EXPERIMENTAL MODEL OF ACUTE TRANSIENT CORONARY SPASM

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Myocardial ischemia is the most important pathogenetic stage of the majority of the severest heart diseases giving rise to cardiovascular failure. The most urgent problem in experimental cardiology is evidently to obtain models of different kinds of ischemic myocardial damage and, in particular, that developing on the basis of transient coronary spasm (TCS), for this may be a cause of myocardial infarction [5]. Acute coronary failure in most cases has been studied experimentally on a model of permanent occlusion of the coronary arteries by means of a ligature, followed by sacrifice of the animals at various times after ligation. It is on the basis of such models that the principal electrocardiographic criteria of myocardial infarction have been obtained. To reduce the degree of trauma to the coronary arterial wall, various versions of ligation have been suggested at different times [2, 4]. Meanwhile, attempts have been made to produce measured occulsion of the lumen of the coronary arteries [3].

The writers suggest a model of TCS which is sufficiently atraumatic and allows continuous monitoring of the volume of the blood flow in the coronary arteries distally to the site of occlusion.

In rabbits weighing 1.5-2 kg anesthetized with hexabarbital (40 mg/kg) thoractotomy was performed through division of the sternum, the pericardium was opened, after which a branch of the left descending coronary artery was ligated with Kapron (nylon-like synthetic fiber) tape from 10 to 15 μ thick. The Kapron tape was made beforehand by hot rolling of a filament the diameter of which was chosen so that, after rolling, the width of the tape would be about 1.5 mm (thickness 10 μ). After the Kapron ligature had been applied to the coronary artery a plastic plate with two holes of the type used in [1] was placed over it. One end of the tape was fixed in one hole in the plate, the other, which passed freely through the hole, could be drawn tight to the desired degree (Fig. 1).

To monitor changes in the volume of the blood flow in the coronary artery distally to the site of occlusion, specially prepared rheographic electrodes were placed around the artery; these consisted of four rings, coiled from silver-plated copper wire, insulated on one side with a thin (5-10 μ) layer of Kapron. The four wire rings were connected to the corresponding terminals of an RPG 2-02 rheoplethysmograph (Fig. 2).

Measured occlusion of the coronary arteries is produced by traction on the free end of the tape, under continuous monitoring of the volume of the blood flow by means of the differential rheogram.

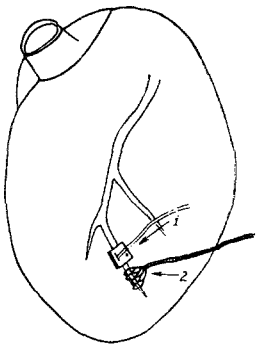

Fig. 1. Model of transient coronary spasm. 1) Mechanical occulsion of coronary artery by means of a tape and plastic plate; 2) rheographic electrodes consisting of metal wire rings.

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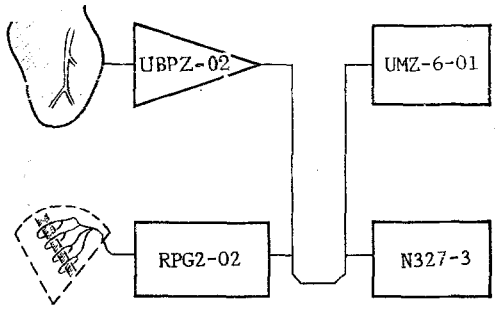

Fig. 2. Scheme of electrophysiological arrangement. 1) Biopotentials amplifier for recording ECG; 2) RPG 2-02 rheoplethysmograph; 3) UMZ-6-01 tape recorder; 4) N327-3 3-channel automatic writer.

The suggested method, by which the coronary artery can be repeatedly occluded for different periods of time and with different intervals between procedures, enables TCS to be identified electrocardiographically and can serve as the basis for fundamentally new models of ischemic myocardial damage resulting from TCS.

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