Negative results - Vascular thoracic

Acute intraoperative aortic dissection following axillary artery cannulation

Chris K. Rokkas*, Dimitrios Angouras, Themistokles Chamogeorgakis, Constantine E. Anagnostopoulos

Department of Cardiothoracic Surgery, University of Athens School of Medicine, Attikon Hospital, 1 Rimini St., Haidari 12462, Athens, Greece

Received 12 August 2007; received in revised form 30 November 2007; accepted 10 December 2007

Abstract

We describe a 75-year-old woman who underwent right axillary artery cannulation in preparation for reconstruction of the aortic arch and the proximal descending aorta for atherosclerotic aortic aneurysm via a 'clamshell' incision. As soon as cardiopulmonary bypass was established, the ascending aorta and the aortic arch was dissected. The innominate artery was dissected including one-third of its circumference anteriorly. Arterial perfusion was stopped immediately and the left femoral artery was cannulated to resume CPB. We proceeded with replacement of the ascending aorta, the aortic arch and the proximal descending thoracic aorta with a Dacron branched aortic graft. The patient recovered uneventfully. Arterial blood pressure was equal bilaterally.

Keywords: Aorta/aortic; Aortic arch; Aortic dissection; Aortic operation

1. Introduction

Cannulation of the right axillary artery for arterial inflow during operations involving reconstruction of the ascending aorta and the aortic arch has been advocated as a safer alternative compared to femoral artery cannulation [1]. This cannulation technique offers the possibility of direct antegrade perfusion of the right carotid artery and enhanced cerebral perfusion during a period of circulatory arrest. In addition, it may protect against retrograde atheroembolism by providing antegrade aortic perfusion. Nevertheless, complications related to axillary artery cannulation may arise and can be catastrophic [2].

2. Case presentation

We describe a 75-year-old woman who underwent right axillary artery cannulation in preparation for reconstruction of the aortic arch and the proximal descending aorta for atherosclerotic aortic aneurysm via a ‘clamshell’ incision (Fig. 1). This type of incision provides access to the entire ascending aorta, aortic arch, and proximal descending thoracic aorta [3]. The axillary artery was prepared for cannulation prior to making the chest incision. Following bilateral anterior thoracotomy and transverse sternotomy through the fourth intercostal space, the right axillary artery was cannulated directly without use of a guidewire. A 21 F DLP Medtronic arterial cannula (Medtronic Inc., Minneapolis, MN, USA) was inserted without apparent difficulty. This cannula was advanced to approximately 8 cm from its tip. Once inserted, it provided adequate arterial backflow and the pump circuit pressures were not elevated. The chest retractor was reinserted and the mediastinal structures were adequately exposed. Venous drainage was provided by routine right atrial cannulation with a dual-stage cannula. As soon as cardiopulmonary bypass (CPB) was established, we immediately observed the ascending aorta and the aortic arch being dissected and the false lumen filled with clear perfusate. Arterial perfusion was stopped immediately and the left femoral artery was cannulated to resume CPB. We proceeded with replacement of the ascending aorta, the aortic arch and the proximal descending thoracic aorta with a Dacron branched aortic graft. There was no intimal tear noticed within the aorta. The innominate artery was dissected including one-third of its circumference anteriorly. The origins of the left carotid and the left subclavian artery were not involved in the dissection. Reperfusion during rewarming was provided by a side branch of the aortic graft. At the conclusion of the procedure and prior to protamine administration the axillary cannula was removed. Prior to artery repair, good antegrade perfusion was noticed through the arteriotomy. The patient recovered uneventfully. Arterial blood pressure was equal bilaterally.

3. Discussion

The optimal method of axillary artery cannulation is not clear yet. Direct cannulation of the axillary artery [1] or cannulation via an interposition side graft [4] have been described. The primary disadvantages of direct cannulation are related to (a) the trauma incurred to the artery, (b) the prolonged normothermic ischemia of the arm, and (c) the inability to monitor perfusion pressure during ante-

*Corresponding author. Fax: +30-2105326416.
E-mail address: crokkas@yahoo.com (C.K. Rokkas).
© 2008 Published by European Association for Cardio-Thoracic Surgery
grade cerebral perfusion. In addition, direct repair of a fragile arterial wall can be challenging at times. Most cannulae being used are primarily designed for femoral or aortic cannulation, as was the case in our patient. A few cannulae designed specifically for axillary artery cannulation simply take into consideration the required angulation without addressing the perfusion limitations. On the other hand, the use of an interposition side graft may be preferable to direct cannulation, particularly when atherosclerosis of the aortic branches is suspected, as it may be less traumatic to the arterial endothelium [2, 5]. An additional benefit of this technique is that antegrade cerebral perfusion pressure can be monitored with a right radial artery catheter. Nevertheless, regardless of the type of cannulation, direct or via an interposition graft, it is advisable that the surgeon directly observes the aorta during the initiation phase of CPB as the few first seconds may be critical.

In conclusion, the appearance of catastrophic complications, such as acute aortic dissection, following cannulation of the axillary artery is possible and the surgeon should carefully choose the technique that is best suited to the particular situation. Precautions can be taken to minimize the occurrence of these complications and deal successfully with them when they occur. Axillary artery cannulation techniques that take into consideration the limitations of existing techniques need to be developed.

References


eComment: TEE- and guidewire-guided axillary artery cannulation. An option?

Author: Stefanos Demertzis, Cardiocentro Ticino, Via Tessere 48, 6900 Lugano, Switzerland
doi:10.1510/icvts.2007.164913A
I confirm that this is a scary experience [1]. What do the authors think about TEE guided cannulation over the wire? The wire is easily identified on TEE and wire-guided cannulation and should carry a lower risk regarding intimal disruptions. We adopted this policy after a similar incident. Congratulations for saving the patient and the excellent final result.

Reference