Mechanical Chest Compressions in a Patient with Left Main Closure During PCI

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History:
The patient was a 68 year old white male with a history of a myocardial infarction in 1996. The patient was otherwise healthy prior to this encounter and had no angina until the day of admission.

He was admitted directly to the Coronary Care Unit (CCU) following a 2 hour episode of chest pain. His ECG on admission showed ST-Depressions of 1 mm in leads V4 and V5. The patient became free of chest pain upon arrival to the CCU. Lab-tests showed a slightly elevated CKMB 22.4µg/L (ref <0.5) and Trop-T 0.10 µg/L (ref<0.03). 600mg clopidogrel, 300mg aspirin, and a full dose of enoxaparin (s.c.) were administered. Two hours later, the patient developed chest pain; and coronary angiography was performed.

Angiography:
1) A proximally occluded LCX artery (Figure 1).

2) The left main, LAD, and RCA contained no significant lesions.

It was decided to start the patient on abciximab and then perform a PCI on the LCX occlusion.

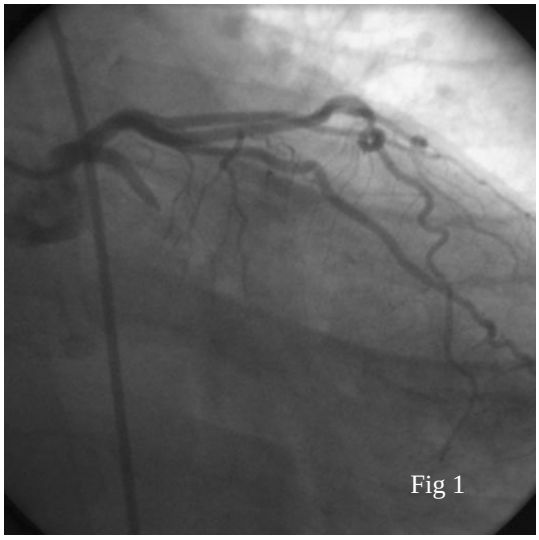
Fig 1

Procedure:

The LCX occlusion was successfully crossed with a Choice PT guidewire (Figure 2). The occlusion was predilated with a Maverick 2.0x20mm rapid exchange balloon. The occlusion in the first marginal branch seemed to be chronic. Several attempts to pass the guide wire into the first marginal branch failed. At the same time the patient developed inexplicable thrombi in the LM with embolization to the LAD and the LCX (Figure 3). Shortly thereafter the LM completely occluded with thrombi (Figure 4).

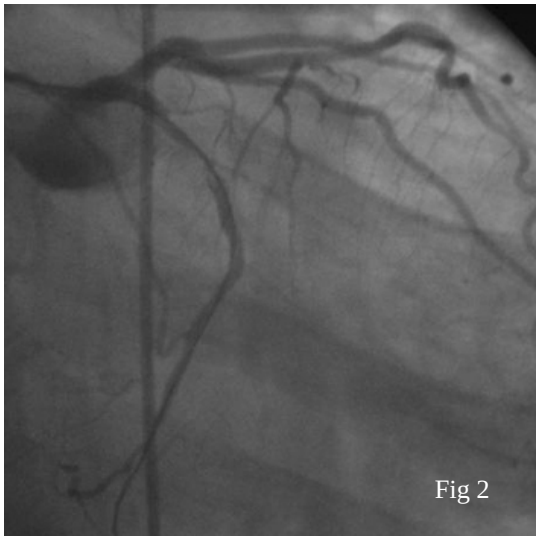
Fig 2

At this point in time, the patient experienced an episode of ventricular fibrillation (VF) and was twice defibrillated unsuccessfully. Manual compressions were started until a mechanical chest-compression device, which can be used during angiography and PCI, was applied (LUCAS-Lund University Cardiac Assist System, Jolife, Sweden) (Figure 5). Circulation was re-established with device despite on-going VF. Systolic blood-pressure varied between 75 and 85mmHg. The patient was given 300mg of cordarone, and it was decided to let the patient remain in VF with ongoing LUCAS support until the LM was reopened. The patient was then given 6000U of heparin through the guiding catheter.

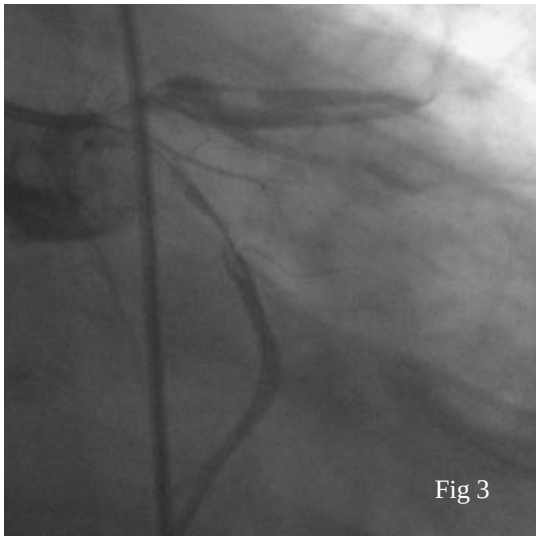
Fig 3


Fig 5

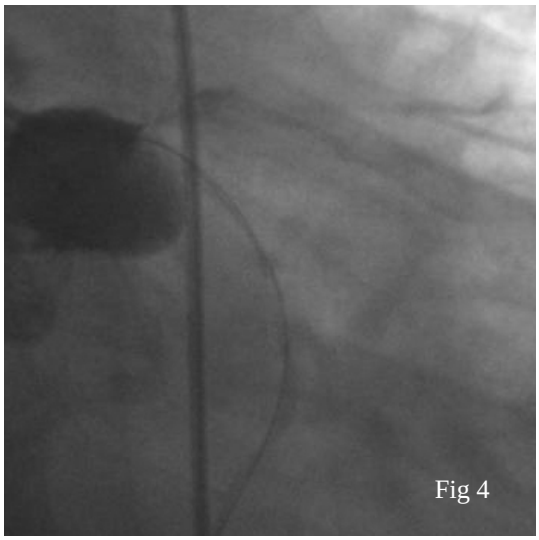
Fig 4

The LAD was wired with a Choice PT guidewire (Figure 6). The LAD was dilated with a Maverick 3.0x20mm rapid exchange balloon. The thrombi in the LM then slowly dissipated, and flow was re-established to the LAD and the LCX (Figure 7). There was no sign of a dissection in the LM. At this point, 20 minutes following initiation of LUCAS support and 25 minutes following onset of VF, the patient was defibrillated to sinus rhythm. Because of initial low systolic blood pressure (65mmHg systolic) LUCAS support was restarted and continued for another 10 minutes despite sinus rhythm. An intra aortic balloon pump (IABP) was then inserted, and LUCAS support was stopped when the patient reached a systolic blood pressure of 95 mmHg, at which time the pumping of the IABP was initiated.

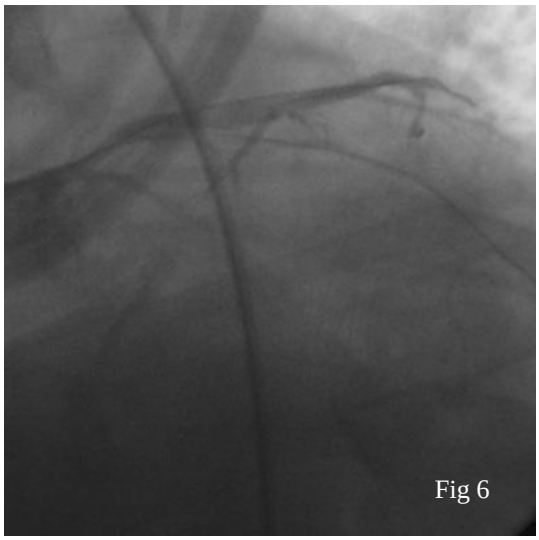
Fig 6

The LCX was then uneventfully stented with a Driver 3.0x15mm and a Driver 3.0x9mm (Figure 8). Much to our astonishment the patient then started to wake up and was actually extubated and able to communicate while still in the cath lab.

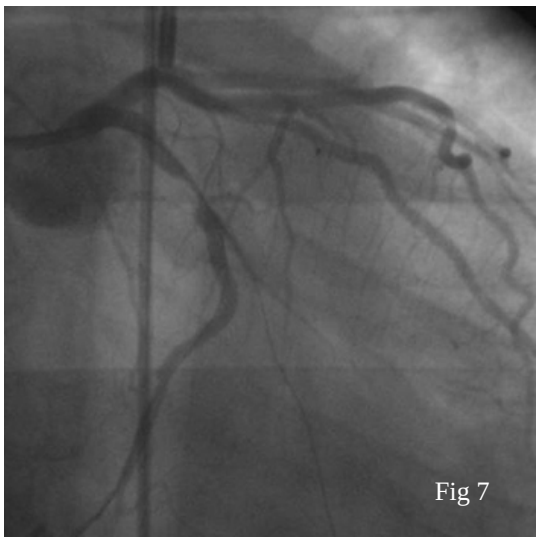
Fig 7

The next day the patient was fully awake. He had been in stable circulatory condition following his return to the CCU. On direct questioning, he admitted to somewhat of a musculoskeletal chest pain that he did not associate with angina. He was very happy to be alive and fully aware of what had taken place.

A photograph of the chest illustrates a mark left by the suction cup of LUCAS (Figure 9). Four weeks after the procedure, the patient was alive and doing well.

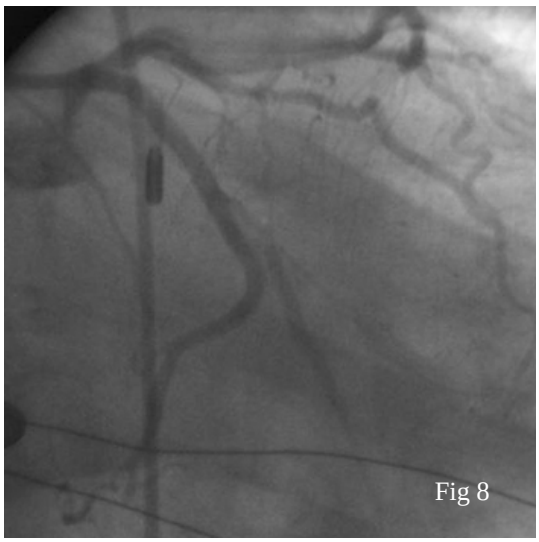
Fig 8

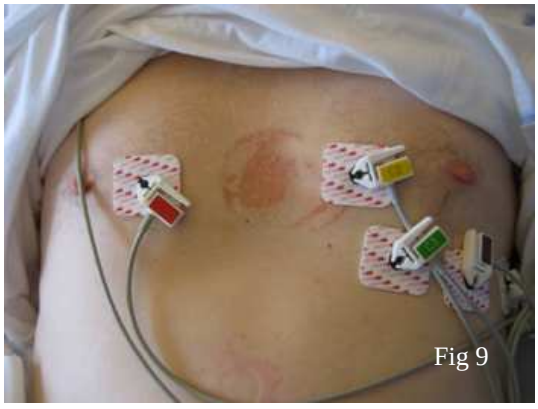
Fig 9

Conclusion:
1. Despite a total occlusion of the LM and concurrent VF, the patient's circulation could be maintained with the assistance of a mechanical chest-compression device for 20 minutes until the LM was opened and the patient defibrillated to sinus rhythm.
2. The patient incurred no neurological damage despite 25 minutes in VF.
3. The mechanical chest-compression device did not hinder continuation of the PCI procedure to reopen the LM.
4. The mood in the cath lab was calm at all times despite the ongoing VF since the patient's circulation was maintained with LUCAS. This is quite contrary to what usually happens in such situation when manual compressions are used.

Comments:
The mechanical chest compression device (LUCAS) can be a useful tool in the cath lab during situations of acute vessel closure causing cardiac arrest.

Conflict of Interest:
Lecture fees from Jolife AB, Sweden