سامية محمد مصطفى

شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

سامية محمد مصطفى

شبكة المعلومات الجامعية

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التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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بالرسالة صفحات لم ترد بالأصل

EVALUATION OF THE ROLE OF BLOOD CARDIOPLEGIA IN MYOCARDIAL PROTECTION DURING OPEN HEART SURGERY

Thesis

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Contents

Introduction

Perioperative myocardial damage remains the most common cause of morbidity and death following technically successful cardiac operations. Despite major advances in the surgical correction of congenital and acquired cardiac diseases, many patients who don't survive the perioperative period show, at postmortem examination, varying combination of gross or histochemical myocardial necrosis, which is most severe in the subendocardial layer of the left or right ventricle. This necrosis may occur in the absence of any coronary obstruction and may affect the entire ventricular shell in patients with valvular and congenital heart disease, as well as areas of myocardium supplied by patent grafts following myocardial revascularization.[1]

Patients suffering from intraoperative myocardial damage may require inotropic drugs or balloon counterpulsation support in the post operative period and may go on to develop late myocardial fibrosis despite a seemingly "uneventful" postoperative convalescence. Such a damage is caused by an imbalance between myocardial energy supply and demand that reflects cumulative effects of unfavorable alterations in the supply-demand balance occurring before, during and after extracorporeal circulation. Understandably, the major emphasis of the surgeons has been and will remain directed toward events occurring during extracorporeal circulation, especially during the necessary period the heart must be arrested to provide a quiet, bloodless field during which the surgeon can work.

Anatomy of the coronary arteries

The anatomy of the coronary arteries is fascinating. Raymond Vieussus, a French anatomist, first described it in 1706.[2] As selective coronary angiography was first developed by Mason Sones in the mid-1960s,[3] interests and knowledge grew rapidly as did the number of anatomical classifications and nomenclature of the coronary arteries. However, no one classification is complete or entirely satisfactory. [1]

In general, these classifications follow three lines; the name of the artery, the origin of the artery and the course of the artery and its branches. The classification most commonly used today is the one proposed by the National Heart, Lung and Blood Institute for the Coronary Artery Surgery Study (CASS).[4]

The right coronary artery (RCA):

It arises from the anterior (right coronary) aortic sinus. Its ostium is located in the middle of the sinus at a point level with the free edge of the aortic leaflets.[5] The right coronary ostia may be, however, located above the corresponding sinus in the tubular portion of the aorta in about 8 % of cases. [6] The RCA at first passes anteriorly and to the right between the right auricular appendage and the main pulmonary artery. Then it descends in the atrioventricular sulcus into the right (acute) cardiac margin, curving around it into the posterior part of the sulcus, where it approaches the crux of the heart, an ill-defined area of the heart where all four chambers are in apposition. In about 60 %, the RCA reaches the crux and terminates some little distance to its left by variable anastomoses with the circumflex artery, a branch of the LCA. In about 10 % of individuals, the RCA ends near the acute border of the heart or between it and the crux in another 10 %. More often, in about 20 %, it may reach the left border replacing part of the circumflex artery.[3]

Branches of the RCA supply the right atrium and ventricle and variably parts of the left chambers and atrioventricular septum. It's first branch, the conus artery, ramifies anteriorly on the lowest part of the pulmonary conus and upper part of the right ventricle. It anastomoses with a similar branch of the LCA forming the "annulus of Vieussens" around the pulmonary trunk. This conus artery may arise separately from the anterior aortic sinus in 36 % of individuals.[7]

Anterior atrial and ventricular branches divert from the anterior segment of the RCA, extending from its origin to the right margin of the heart. The right anterior ventricular branches are usually 2 or 3 in

number, branch towards the cardiac apex, which they rarely reach, unless the right marginal artery, the most distal one, is included in them. When the right marginal artery is very large, the anterior right ventricular branches may be reduced to one or even may become absent. The right anterior atrial branches are occasionally double, very rarely triple and supply chiefly the right atrium. The right posterior ventricular branches are usually two in number and supply the diaphragmatic aspect of the right ventricle. As with the anterior branches, their size is reciprocal with that of the right marginal artery. They may be completely absent. As the RCA approaches the crux, it produces 1 to 3 posterior interventricular branches, but only one run in the posterior interventricular sulcus. This is the posterior interventricular artery, or posterior right descending artery (PDA), as it does not follow the septum with enough regularity to be called the posterior interventricular artery. It is single in about 70 %, otherwise accompanied by parallel right coronary branches to the right or left or on both sides of the sulcus. In about 25 % it does reach the apex and in another 25 % it reaches midportion between the apex and the base.[7] It is replaced in about 10 % of the individuals by a left coronary branch. The right posterior atrial branch is usually single and is distributed to the right and left atria, but in about 40 % or more a left posterior atrial branch of the right coronary exists.

The artery to the sinuatrial node may arise from the right coronary artery, though it arises from the LCA in about 35 % of individuals.[3] It commonly arises from its anterior segment, less commonly from its lateral (right) part and least of all from its posterior atrioventricular part. It then passes back in the sulcus between the right auricular appendage and the aorta, and then it branches around the superior vena cava's base,

commonly as an atrial loop, from which branches pass to supply the right atrium.

Right coronary septal branches are relatively short, leaving its posterior interventricular branch to supply the posterior part of the interventricular septum. They are numerous, but usually don't reach the apical parts of the septum. The largest posterior septal artery is usually the first one and is commonly from the inverted loop, said to characterize the RCA at the crux and usually supplies the atrioventricular node in about 80 % of hearts.[3]

Often a collateral branch of the RCA (right atrial branch) joins the main RCA via the atrioventricular (A-V) node artery and creates an arterial cross (crux) with the main RCA horizontally and the PDA vertically. This some times arises from a LCA (left atrial branch or Kugel's artery). The artery to the anatomical crux, according to the CASS classification is the horizontal segment located between the PDA and the first posterolateral branch of the RCA.