



## Short Communication

## Evaluation of thrombotic left main coronary artery occlusions; old problem, different treatment approaches



Murat Akcay

Department of Cardiology, Faculty of Medicine, Ondokuz Mayıs University, Samsun, Turkey

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## ABSTRACT

Thrombotic left main coronary artery (LMCA) occlusions usually manifest as acute coronary syndrome (ACS) with cardiogenic shock, acute pulmonary edema, cardiac arrest, fatal arrhythmias or sudden cardiac death. There is no clinically predictor for LMCA thrombosis and no consensus regarding the optimal treatment. In the current literature, treatment options include emergency coronary artery bypass grafting (CABG), stent implantation, intracoronary thrombolysis, anticoagulation with heparin or glycoprotein IIb/IIIa inhibitors, thrombus aspiration as reperfusion strategies. Recently, successful results have been reported with low dose, slow infusion tPA for treatment of LMCA thrombus that allowing coronary flow. This regime may be a new treatment idea in only hemodynamically stable patients. Prospective studies and common consensus are needed about the low dose, slow infusion tPA treatment regime and optimal treatment for thrombotic LMCA obstructions.

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## 1. Introduction

Left main coronary artery (LMCA) occlusion is found in about 5–7% of patients undergoing coronary angiography.<sup>1</sup> Multivessel coronary artery disease accompanies in nearly 70% of these patients.<sup>1,2</sup> It usually manifests as acute coronary syndrome (ACS) with cardiogenic shock, cardiac arrest, acute pulmonary edema, sudden cardiac death or fatal arrhythmias.<sup>2–4</sup> The usual cause of LMCA and other coronary obstructions are arisen from atherosclerotic plaque rupture and subsequent thrombus formation.<sup>2</sup>

LMCA thrombus is a clinically rare event. It is triggered by a variety of pathologic causes including rupture of the fibrous capsule with release of thrombogenic components from the lipid core of the plaque. The incidence is estimated to be ~0.8% in acute coronary syndrome patients.<sup>3</sup> The occurrence of spontaneous thrombosis without atherosclerosis in the LMCA is particularly described in young patients.<sup>4,14</sup> Other causes are reported as embolism, persistent hypercoagulable state, cocaine use, aortic dissection, haematological or malignant disorders, vasculitis or vasospasm.<sup>1–6</sup>

Many clinic studies are shown coronary bypass grafting (CABG) as a gold standard method and superiority against medical treatment for treatment of LMCA atherosclerotic stenosis.<sup>1,7</sup> In the setting of ACS, percutaneous intervention of LMCA lesions can be performed with reliable results in selected patients.<sup>8,9</sup> Surgery

can be selected for stable patients with multi-vessel diseases and/or higher SYNTAX score.<sup>1</sup> Percutaneous coronary intervention (PCI) under intravascular ultrasound (IVUS) guidance is useful of assessment the vessel size, the extent and content of atherosclerotic plaque, adequate stent expansion or stent malapposition.<sup>1</sup> Also, IVUS is more sensitive than coronary angiography for assessment the intermediate lesions and distinguish thrombus from other pathologies in LMCA stenosis.<sup>1</sup>

But there is no consensus regarding the optimal treatment for LMCA thrombotic occlusions.<sup>2,3</sup> Patients with LMCA thrombus describe as a high risk subgroup of ACS patients. There is no clear definition in the angiographic imaging of LMCA thrombus. But commonly used the angiographic definition of intracoronary thrombus is intraluminal globular filling defects in different angiographic projections, haziness or a convex margin in presence of total occlusion.<sup>3</sup> There is no predictor for LMCA thrombosis clinically. There is no prospective study for the treatment modality choice.<sup>1–3</sup> In the current literature, treatment options include emergency CABG, stent implantation, intracoronary thrombolysis, anticoagulation with heparin or glycoprotein IIb/IIIa inhibitors, thrombus aspiration as reperfusion strategies.<sup>1–10</sup> The treatment choice of LMCA thrombus has been usually dependent on the acuity or severity of presentation and presence of urgent surgical back-up.<sup>3</sup> There is no clear guidelines describing the best approach to managing of this patients yet.<sup>2</sup>

Mortality rate was found high despite emergent or urgent CABG in patients with thrombotic LMCA obstructions who present with

E-mail address: [drmuratakay@hotmail.com](mailto:drmuratakay@hotmail.com) (M. Akcay).

ACS.<sup>2,7</sup> Although there is no study head-to-head comparison between PCI versus CABG, successful case reports have been reported with PCI.<sup>8,9</sup> Distal embolism or no/slow flow is well known as a complication of PCI for the treatment of thrombotic LMCA obstructions.<sup>2</sup> Hernandez et al.<sup>11</sup> reported successful primary PTCA and stenting, although distal embolization had occurred and TIMI-II flow was maintained. With the advances in PCI, some publications suggest the intracoronary thrombolysis for widespread thrombus in the LMCA.<sup>12</sup> Tissue plasminogen activator (tPA) and streptokinase, prolonged abciximab infusion with aspirin and heparin have been used effectively in individual cases with angiographic LMCA thrombus resolution.<sup>10,12,15,18</sup> Aspiration thrombectomy was used effectively in some cases.<sup>1,2</sup> Garcia et al.<sup>13</sup> reported a successful case with manual thrombectomy. Again, Otto et al.<sup>14</sup> reported a case they have treated mechanically with self-expanding trapping device after an unsuccessful attempt of thromboaspiration. Conversely, there are some reported cases in which catheter aspiration was unsuccessful.<sup>2,6</sup>

Aydin et al.<sup>15</sup> reported successful treatment with tPA in LMCA thrombus which allows flow. Karakoyun et al.<sup>16</sup> have reported prosthetic valve thrombosis (PVT) complicated with coronary embolism which were successfully treated with low dose, slow infusion intravenous tPA. Again Akcay et al.<sup>17</sup> reported successfully treatment with 25 mg tPA intravenous infusion for 6 h in a case which was refractory to antiaggregant treatment and resulted from atherosclerotic plaque rupture. As shown this case, low dose, slow infusion tPA regime may be new treatment approach for thrombotic LMCA occlusions that allow coronary flow and on hemodynamically stable patients. Previously, a low dose, slow infusion tPA treatment regime has been proven to be effective treatment for prosthetic valve thrombosis with TROIA and PROMETEE clinical trials.<sup>18,19</sup> We need new prospective clinical trials on the basis of this new idea for treatment of thrombotic LMCA occlusions.

The number of stable hemodynamic patients who present with ACS related with thrombotic LMCA is high in the literature.<sup>13–15,20</sup> Some of these patients have been followed with medical therapy, some have been given a gp 2b–3a inhibitor and some have undergone thrombus aspiration and percutaneous intervention.<sup>20</sup> A low dose, slow infusion tPA treatment regime may be more efficient alternative method instead of gp 2b–3a inhibitor under hemodynamic monitoring. Also in that patients, there is no atherosclerotic serious plaque lesion, distal flow is observed on angiography, but thrombus burden is high. As recommended by guidelines, urgent bypass surgery or PCI in selected cases are first treatment option for the patients who have tight atherosclerotic stenosis, unstable hemodynamic state or under support of the intra aortic balloon pump (IABP).

## 2. Conclusion

In conclusion, patients with LMCA thrombus represent a high risk subgroup of AMI patients that we can see catastrophic events in the clinic. It's treatment is emergency and of vital importance. There is no any consensus or optimal treatment method for treatment of thrombotic LMCA obstruction. A lot of cases reported in the literature that received urgent CABG, PCI, thrombus aspiration, thrombolytic therapy, aggressive anticoagulant and antiaggregant therapy. Recently, there are new case reports for

treatment of LMCA thrombus with successful results of low dose, slow infusion tPA treatment modality that has been proven to be effective in treatment of prosthetic valve thrombus previously. Our new opinion that low dose, slow infusion tPA regime may be new treatment approach for thrombotic LMCA occlusions that allow the coronary flow and hemodynamically stable patients. These patients may constitute a considerably limited group, but it may be an efficient minimally invasive treatment option in selected cases. Based on this new idea, we need new prospective clinical trials and common consensus about the optimal treatment for thrombotic LMCA obstructions.

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