

Case Report

Interventional Hypothermia and Primary Percutaneous Coronary Intervention in a Patient with Anterior Wall ST Elevation Myocardial Infarction and Aborted Sudden Death

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We present the case of a 38-year-old man who was successfully treated with interventional hypothermia and primary percutaneous coronary intervention after cardiac arrest and prolonged resuscitation, following an ST-segment elevation myocardial infarction.

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A 38-year-old man was admitted to our hospital from another hospital in the Athens region because of anterior wall ST-segment elevation myocardial infarction and primary ventricular fibrillation treated with defibrillation and intubation, due to prolonged resuscitation.

The patient was transferred from the Emergency Department to the Catheterisation Laboratory for a primary percutaneous coronary intervention (PCI). The coronary angiography performed showed total left anterior descending artery occlusion (Figure 1A), while the circumflex and the right coronary arteries were without significant stenoses. A bare metal stent, 3.0 mm x 18 mm, was implanted at the site of the occlusion with a favourable outcome (Figure 1B). The door-to-needle time was 30 minutes and the door-to-balloon 45 minutes.

The patient was then transferred to the Intensive Care Unit, where it was decided to induce interventional hypothermia, in view of the prolonged resuscitation performed. Hypothermia was ap-

plied using the Coolguard system (Alcius, Irvine CA, USA), using the Icy 8.5 Fr catheter (Alcius) placed in the inferior *vena cava* through the left femoral vein. The feasibility of providing hypothermia during PCI and a detailed description of the system were reported by Kandzari et al.¹ Midazolam and cistracurium were administered in order to keep the patient sedated and to control shivering. The patient's temperature was measured through an oesophageal thermometer and was lowered to 32°C for 24 hours, after which he was slowly rewarmed, at a rate of 0.2°C per hour, to a final temperature of 37°C. The sedation was then discontinued and the patient successfully completed the weaning procedure after 24 hours. He was hospitalised for another 8 days and was discharged with an ejection fraction of 45% and fully preserved mental status. Three months after the myocardial infarction the patient is in New York Heart Association functional class I, without any ventricular arrhythmias on consecutive 24-hour Holter recordings.

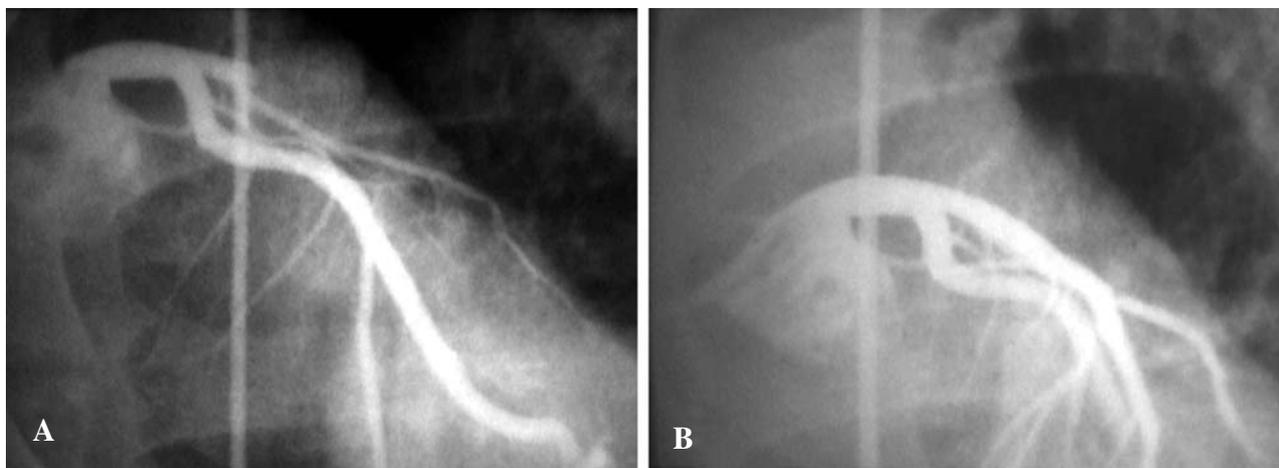


Figure 1. A: Angiography of the left coronary artery in the postero-anterior projection demonstrating total occlusion of the left anterior descending artery after the bifurcation of the first septal perforator branch. B: After percutaneous coronary intervention the blood flow is restored in the left anterior descending artery, with a good angiographic result.

Discussion

Primary PCI is considered a first line therapy in patients presenting with ST elevation myocardial infarction.² The favourable effect of mild hypothermia on the mental status of patients surviving an out-of-hospital cardiac arrest is well documented.^{3,4} It seems that hypothermia protects the brain of patients after cardiac arrest via many different pathways. It reduces cerebral oxygen demand, has a beneficial effect on destructive enzymic reactions, suppresses free radical reactions, protects the blood-brain barrier, reduces intracellular acidosis, and inhibits several neurotransmitters.⁵⁻¹¹ Although these results are very promising, there is a lack of evidence about the effect of the combination of primary PCI and hypothermia in patients with ST elevation myocardial infarction who have survived malignant ventricular arrhythmias.

Dixon et al¹² demonstrated that interventional hypothermia can be safely induced in patients with myocardial infarction treated with primary PCI, but they failed to demonstrate any reduction of infarct size. Another, ongoing study is trying to evaluate the effect of hypothermia on infarct size,¹³ but the results have not yet been published. Although there are no randomised trials attempting to evaluate the effect of hypothermia in survivors of malignant arrhythmias after myocardial infarction, Knafelj et al,¹⁴ in a retrospective, non-randomised study, recently demonstrated that patients with ST-segment elevation myocardial infarction who were treated with primary PCI and externally induced hypothermia with ice packs

had a better cerebral performance category on discharge than patients with normothermia.

It seems that the combination of primary PCI and hypothermia (interventional or external) is a safe and promising combination for the treatment of patients with myocardial infarction, ventricular arrhythmias and prolonged resuscitation, in order to protect their brain from ischaemic damage. Randomised trials are needed in order to fully evaluate the benefit to the patients, the optimal methodological approach, and the cost-benefit ratio, before this combination treatment may be provided to a large number of patients.

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