Case report - Coronary

Oxidized cellulose as the cause of an acute ischemic event after coronary revascularization

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Abstract
Absorbable topical hemostatic agents are commonly used in cardiac surgery. In this study, we report an unusual case of an acute ischemic event after coronary revascularization produced by interaction between oxidized cellulose and epsilon aminocaproic acid (EACA). An in vitro study was also performed to test the interaction between oxidized cellulose and EACA.

Keywords: Ischemic event; Oxidized cellulose; Coronary revascularization

1. Clinical summary

Postoperative bleeding is one of the most frequent complications in cardiac surgery [1]. Bleeding necessitating reoperation occurs in 4%–7% of patients after cardiopulmonary bypass (CPB) and 50%–70% of them will not have a surgical bleeding source. Fibrinolysis has been reported to be the cause of 25%–45% of postoperative bleeding [2] and the use of both systemic antifibrinolytic agents and absorbable topical hemostatic agents is commonplace during cardiac surgical procedures [3, 4]. The adverse effects after systemic use of antifibrinolytic agents is one of the reasons these agents are applied topically [5]. Until recently, there were no reports in the literature describing ischemic events produced by the interaction of oxidized cellulose with topical epsilon aminocaproic acid (EACA).

We report the case of a 79-year-old man with unstable angina who was referred to our department for surgical revascularization. The coronariography showed significant left main coronary artery and right coronary artery lesions. The patient had insulin-dependent diabetes and chronic obstructive lung disease. A routine coronary revascularization with left internal mammary artery to anterior descending and saphenous veins to right coronary artery and first marginal (OM) was performed under CPB. Oxidized cellulose was placed around the OM anastomotic suture because of a continuous oozing and before proceeding with the sternal closure the pericardial cavity was washed with 100 ml of saline solution containing 8 g of EACA. During the sternal closure, the patient experienced a severe hypotension with ST segment elevation in the posterior leads and ventricular fibrillation. Defibrillation was performed and because the ST modifications remained, the oxidized cellulose which had formed a solid and rigid shape, was removed. The ST elevation immediately disappeared. The subsequent intraoperative and postoperative course was uneventful.

An in vitro study was performed using three different doses of EACA (4, 8, 12 Gr). When the oxidized cellulose contacted the saline solution containing EACA, it rolled up immediately and it turned into a rigid shape (Fig. 1). A segment of the saphenous vein with a hemostatic clip at the distal end was gently distended and a piece of oxidized cellulose was placed around the vein. Then we placed the vein in a saline solution containing EACA and when the oxidized cellulose turned into the rigid shape, the vein became constricted (Fig. 2).

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Fig. 1. The rigid shape that the oxidized cellulose takes after contact with EACA. We show a control, unexposed piece for comparison.
Oxidized cellulose is a fabric material that is obtained by the oxidation of cotton gauze or other cellulose fabric using nitrous oxide to achieve oxidation. The oxidation reaction makes the material soluble at physiological conditions. Oxidized regenerated cellulose similar to oxidized cellulose, but natural cellulose is first dissolved and then extruded as a continuous fiber. The fabric made from the fiber is very uniform in chemical composition and its oxidation, therefore is more closely regulated. This uniform oxidation results in less variation in stability and absorbability of the material.

In our in vitro study, when the oxidized regenerated cellulose contacted with EACA, it turned a yellowish brown color and became gelatinous. However, when the oxidized cellulose contacted EACA, it rolled up immediately and turned into a rigid shape. Within a few days, most of the fibrous structure is gone.

The information presented in this report is the first case of adverse interactions between oxidized cellulose and topical EACA and we do not advise the use of this combination.

**References**


