Perfusion Technique during Aortic arch Aneurysmectomy

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Aortic arch aneurysms have always been difficult cases to perfuse. Most reports describe the use of several pump heads to perfuse different arterial trees. (1,2,3) A technique described by Pearce, (4) uses one arterial pump head to perfuse all necessary arterial branches (Fig. 1). This case report emphasizes this technique for resection of a distal arch aneurysm.

A 74 kg, 56 year old male experienced chest pain described as "tearing" in nature and radiating to the back. An EKG showed no signs of myocardial ischemia or infarction. A chest roentgenogram revealed evidence of a large mediastinal mass and left pleural effusion. Thoracentesis yielded bloody transudate, and the diagnosis of dissecting thoracic aneurysm was made. Treatment consisted of bed rest, antihypertensive medication, and on discharge an appointment for re-admission to undergo elective resection.

During the operative procedure, arterial pressures were monitored via catheters placed in the left and right temporal arteries. The SVC and IVC were cannulated using two #32 French argyl catheters for venous drainage. The pump was primed with 2,500 ml Isolyte-S, 75 gm salt-poor albumin, 25 gm dextrose, 20 units insulin, 2 gm staphcillin, and 1000 units heparin.

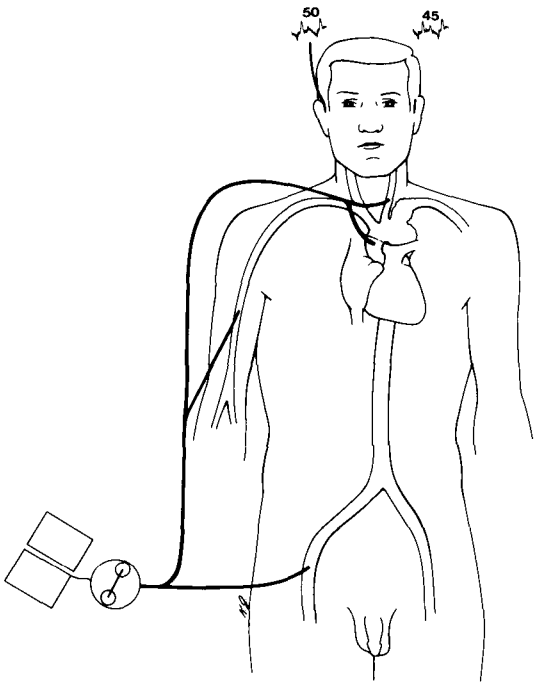

Fig. 1 Schematic of arterial perfusion system and cannulation sites.

A "Y" connector was placed in the arterial line immediately after one-half inch silastic tubing placed through the pump head. This allowed two arterial lines, one to the femoral artery and a second to the upper half of the body, coming from a single pump head. To the second arterial line, two more "Y" connectors were placed close to the surgeon so that if need be, three cannulas could be placed into the arterial system of the upper part of the body. A "C" clamp was placed on the femoral line allowing for regulation of flow to the head.

The patient was cooled to 25° C via the femoral arterial cannula. While on partial bypass, a temperature of 25° C was maintained for approximately ten minutes to assure a low temperature gradient. The patient's flow was maintained at a cardiac index of 1.6 to 1.9 liters per minute per Meter^2. The right brachial artery was cannulated with a #18 French arterial cannula, and the left common carotid with a #26 French right angle cannula.

As the procedure progressed, cross clamps were placed on the descending aorta, left subclavian, left proximal carotid and innominate arteries. After 75 minutes of anoxic time a #24 French cannula was placed in the aortic root proximal to an aortic cross-clamp for coronary perfusion.

Initial arterial pressures were 60 mm Hg in the right temporal artery and 50 mm Hg in the left temporal artery. After initiating coronary perfusion, the temporal pressure fell to 45 mm Hg in the right, and 35 mm Hg in the left. After the proximal anastomosis and distal anastomosis were completed, the ascending aortic and left carotid cross-clamps were removed. The temporal artery pressures rose to 66 mm Hg on the right and 55 mm Hg on the left. While left subclavian artery continuity was being performed the patient was warmed to 30° C. The brachial artery cannula was then removed, the patient rewarmed to 34° C and cardiopulmonary bypass slowly discontinued.

The heat exchanger in the Bentley Oxygenator was utilized and found to be sufficient. Ice water to cool and wall water to rewarm the patient completed the protocol.

Total bypass time was 3 hours and 54 minutes. Additional volume added during bypass was: 1,100 ml Isolyte-S, 1,500 ml blood, 40,500 units heparin, 6.5 gm Mannitol, 40 mg Lasix, 75 mg Chlorpromazine.

Tham was used as a pH buffer. Total urinary output on bypass was 325 ml. Blood gases and electrolytes were maintained at normal levels throughout the procedure. Patient perfusion was simplified utilizing the one arterial pump head for total body perfusion. After five months the patient is home, doing well and has had no major post-operative complications.

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