CASE REPORT

Use of the Bio-Medicus™ Pump in Conjunction with the Argyle Gott™ TDMAC Shunt During Repair of an Atherosclerotic Aneurysm of the Descending Thoracic Aorta

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Abstract

A Bio-Medicus™ pump with a model 600 cone and flow probe was used in combination with an Argyle Gott™ TDMAC shunt on a patient suffering from an atherosclerotic aneurysm of the descending thoracic aorta. After a simple set-up and priming procedure with Normosol™ R (pH 7.4), the circuit was connected to the patient and partial bypass was initiated. Perfusion flows were maintained at approximately 1.2 liters/min/M². Activated clotting times were maintained at 150–250 seconds.

Upon completion of the surgical procedure, partial bypass was terminated with no difficulty to the patient. There was no evidence of fibrin formation in the circuit. Post-bypass and post-operative courses were uneventful. Because of the ease of set-up and increased flexibility of controlling flow rates through the shunt, we recommend consideration of this technique for repairs of descending thoracic aortic aneurysms.

Methods and Materials

The circuit was prepared by incorporating three (3) feet of ¼" I.D. × ½" wall thickness PVC tubing on each end of a model 600 Bio-Medicus™ cone. ¼" × ¼" connectors with luer-lock fittings were placed about one (1) inch from each port of the cone to either add fluid or remove air bubbles from the system. A Bio-Medicus™ flow probe was inserted into the distal tubing just after the distal ¼" connector.

Priming the circuit was performed by filling a Bentley venous reservoir with one liter of Normosal-R™ pH 7.4. Vacuum was applied to the cone by clamping the tubing.
near the outlet of the reservoir and the tubing just distal to the cone and aspirating the air from the proximal tubing, thereby creating negative pressure in the tubing. After removing the clamp from the proximal tubing, and maintaining the cone at a level lower than the reservoir, priming fluid was syphoned from the reservoir to the cone where, once full, any small bubbles still in the cone were evacuated via the %" connector near the outlet port of the cone. Once this was achieved, the Bio-Medicus™ pump was turned on a low flow, removing the distal clamp, and priming fluid filled the rest of the distal tubing up to and including the reservoir. Once all air was removed from the system and the flow probe was calibrated and zeroed according to proper procedure, the circuit was ready for use.

After heparinizing the patient with 10,000 units of beef lung heparin, a 9 mm Gott™ TDMAC shunt was cut into two equal parts. The thoracic aorta just proximal to the aneurysm was cannulated with one-half of the shunt and the thoracic aorta just distal to the aneurysm was cannulated with the other half of the shunt. The primed cannulae were then connected to the extracorporeal circuit with Y% × Y% connectors with luer-lock fittings.

Results

After making certain that no air was either in the cannulae or the tubing, partial bypass was initiated. Activated clotting times, as measured by the Haemochron™ 400®, were maintained between 150 and 250 seconds. Flow rates were calculated at 1.2 liters/min/M², or approximately one-half normal flow, and were maintained at these calculations. Normothermia was maintained throughout the partial bypass period. Systemic arterial pressure was monitored both above and below the repair site and the pressure difference never exceeded 20 torr. After the section of the aneurysm was replaced with a tubular dacron graft, partial bypass was terminated. Bypass time was 55 minutes. A protamine dose was determined with a Hemotec Hepcon A-10™ heparin analyzer and the heparin reversed. The rest of the operation was uneventful and the patient left the operating room with all vital signs within normal limits. The postoperative period was also uneventful.

Discussion

This technique of incorporating a Bio-Medicus™ pump with a Gott™ TDMAC shunt provided us with more concise control of the flow through the shunt during repair of an aneurysm of the descending thoracic aorta. The flow probe incorporated into the circuit allowed accurate determination of the flow and the Bio-Medicus™ pump allowed provision for improving that flow beyond what is normally available with just the shunt. With the TDMAC-heparin bonded shunt, and maintaining the ACTs between 150 and 250 seconds, we saw no evidence of fibrin formation. In similar situations, we recommend consideration of this technique during repairs of descending thoracic aortic aneurysms (2,3).

References