Case Report

The Use of Retrograde Cerebral Perfusion in a Patient with Acute Ascending Aortic Dissection Following Elective Coronary Bypass Surgery: A Case Report.

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ABSTRACT

A 74 year old male patient presented with congestive heart failure and significant multivessel coronary artery disease. Following successful coronary artery bypass surgery, the patient developed an acute dissection of the ascending aorta. The patient was placed back on cardiopulmonary bypass and deep hypothermic circulatory arrest was instituted while the ascending aortic dissection was repaired. In an attempt to preserve brain tissue and decrease cerebral edema during hypothermic arrest, a modified form of retrograde cerebral perfusion was used. The patient tolerated the procedure and was weaned from cardiopulmonary bypass with the help of an intraaortic balloon pump. On the second postoperative day, the patient woke up and responded appropriately to verbal commands.

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INTRODUCTION

Cerebral protection during cardiac surgery with deep hypothermic circulatory arrest remains a challenge to the cardiac surgical team. Deep hypothermic circulatory arrest without retrograde cerebral perfusion and isolated partial cerebral antegrade perfusion is a technique that is commonly used but has many risks associated with it. (1-3). While deep hypothermic circulatory arrest provides a dry surgical field, cerebral preservation must be of prime concern. Canine studies have demonstrated that neurological compromise may appear if the cerebral ischemic period exceeds 60 minutes. (4). When retrograde cerebral perfusion is added to conventional hypothermic circulatory arrest, the risks of cerebral injury and embolization of air and particulate should decrease.

CASE REPORT

A 74 year old male patient presented with congestive heart failure and multivessel coronary artery disease. The patient was scheduled for elective coronary bypass surgery. The cardiopulmonary bypass circuit was prepared using a roller pump, a membrane oxygenator, a 4:1 blood cardioplegia system, a 40 micron arterial line filter, a custom tubing pack which included a 3/8 inch arterial roller head tubing, 3/8 inch arterial tubing and 1/2 inch venous tubing, and an in-line blood gas monitor. The patient was heparinized with 300 IU/kg of beef lung heparin. The patient was then cannulated using a 24 fr. arterial cannula and a 51:36 venous cannula. The patient was then placed on cardiopulmonary bypass in the usual fashion and the heart was arrested using a high potassium blood cardioplegic solution via both antegrade and retrograde delivery. During the cross clamp period the patient received low potassium retrograde cardioplegia in order to maintain cardiac arrest. The patient received five bypass grafts including four vein grafts and a left internal mammary. After completion of the operation, the patient was weaned from cardiopulmonary bypass without difficulty. The patient required no inotropic support and was in normal sinus rhythm. Protamine was administered by the anesthesiologist and hemostasis was achieved. The total cardiopulmonary bypass time was 192 minutes. The patient was transported to the intensive care unit in stable condition. The patient woke up on the second postoperative day and was responding to verbal commands.

DISCUSSION

Profound hypothermic circulatory arrest has been widely used in surgeries which involve the aorta and great vessels. A safe period of cerebral arrest in humans has not yet been clearly defined. Although many patients survive hypothermic circulatory arrest, there is a risk of neurologic compromise when these techniques are employed.

Retrograde cerebral perfusion techniques have been used since the early 1980's. In 1980, Mills and Oschner documented the effectiveness of retrograde cerebral perfusion with hypothermia in the management of massive air embolism during cardiopulmonary bypass. (5).

Diffuse injury to the brain has been attributed to hypothermic circulatory arrest and may be the result of nonuniform cooling or embolization of air or microparticles. When retrograde...
cerebral perfusion is added to the technique of hypothermic circulatory arrest, the safe time limits of the surgery may be extended and many of the associated risks may be decreased.

REFERENCES