutaneous coronary intervention for ST-elevation myocardial infarction with high-risk angiographic characteristics. *Am J Cardiol* 2008; **101:** 452–56.

Pieter Vlaar and colleagues[1] show that thrombus aspiration before percutaneous coronary intervention (PCI) improves the 1-year clinical outcomes in patients with ST-elevation myocardial infarction.

Distal blockage is known to induce microvascular obstruction—ie, the "no reflow" phenomenon and to result in suboptimum reperfusion. In addition to thrombus aspiration, upstream administration of a glycoprotein IIb/IIIa inhibitor, nicorandil treatment, ischaemic postconditioning after coronary stenting, and deployment of an embolic protection device are known to reduce microvascular obstruction.[2] Periprocedural glycoprotein IIb/IIIa inhibitors are particularly known to improve microvascular flow and reduce the infarct area after coronary occlusion and reperfusion.[3,4]

So treatment with glycoprotein IIb/IIIa inhibitors might be an important confounder in Vlaar and colleagues' analysis. In the Methods section (p 1916), Vlaar and colleagues mention that patients received a weight-adjusted glycoprotein IIb/IIIa inhibitor (abciximab) during the procedure unless contraindicated, but we could not see how many patients were thus treated in the conventional PCI group and the thrombus-aspiration group and whether there are any significant differences between groups. Could they provide these data?

We declare that we have no conflict of interest.

*Jaewon Oh, Namki Hong, *Seok-Min Kang*
smkang@yuhs.ac
Yonsei University College of Medicine, Seoul, South Korea

1 Vlaar PJ, Svilaas T, van der Horst IC, et al. Cardiac death and reinfarction after 1 year in the Thrombus Aspiration during Percutaneous coronary intervention in Acute myocardial infarction Study (TAPAS): a 1-year follow-up study. *Lancet* 2008; **371:** 1915–20.
2 Jaffe R, Charron T, Puley G, et al. Microvascular obstruction and the no-reflow phenomenon after percutaneous coronary intervention. *Circulation* 2008; **117:** 3152–56.
3 Montalescot G, Barragan P, Wittenberg O, et al. Platelet glycoprotein IIb/IIIa inhibition with coronary stenting for acute myocardial infarction. *N Engl J Med* 2001; **344:** 1895–903.
4 Kunichika H, Ben-Yehuda O, Lafitte S, et al. Effects of glycoprotein IIb/IIIa inhibition on microvascular flow after coronary reperfusion. A quantitative myocardial contrast echocardiography study. *J Am Coll Cardiol* 2004; **43:** 276–83.

Authors' reply

We appreciate Laurent Bonello and colleagues' comment with regard to the difference in direct stenting between the two treatment groups. This issue is often brought up when the results of TAPAS are discussed.

Our interventional strategy always starts with establishment of brisk antegrade flow in the infarct-related vessel (followed by intracoronary nitroglycerine) to allow selection and placement of a stent of appropriate length and diameter. In TAPAS, thrombus aspiration reduced the source of distal embolisation by removing atherothrombotic material exposed to the lumen. After aspiration, coronary flow was established in most patients. Consequently, balloon predilatation