

Editorial / Editöryal Yorum

Distal embolization during primary percutaneous coronary interventions

Primer perkütan koroner girişim sırasında distal embolizasyon

Kadriye Orta Kılıçkesmez, M.D.

Institute of Cardiology, Istanbul University, Istanbul

Primary percutaneous coronary intervention (p-PCI) significantly improves myocardial perfusion and survival after acute ST-segment elevation myocardial infarction (STEMI). However, despite the recent technical improvements in PCI, embolization of atherosclerotic and thrombotic material in the coronary circulation often occurs, as detected by coronary angiography. Angiographically visible distal embolization was defined as a filling defect with abrupt cutoff in the distal vessel of the culprit lesion at any stage during PCI without evidence of dissection, stenosis or vasospasm. This angiographically visible distal embolization of thrombus and plaque debris has been reported in 6% to 18% of patients with STEMI treated with PCI, and was associated with impairment of myocardial perfusion, impaired microvascular perfusion and poor outcome. Patients with distal embolization showed higher all-cause mortality and cardiac mortality rates than patients without distal embolization.^[1-4]

Previous studies have demonstrated that the presence of an intracoronary thrombus at the lesion site and plaque volume and composition are associated with distal embolization in patients with STEMI.^[3-5] Other studies showed that thrombus composition and size were associated with distal embolization, and large and erythrocyte-rich thrombi were associated with poor myocardial perfusion.^[4,6] Similarly, in a study^[7] published in 2013 in the Journal of the American College

of Cardiology (JACC): Cardiovascular Interventions, Yunoki et al. reported an association between pathological

characteristics of aspirated intracoronary thrombi and the incidence of distal embolization. Pathological analysis revealed that an erythrocyte-rich component in the aspirated thrombi was associated with the incidence of distal embolization. Moreover, glucose level on admission, larger vessel diameter and predilation were independent predictors for distal embolization.

The recent meta-analysis using aspiration thrombectomy devices has demonstrated that the use of these devices significantly reduced the incidence of distal embolization and improved myocardial perfusion and clinical outcome when compared with conventional PCI alone.^[8] The INFUSE-AMI (Intracoronary Abciximab and Aspiration Thrombectomy in Patients with Large Anterior Myocardial Infarction) Trial^[9] compared intracoronary bolus of abciximab versus no abciximab, and manual thrombus aspiration versus no aspiration. Intracoronary abciximab and manual thrombus aspiration further reduced infarct size and microvascular obstruction.

In this issue of Archives of the Turkish Society of Cardiology, Oduncu et al.^[10] presented predictors and long-term prognostic significance of angiographi-

Abbreviations:

PCI Percutaneous coronary intervention

STEMI ST-segment elevation myocardial infarction

Correspondence: Dr. Kadriye Orta Kılıçkesmez, İstanbul Üniversitesi, Kardiyoloji Enstitüsü, Haseki, İstanbul, Turkey.

Tel: +90 212 - 651 00 43 e-mail: kadriye11@yahoo.com

© 2013 Turkish Society of Cardiology



cally visible distal embolization during p-PCI. Distal embolization was found as 6.5% in that study. Their outcomes are in accordance with those of the recent relevant publications and meta-analyses. An important limitation of this study is the fact that thrombus aspiration was not performed routinely. The use of a mechanical device for thrombus removal to improve clinical outcomes and the efficacy of these devices have been tested in many clinical trials.^[11-14] In the 2013 American College of Cardiology/American Heart Association guidelines for the management of patients with STEMI, thrombus aspiration received a Class IIa, Level of Evidence: B recommendation.^[15] Based on the finding, if not anatomically contraindicated, an adjunctive manual thrombectomy device should be widely and routinely used in STEMI patients undergoing p-PCI. If more patients underwent thrombus aspiration, more information could be gleaned about which of the other related factors was more associated with distal embolization. Ideally, we would have liked to see a comparison of patients in whom thrombus aspiration was versus was not attempted.

In conclusion, technical developments in PCI and aspiration catheters used during PCI are among the treatment approaches in both the normalization of coronary flow and improvement in tissue perfusion. In the future, decreased distal embolization might be an effective target point for the prevention and treatment of myocardial infarction.

Conflict-of-interest issues regarding the authorship or article: None declared

REFERENCES

- Henriques JP, Zijlstra F, Ottervanger JP, de Boer MJ, van 't Hof AW, Hoorntje JC, et al. Incidence and clinical significance of distal embolization during primary angioplasty for acute myocardial infarction. *Eur Heart J* 2002;23:1112-7.
- Svilaas T, Vlaar PJ, van der Horst IC, Diercks GF, de Smet BJ, van den Heuvel AF, et al. Thrombus aspiration during primary percutaneous coronary intervention. *N Engl J Med* 2008;358:557-67.
- Napodano M, Ramondo A, Tarantini G, Peluso D, Compagno S, Fraccaro C, et al. Predictors and time-related impact of distal embolization during primary angioplasty. *Eur Heart J* 2009;30:305-13.
- Fokkema ML, Vlaar PJ, Svilaas T, Vogelzang M, Amo D, Diercks GF, et al. Incidence and clinical consequences of distal embolization on the coronary angiogram after percutaneous coronary intervention for ST-elevation myocardial infarction. *Eur Heart J* 2009;30:908-15.
- Kawaguchi R, Oshima S, Jingu M, Tsurugaya H, Toyama T, Hoshizaki H, et al. Usefulness of virtual histology intravascular ultrasound to predict distal embolization for ST-segment elevation myocardial infarction. *J Am Coll Cardiol* 2007;50:1641-6.
- Yunoki K, Naruko T, Sugioka K, Inaba M, Iwasa Y, Komatsu R, et al. Erythrocyte-rich thrombus aspirated from patients with ST-elevation myocardial infarction: association with oxidative stress and its impact on myocardial reperfusion. *Eur Heart J* 2012;33:1480-90.
- Yunoki K, Naruko T, Inoue T, Sugioka K, Inaba M, Iwasa Y, et al. Relationship of thrombus characteristics to the incidence of angiographically visible distal embolization in patients with ST-segment elevation myocardial infarction treated with thrombus aspiration. *JACC Cardiovasc Interv* 2013;6:377-85.
- Kumbhani DJ, Bavry AA, Desai MY, Bangalore S, Bhatt DL. Role of aspiration and mechanical thrombectomy in patients with acute myocardial infarction undergoing primary angioplasty: An updated meta-analysis of randomized trials. *J Am Coll Cardiol* 2013 May 8.
- Brener SJ, Maehara A, Dizon JM, Fahy M, Witzensbichler B, Parise H, et al. Relationship Between Myocardial Reperfusion, Infarct Size, and Mortality: The INFUSE-AMI (Intracoronary Abciximab and Aspiration Thrombectomy in Patients With Large Anterior Myocardial Infarction) Trial. *JACC Cardiovasc Interv* 2013;6:718-24.
- Oduncu V, Erkol A, Turan B, Akgün T, Karabay CY, Tanboga Hİ, et al. Predictors and long-term prognostic significance of angiographically visible distal embolization during primary percutaneous coronary intervention. *Arch Turk Soc Cardiol* 2013;41:486-96.
- Dudek D, Mielecki W, Burzotta F, Gasior M, Witkowski A, Horvath IG, et al. Thrombus aspiration followed by direct stenting: a novel strategy of primary percutaneous coronary intervention in ST-segment elevation myocardial infarction. Results of the Polish-Italian-Hungarian RAndomized ThrombEctomy Trial (PIHRATE Trial). *Am Heart J* 2010;160:966-72.
- Napodano M, Pasquetto G, Saccà S, Cernetti C, Scarabeo V, Pascotto P, et al. Intracoronary thrombectomy improves myocardial reperfusion in patients undergoing direct angioplasty for acute myocardial infarction. *J Am Coll Cardiol* 2003;42:1395-402.
- Ikari Y, Sakurada M, Kozuma K, Kawano S, Katsuki T, Kimura K, et al. Upfront thrombus aspiration in primary coronary intervention for patients with ST-segment elevation acute myocardial infarction: report of the VAMPIRE (VACuum aspiration thrombus REmoval) trial. *JACC Cardiovasc Interv* 2008;1:424-31.
- Kikkert WJ, Claessen BE, van Geloven N, Baan J Jr, Vis MM, Koch KT, et al. Adjunctive thrombus aspiration versus conventional percutaneous coronary intervention in ST-elevation myocardial infarction. *Catheter Cardiovasc Interv* 2013;81:922-9.
- O'Gara PT, Kushner FG, Ascheim DD, Casey DE Jr, Chung MK, de Lemos JA, et al. 2013 ACCF/AHA guideline for the management of ST-elevation myocardial infarction: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *Circulation* 2013;127:362-425.