Sunday, Bloody Sunday: Unanticipated Ascending Aortic Dissection and Grafting After Coming Off CPB for CABG

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Sunday, Bloody Sunday: Unanticipated Ascending Aortic Dissection & Grafting After Coming Off CPB For CABG

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March, 24 2012

Introduction:
Acute ascending aorta dissection as a rare but potentially fatal complication of open heart surgery.

Case Report:
A 68 year old male with a past medical history of gastroesophageal reflux, hypertension, and hypothyroidism had a non-ST segment elevation myocardial infarction one week prior to coronary artery bypass graft surgery. The patient was brought to the OR with an intra-aortic balloon pump in place. The patient underwent coronary artery bypass grafts X4 on cardiopulmonary bypass. The cross clamp time was 1.5 hours. Upon its removal the surgeon noted bleeding around the proximal graft sites, progression of hematoma to rupture of the ascending aorta. There was a 10 minute period of permissive hypotension in an effort to decrease the amount of blood loss. The surgeon inserted an arterial cannula in the left femoral artery, CPB was resumed and ascending aorta replaced with a dacron tube graft. Mannitol & solumedrol were administered. The patient underwent circulatory arrest 17 minutes with a total of 2 hours 49 minutes of CPB for this second procedure. The patient was taken to the ICU from the OR and extubated the following day. The patients glosow coma score was 10 on post operative day 1, and 16 on post operative day 2. His cognition improved daily. He was discharged to cardiac rehabilitation 4 days later. He was seen in cardiac surgery clinic within the following month and was reported to be doing well.

Discussion:
Intraoperative aortic dissection during cardiac surgery is reported to have an occurrence of 0.12 to 0.2. Since the first reports in 1976 and 1983 the incidence has not changed. Cannulating the ascending aorta for cardiopulmonary bypass and for the delivery of antegrade cardioplegia can disrupt the three layered aorta through manipulation and flow. Dissections have been reported to originate at the aortic cannulation site, at the cross clamp site, at the partial occlusion clamp at the proximal anastomosis, and as a result of direct injury. Severe atherosclerotic changes in the aortic wall, a thin or dilated ascending aorta, cystic medial necrosis, or collagen vascular disease can predispose the aorta to injury. Dissections characteristically appear as a tense, circumferential dilatation and bluish discoloration of the exposed aorta. Substantial extravasation of blood produces a false lumen that rapidly bleeds at proximal venous anastomoses, at suture lines for aortotomy closures, at cannulation or cardioplegia sites, or when incised. Deep hypothermic circulatory arrest without cerebral perfusion or moderate hypothermic circulatory arrest with antegrade cerebral perfusion have been used for cerebral protection in these emergent events with a median duration 25 min. Circulatory arrest provides a bloodless surgical field without the need for the use of clamps and cannula. Deep hypothermia significantly decreases brain metabolism and oxygen requirements and thus permits a longer period of interrupted blood perfusion to the brain. Postoperative mortality as been reported at 45% in these patients. The following factors may be associated with aortic dissection during cardia surgery: dilated ascending aorta, known atherosclerosis, previous CABG surgery, older age and high blood pressure at the time of dissection.

Conclusions:
Diagnosis of aortic dissection requires a high degree of clinical suspicion. Once the diagnosis is made, immediate repair should be undertaken to limit the extent of dissection. By recognizing those patients at risk and employing gentle operative technique, the surgical team can minimize the risk of dissection. Once dissection has occurred, however, rapid diagnosis and appropriate surgical management are necessary to improve patient outcome. Several medications have been used to improve outcome after DHCA with variable results but the most important factor in outcome is short duration of DHCA.

Table 1: Proposed Mechanism of Action of Potentially Neuroprotective Pharmacologic Agents

<table>
<thead>
<tr>
<th>Pharmacologic Agent</th>
<th>Proposed Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antioxidants</td>
<td>Reducing CMRO₂, CPP, free fatty acids, free radicals, and cerebral ischemia</td>
</tr>
<tr>
<td>Steroids</td>
<td>Decreasing proinflammatory responses</td>
</tr>
<tr>
<td>Membrane</td>
<td>Reducing endothelial, scavenging free radicals, protecting the kidneys by lowering vascular resistance, sequestering and neutralizing free radicals, and reducing residual end-capillary pressure</td>
</tr>
<tr>
<td>Pentoxifylline</td>
<td>Blocking renal reabsorption of sodium and decreasing renal blood flow</td>
</tr>
<tr>
<td>Calcium channel blockers</td>
<td>Blockade of calcium-sensitive WNK-activated renal Ca²⁺ channels, decreasing calcium influx into epithelium</td>
</tr>
<tr>
<td>Lidocaine</td>
<td>Selective blockade of Na⁺ - channels in neuronal membranes, slowing CMRO₂</td>
</tr>
<tr>
<td>Decerebrocorticosteroids</td>
<td>Inhibit ionota-induced monosynaptic release, protective in both focal and global ischemia</td>
</tr>
</tbody>
</table>

Ranitidine
Glutamate antagonists
NMDA antagonists
Other non-receptor injury

Decreasing inflammatory response

Citations:
1) Intraoperative aortic dissection
Robert J. Still, Alan D. Hilgenberg, Cary W. Akins, Willard M. Daggett and Mortimer J. Buckley
2) Institutional report - Vascular thoracic
Intraoperative iatrogenic type A aortic dissection and perioperative outcome
Tatiana Flecka, Marek Ehrlich, Martin Czerny, Ernst Wolner, Martin Grabenwoger, and M. Grimm
3) Perioperative Management of Deep Hypothermic-Circulatory Arrest
Matina Syriotes, MD, Richard Trousdale, MD, Ming Zhang, MD, PhD, Gave Syriotes, MD, and Joan Charchafiath, MD