Operative Report

Patient: Gordon Conwell, III, (058079039) 37002086
Date of Encounter: 7/10/2009
Completed By: Joseph E. Bavaria, M.D.
Referring Physician: David Rodgers, M.D., F.A.C.C.
Referring Physician: Julie Warman, M.D.

Facility: Hospital of the University of Pennsylvania
PRE OPERATIVE DIAGNOSIS:
5.3cm Ascending Aorta Aneurysm with Proximal Aortic Arch Extension (4.0cm Arch)
Bicuspid Aortic Valve
Severe Aortic Valve Insufficiency (+4)
LVEDD=5.7cm

POST OPERATIVE DIAGNOSIS:
Same. TEE: Severe Eccentric +4 Aortic Valve Insufficiency; Cath: Clear Coronaries

PROCEDURE:

1) **Transverse Aortic Arch Graft - #26mm ("Aggressive" Hemi-Arch) Using Deep Hypothermic Circulatory Arrest with HCA/RCP (CPT: 33870)**
2) **Ascending Aortic Aneurysm Repair with Dacron Graft #28mm (CPT: 33860)**
3) **Aortic Valve Replacement - #25mm CE Pericardial Magna Valve (Supra-Annular Placement) (CPT:33405)**

TIMES:
Cardiopulmonary bypass: 193 minutes
Total ischemic time: 163 minutes
HCA/RCP: 28 minutes

SURGEONS:
Joseph E. Bavaria, M.D., 1st Attending (surgeon)
J. Henle, M.D., CT Fellow

ANESTHESIOLOGIST
W. Vernick, M.D.

RISK STRATIFICATION:
Pre Operative Risk Evaluation:
I estimated an overall perioperative mortality rate of approximately 3-5% and a CVA/stroke risk of 1-2% for this 40-year-old patient. The patient understands the full risks and benefits of Total Proximal Thoracic Aortic Root Ascending/Arch Aneurysm surgery as well as Aortic Valve surgery.

This is a 40-year-old man who is in generally excellent health. He was noted at the age of 15 to have an aortic valve problem. He's unclear how or why this was discovered back then.

He had little to no follow-up until the last couple years. He's known to have a Bicuspid Aortic Valve. He's been progressively more short of breath over the last 6 months. He is normally very active athletically though has noted himself fatiguing more easily of late. His recent evaluation again identifies his Bicuspid Aortic Valve now with severe AI and a 5.3cm ascending aortic aneurysm.

After a long discussion, the decision was made to proceed with High Risk Cardio-Aortic Surgery. The patient understood and agreed to the risks involved, especially aware of CVA/Stroke risk associated with this surgery.

Surgical Priority:
Elective

ASA Class: 3

NYHA: II

PREPARATION:

It should be noted that this operation was done under continuous TEE and EEG monitoring. The patient was taken to the operating room and placed on the operating room table in a supine position. A Swan-Ganz catheter was placed via the right internal jugular vein and a right radial artery line was placed. The neck, chest, abdomen and legs were prepped with Betadine and draped in the usual aseptic fashion. A median sternotomy was performed and the heart was suspended in a pericardial cradle. The patient was systemically heparinized.

INDICATIONS:

Class II New York Heart Association Classification
Transverse Aortic Arch Graft (HemiArch) Indications:
5.3cm Ascending/Proximal Arch Aneurysm (4.0cm Arch). A VERY aggressive HemiArch was done under HCA and RCP. He had a significant aneurysm of his Ascending and into the Arch.
Ascending Aortic Aneurysm Repair with Graft Indications:
Replacement of the aortic valve and ascending aorta with a #28mm graft. There was significant aneurysmal disease of the Ascending Aorta and Arch. It was easily identified. The distal (Hemi-Arch) anastomosis was done under HCA/RCP. The Aortic Valve was inspected and found to be bicuspid.
Aortic Valve Indications:
Clinical symptoms: congestive heart failure.
Hemodynamic indications:
Bicuspid Aortic Valve
Severe Aortic Valve Insufficiency (+4)
LVEDD=5.7cm

FINDINGS:

Transverse Aortic Arch Graft (HemiArch) Findings:
Small Descending Thoracic Aneurysm; IMH
Ascending Aortic Aneurysm Repair with Graft Indications:
Same
Aortic Valve Findings:
The ascending aorta revealed near 53mm size. The sinotubular junction revealed 33mm size. The aortic valve annulus revealed 24mm size. The aortic valve leaflet morphology was bicuspid.

CPB AND PROTECTION DETAIL:

Myocardial temperature fell to 10 degrees centigrade. The heart was also cooled with topical iced saline. An additional # 26 Fr. SVC cannula was placed for eventual retrograde Cerebral perfusion administration for open Arch Reconstruction. Caval tape was placed.

CARDIOPULMONARY BYPASS:

Using digital palpation, TEE and trans-esophageal echocardiography, the ascending aorta was carefully evaluated. Venous cannulation was accomplished using a(n) right atrium location with a two-stage cannula. Profound Deep systemic hypothermia was used. The lowest systemic temperature was approximately 15 degrees Centigrade. The following vents were used for cardioplegia delivery or cardiac decompression: aortic root and right superior pulmonary vein. After completion of the Aortic Arch anastomosis and reconstruction, the Arch Dacron graft was cannulated with Standard Antegrade graft cannulation technique.

MYOCARDIAL PROTECTION:

Aortic occlusion was performed using single clamp. Cardioplegia was antegrade and retrograde delivered through the coronary sinus and direct ostial. Induction was performed using continuous cold cardioplegia. Induction was performed with cold blood/crystalloid solution and high potassium. Maintenance was performed with cold blood/crystalloid solution and low potassium. Quality of myocardial protection was excellent.

OPERATIVE TECHNIQUE:

Technical Details of the Transverse Aortic Arch Graft ("Aggressive" HemiArch):
After completion of profound cooling and flatline EEG, the circulation was stopped and retrograde cerebral perfusion (RCP) was initiated with a target CVP of approximately 25mmHg at an inflow temperature of 12 degrees centigrade in a slight Trendelenburg position. This allowed for a flow rate of approximately 150-300cc per minute. The aortic clamps were removed and the aortic arch was opened. Dark black blood was seen emanating from the brachiocephalic orifices very nicely. The entire Arch of the Aorta was easy to identify and aneurysmal aortic tissue was resected as distally as possible. A #26mm Dacron Graft was then used to reconstruct the aortic Arch in an aggressive "Hemi-Arch" fashion. Utilizing a 4-0 BB running continuous suture, the arch reconstruction was performed with sutures placed literally into the orifices of the brachiocephalic vessels. Patch 4-0 BB sutures were placed as necessary to ensure a hemostatic arch reconstruction. At completion of both the posterior and anterior suture lines, the Aorta and graft were allowed to fill via retrograde cerebral perfusion with dark blood to deair the complete cerebral vessels and cardiovascular system. This also acted as a method to flush any embolic debris from the cerebral circulation. At this point, the clamp was placed on the graft just proximal to the Arch anastomosis, and the Dacron Ascending/Arch graft was cannulated directly with a tapered cannula. Antegrade graft perfusion and cardiopulmonary bypass was then restarted after 28 minutes of HCA/RCP. The aortic arch anastomosis was then pressurized and checked and found to be very satisfactory. This was a diseased, aneurysmal, and a classic proximal, and very thin, aortic aneurysm associated with Bicuspid Aortic Valve Syndrome.
Technical Details of the Ascending Aortic Aneurysm Repair with Graft:
The ascending aorta was opened and the incision was carried down to the right pulmonary artery. The entire ascending aorta was then removed to just above the ST Jct. and excised and sent to pathology for final microscopic evaluation. The Aorta was truly large and aneurysmal. It was associated with a significant Arch component. The dissection was carried down to the Sino Tubular Jct. above the coronary ostia. A #28mm Dacron graft was chosen for replacement of the Ascending aorta essentially from the ST Jct to the Arch graft.

The graft was then placed. Independent 4-0 prolene sutures were then utilized in a 360-degree fashion to complete the proximal anastomosis to the Root. This completed the reconstruction and re-established a normal ST Jct. anatomy. After completing the proximal anastomosis, antegrade cardioplegia was directly instilled into this "neo aortic root" and the proximal anastomosis was checked as well as antegrade cardioplegia delivered. It was found to be quite satisfactory and we were pleased. The graft to graft anastomosis was then made with 2-0 prolene and the Ascending Graft and Arch Graft anastomosis was constructed to simulate the natural curvature of the ascending aorta. This was a Graft to Graft anastomosis. This completed the Ascending Replacement. The Aortic Valve was replaced. The Sinus of ValSalva Segment was not significantly aneurysmal.

Technical Details of the Aortic Valve Replacement:

Implant:

A #25mm CE Pericardial Magna prosthesis was implanted in the following fashion: A transverse aortotomy was performed in the ascending aorta. The aortic valve was excised and calcific deposits were carefully removed. During the valve excision, a small gauze sponge was placed in the left ventricular outflow tract to catch any calcium and debris that fell away during the debridement procedure. After the debridement, this sponge was removed. Traction sutures were then placed above each commissure. The annulus was calibrated and the prosthesis selected. Double ended 2.0 polypropylene pledgeted sutures were placed in an interrupted fashion around the annulus and through the sewing ring of the prosthesis. The prosthesis was then seated into place by putting equally distributed tension on all sutures. The sutures were then sorted and tied into place and cut above the knots. The aortotomy was closed with a running 4.0 polypropylene suture and the aortic root de-aired by turning off the vent prior to pulling up the tension and tying the suture.

This was a Supra-Annular Placement.

COMPLICATIONS:

There were no technical difficulties.

COMPLETION DETAIL:

A postoperative TEE revealed unchanged Left and Right Ventricular function. ZERO ParaValvar Leaks. Mild MR. A Post-Op EEG/SEP revealed normal symmetrical EEG.

The patient weaned off CPB without difficulty. The operation was completed without difficulty. Defibrillation and DDD was required before completion of surgery. Anti-arrhythmics in the peri-operative period included lidocaine. Inotropes and pressors in the peri-operative period included epinepherine.

After careful maneuvers to evacuate air the cross clamp was removed. Pacing wires were placed on the right atrium and ventricle. Heparin was reversed with protamine. Mediastinal drainage tubes were placed through separate stab wounds and the chest was closed in layers. Sponge and needle counts were correct. The skin and subcutaneous tissues were closed using absorbable sutures. The patient tolerated the procedure well.

RESIDENT SUPERVISION:

I, Dr. Joseph E. Bavaria, the Attending Cardiac Surgeon, was present for all the key parts of this operative procedure.

DISPOSITION:
The patient was transported while intubated to the intensive care unit in critical condition.

Electronically signed by Joseph Bavaria, MD at 07/28/2009 08:00:10 PDT

JOSEPH E. BAVARIA, M.D.

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