

Ascending aortic cannulation in acute type A aortic dissection: a frightening but lifesaving procedure

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ABSTRACT

Different cannulation sites (e.g., femoral artery, axillary artery, left ventricular apex, and ascending aorta) and perfusion techniques (anterograde or retrograde) have been used for treating acute type A aortic dissection. The patient's pathology and status determine the cannulation site. We present our experience with ascending aortic cannulation for acute type A aortic dissection.

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Introduction

The ideal cannulation method for acute aortic dissection repair is usually described as “quick, easy and safe”. For arterial intervention, peripheral cannulation sites (femoral and axillary) have been used as standard approaches [1–3]. Some centres also use direct ascending aortic cannulation with good results [4–6]. We report a case in which we had to use direct true lumen cannulation of the ascending aorta.

Case Presentation

A 66-year-old man was admitted to our emergency service with the symptoms of chest and back pain and dyspnoea. A computed tomographic angiography (CTA) revealed type A aortic dissection (Figure 1). Bilateral femoral arteries were also affected. A transthoracic echocardiography showed a

mild aortic regurgitation and the ejection fraction was 55%. His arterial tension was 100/70 mmHg, and his pulse was 88/minute when he admitted to the hospital. He was taken to the operation room.

In our clinical experience, axillary artery cannulation is the first choice for the ascending aortic operations. Therefore, an infraclavicular incision was performed, and the right axillary artery was exposed. Although not observed in the CTA, the dissection had progressed to the axillary artery too. The bilateral femoral arteries were not intact either. We decided to cannulate the ascending aorta.

Following the median sternotomy, the pericardium was opened slowly. After careful dissection between the adventitial layers of the ascending aorta and the pulmonary artery, a clamp was passed around the ascending aorta and a tape placed.

An aortic cannula was inserted into the true lumen directly, and the ascending aorta snared tightly. A two-

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stage cannula was inserted into the right atrium, and a cardiopulmonary bypass (CPB) was established, and the patient started to cool down. The ascending aorta was then cross-clamped and the proximal part of the ascending aorta was opened. It was seen that the tear was beginning from supra-coronary part of the ascending aorta.



Figure 1. Preoperative computerized tomography image of dissected aorta; Arrows=intimal flaps.

The proximal anastomosis was done during the cooling period. At the desired temperature (18°C) CPB was stopped, and a deep hypothermic circulatory arrest started. The arterial cannula removed and the affected part of the ascending aorta was resected, and distal anastomosis was completed. A supra-coronary ascending aortic replacement with a 32 mm Dacron graft was performed. Then an aortic cannula was inserted into the graft and CPB started again. After rewarming to normothermia, the patient was weaned from CPB and the operation finished. (The cross clamp time, CPB time and total circulatory arrest time were 60 minutes, 130 minutes, and 24 minutes, respectively). His postoperative course was uneventful, and he was discharged on postoperative day 7. He recovered without complications following the surgery and today, i.e. three years later, he continues to feel well (Figure 2).

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Figure 2. Postoperative computerized tomography image. Arrow shows regression of false lumen in repaired aorta

Discussion

Until the 1990s, the femoral artery was the most popular site for cannulation. Then to prevent the cerebral embolization and extension of dissection because of retrograde blood flow as well as to achieve selective anterograde cerebral perfusion during the hypothermic circulatory arrest, the femoral artery was replaced by the axillary artery. To minimize the risk of meal perfusion caused by retrograde flow during CPB femoral cannulation should be avoided and arterial perfusion through the axillary artery may be a useful alternative [7].

The axillary artery may be cannulated directly or through an 8 mm Dacron side-arm. We prefer to use

an 8 mm Dacron graft. However, while axillary artery cannulation is the preferred intervention, extension of the aortic dissection to the axillary artery remains a contraindication to its use [8]. Retrograde carotid dissection and cerebral meal perfusion complications may occur by the cannulation of the dissected axillary artery [9]. Blood flow into the false lumen at this level increases the risk of cerebral meal perfusion because of the proximity of the cerebral vessels. Borst *et al.* [10] first described the ascending aorta cannulation in the 1990s. It has been reported a few times since [11-15]. The Seldinger technique under epiaortic colour Doppler echography and transoesophageal echocardiography are used routinely in this cannulation procedure [16]. We believe that, because of the possible expanding aortic dissection that was affecting both axillary and femoral arteries, it clearly was mandatory to cannula the ascending aorta.

The ascending aorta offers several advantages as an alternative access for cannulation. First of all, if the patient is experiencing hemodynamic instability, this method is more suitable than others because there is no need to open another surgical area. There is no limitation on the diameter of inflow cannula so that a large-diameter cannula can be used. Also, ascending aortic cannulation does not require repair of the cannulation site. Finally, it is feasible when axillary and femoral arteries are dissected [17].

The risks of the ascending aortic cannulation are aortic rupture at the cannulation site and cannulation into the false lumen. Khalid *et al.* [5] found that only 1 (0.8%) of 122 patients had an aortic rupture caused by aortic cannulation.

Conclusion

Acute aortic dissection can present with various conditions, so there is no perfect cannulation side and method. Therefore, ascending aortic cannulation must be kept in mind as an appropriate choice of cannulation for CPB, mainly; in patients whom the peripheral arteries cannot be used.

Informed Consent

Written informed consent was obtained from the patient for the publication of this case report.

Competing interests

The authors declare that they have no competing

interests with respect to the authorship and/or publication of this article.

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