

Primary left main coronary artery thrombus aspiration as a standalone treatment: sailing in uncharted waters

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Introduction

Left main coronary artery thrombosis (LMCAT) identified during coronary angiography is a rare and challenging condition. The following case report describes the use of the thrombus aspiration technique, as a lone therapy for LMCAT, in the setting of ST-segment elevation myocardial infarction (STEMI) and reviews current data regarding this therapeutic approach.

Case report

A 49-year-old patient, a heavy smoker with untreated dyslipidemia and no other apparent risk factors for coronary artery disease, was admitted to the emergency room with retrosternal burning chest pain. During physical examination the patient was symptomatic but hemodynamically stable, and ECG was consistent with acute STEMI. The bedside cardiac triplex revealed a left ventricle of normal dimensions with segmental akinesia of the apex and the apical anterior wall with a normal right ventricle. The existence of aortic aneurysm or dissection was also ruled out.

The patient was immediately transferred to the coronary unit for primary percutaneous coronary intervention (PCI). The examination was performed using a right transradial approach and revealed the presence of a mobile structure within the left main coronary artery (LMCA) that partially compromised the coronary flow in the left anterior descending and left circumflex arteries (LAD, LCX), while the right coronary artery (RCA) appeared normal (Figures 1 A, B). The LMCA angiographic finding resembled a thrombus; therefore manual aspiration was performed with a STENTYS aspiration catheter (Brage Medical, France), while the patient received concomitantly intravenous bivalirudin. After the guidewire apposition at the distal part of the LMCA, the aspiration catheter was guided to the proximal part of the thrombus and manual aspiration was performed at a rate of 1 ml per second using a lockable syringe

(Figure 1 C). After advancing the aspiration catheter several times through the thrombotic lesion the aspirated material was emptied to a filtered basket in order to isolate the thrombotic particles (Figure 2 A). Immediate reexamination of the LMCA revealed thrombus resolution and restoration of Thrombolysis in Myocardial Infarction (TIMI) flow III in both the LAD and LCX (Figure 2 B).

The patient was transferred to the coronary intensive care unit in an asymptomatic and hemodynamically stable condition, while ST elevation subsided after the thrombus resolution. Troponin I peak measurement was 16.588 ng/ml and during the following days presented a declining course. Bivalirudin administration was continued for 24 h.

Follow-up coronary angiography was performed 3 days later using intravascular ultrasound (IVUS), which revealed non-significant residual stenosis of the LMCA (20%) (Figure 2 C). On the seventh day the patient was discharged in an asymptomatic and hemodynamically stable condition. Thorough coagulation testing, which was performed a few weeks later, was negative. At 1- and 6-month follow-up the patient remained uneventful.

Discussion

Left main coronary artery thrombosis is a rare and life-threatening angiographic finding. Its incidence has been estimated as 0.8–1.7% among patients with STEMI [1–3]. Left main coronary artery thrombosis usually has a dramatic clinical presentation with cardiogenic shock or sudden cardiac death [2, 4]. The usual pathophysiological substrate of LMCAT is fibrous cup rupture of an atherosclerotic plaque followed by thrombus formation [2]. However, other predisposing factors include hypercoagulable state, post-partum state, embolization of intracardiac masses, cocaine-induced plaque rupture and vasospasm [2, 5].

The optimal management of LMCAT remains a challenging issue. According to current practice, thrombus as-

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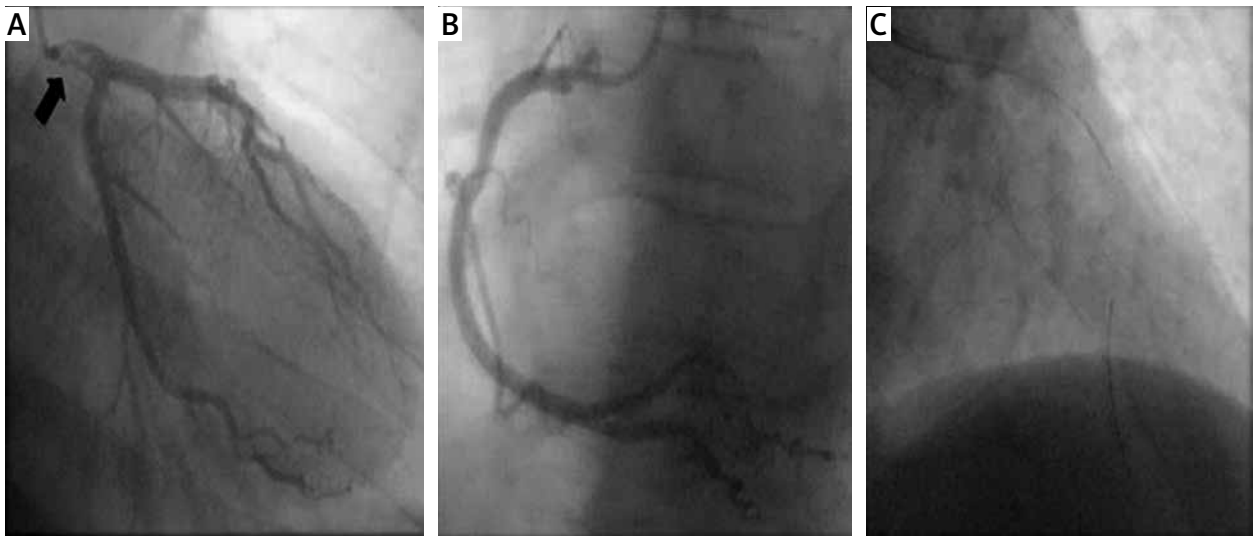


Figure 1. A – LMCA thrombus (black arrow), B – RCA appeared normal, C – thrombus aspiration catheter advancement

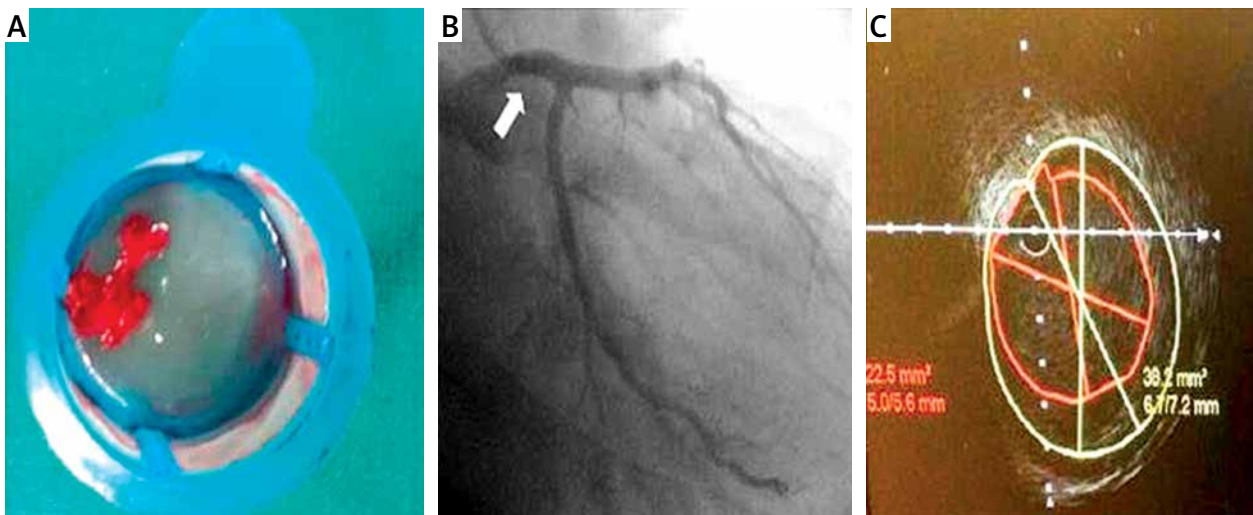


Figure 2. A – thrombotic material aspirated manually, B – LMCA after manual thrombus aspiration (white arrow), C – IVUS measurements revealed non-significant residual stenosis of the LMCA (20%)

piration is an adjuvant but not routine therapy during primary PCI as it prevents distal thrombus embolization and therefore facilitates epicardial and myocardial reperfusion (class IIB level of evidence A) [6]. The TASTE and TOTAL trials did not show a statistically significant benefit of thrombus aspiration over PCI alone regarding hard clinical endpoints such as recurrent myocardial infarction, cardiogenic shock and mortality. The TOTAL trial, however, managed to demonstrate an improvement of distal embolization when manual thrombectomy was performed [7, 8]. Additionally, rheolytic thrombectomy was associated with increased mortality and has been gradually abandoned [1, 9–11].

Despite the above data, a question still remains regarding the requisition of angioplasty in patients with only minor residual stenoses after complete removal of the thrombotic material. This consideration is further justified by the fact that stenting demands prolonged

dual antiplatelet therapy and may be complicated with distal embolization of thrombotic particles.

Manual thrombus aspiration in LMCAT has been previously described as a promising therapeutic technique, although data remain sparse [5, 12–14]. Maddoux *et al.* were the first to introduce the thrombus aspiration technique as a standalone treatment in a patient with LMCAT complicated with STEMI who followed an uneventful clinical course at 24-month follow-up [5]. Promising results from manual thrombus aspiration were also described by Bhindi *et al.* in a patient with LMCAT presenting as STEMI after CABG [12]. Hajek *et al.* also reported thrombus aspiration as a standalone therapeutic approach in a case of LMCAT manifesting as NSTEMI [13]. Finally, Udayakumaran *et al.* reported three STEMI patients with LMCAT that were successfully treated with lone thrombus aspiration and remained uneventful at 1-month follow-up [14] (Table I).

Table I. Left main coronary artery thrombosis treatment with thrombus aspiration as a lone treatment

Author's name	Cases	Thrombus aspiration technique	Angiographic result	Clinical outcome	Follow-up
Maddoux <i>et al.</i> [5] (1987)	1 patient with STEMI and LMCAT	#2 Fogarty catheter while preparing for CABG which was never done due to successful thrombus resolution	Good. Normal appearance and flow of the proximal left coronary system	Uneventful	24 months
Bhindi <i>et al.</i> [12] (2006)	1 patient with STEMI and LMCAT 48 h after CABG	6 Fr XB 3.5 guiding catheter (Cordis Corporation, Miami, USA)	The angiographic findings after thrombus aspiration were not clarified. The authors mention prompt improvement of ECG findings, symptoms and hemodynamic status after manual thrombectomy	Uneventful	6 months
Hajek <i>et al.</i> [13] (2009)	1 patient with NSTEMI and LMCAT	7 Fr Pronto V3 extraction catheter (Vascular Solutions Inc.)	Good. No residual thrombus or distal embolization	Uneventful	Not mentioned
Udayakumaran <i>et al.</i> [14] (2013)	3 patients with STEMI and LMCAT	7 Fr Export catheter (Medtronic) 7 Fr Thrombuster aspiration catheter (KARDIA – KANEKA)	Good. TIMI III flow in LAD and LCX with minimal or no residual LMCA stenosis	Uneventful	1 month

STEMI – ST-segment elevation myocardial infarction, NSTEMI – non-ST-segment elevation myocardial infarction, LMCAT – left main coronary artery thrombosis, TIMI – Thrombolysis in Myocardial Infarction, LAD – left anterior descending artery, CABG – coronary artery bypass grafting.

Hemodynamically stable patients without significant coronary stenoses may be treated conservatively using intravenous heparin, glycoprotein IIb/IIIa inhibitors as well as per os antiplatelets. Repeat coronary angiography 24 to 48 h later will reveal thrombus resolution or will determine the need for further intervention. Intravascular ultrasound may facilitate at this point revealing the remaining plaque burden [1, 11]. The use of bivalirudin in primary PCI has been associated with comparable mortality rates but fewer bleeding complications compared to heparin plus glycoprotein IIb/IIIa inhibitors, although it also correlated with increased risk of acute stent thrombosis [15]. According to the above, bivalirudin serves as an appealing pharmaceutical option in cases of coronary thrombosis not followed by significant atherosclerotic stenoses that require stent implantation. The possible advantageous role of bivalirudin in hemodynamically stable patients with LMCAT has not been investigated.

The present case report describes the therapeutic approach of LMCAT in a young patient with STEMI who was treated with manual aspiration thrombectomy as a standalone treatment, and according to our knowledge this is the first report of bivalirudin usage as an adjunctive treatment in this setting. Repeat coronary angiography and IVUS revealed a minor residual stenosis in the LMCA that justified the initial approach to avoid angioplasty. The patient's clinical course remains uneventful at 1- and 6-month follow-up. The present case report expands our current understanding regarding the optimal LMCAT therapeutic approach and suggests that manual aspiration thrombectomy is a safe and technically feasible standalone therapy in selected cases with no significant stenoses after thrombus resolution.

Conflict of interest

The authors declare no conflict of interest.

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