



Original article

Innominate artery cannulation for Thoracic Aortic surgery: A safe alternative

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Abstract

Background: Innominate artery cannulation for conducting cardiopulmonary bypass has been proposed as an alternative cannulation site in surgeries involving proximal thoracic aorta. Evaluate Innominate artery cannulation as a safe reliable route for conducting cardiopulmonary bypass during proximal Thoracic Aortic surgery.

Methods: Between January 2010 and October 2016, 30 adult patients had Innominate artery cannulation for surgeries involving the proximal thoracic aorta in a single center. Operations performed were 26 (86.7%) Ascending Aortic replacements of which 6 patients (23%) had concomitant Aortic valve replacement and 5 patients (19.2%) had concomitant coronary artery bypass grafts, 3 patients (10%) had Modified Bentall's procedure and one patient (3.3%) had Aortic valve replacement and endarterectomy of the Ascending Aorta for Porcelain Aorta. Deep hypothermic circulatory arrest was used in 6 patients (20%) without antegrade or retrograde cerebral perfusion, redo surgery was performed in 2 patients (6.7%). Data was collected retrospectively.

Results: Age range (49–74) years, mean 59.4 years \pm 7.9, 23 patients (76.6%) were males. Size 20 French cannulas were used for arterial inflow during cardiopulmonary bypass reaching a mean Maximal blood flow of 2.82 l/m² \pm 0.4. 2 patients (6.7%) were re-explored for bleeding not related to cannulation site, none had Innominate artery dissection, right arm ischemia or permanent stroke, 1 patient (3.3%) had transient disturbed conscious level for 24 h. Mortality occurred in 1 patient (3.3%).

Conclusions: Direct Innominate artery cannulation is safe and provides satisfactory blood inflow throughout cardiopulmonary bypass in patients undergoing proximal Thoracic Aortic surgery.

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Keywords: Innominate artery; Thoracic Aortic surgery; Cardiopulmonary bypass cannulation site

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1. Introduction

The success of proximal Thoracic Aortic surgery depends mainly upon surgical planning and should be tailored as per individual case [1]. Cannulation site for conducting cardiopulmonary bypass (CPB) is a corner stone in designing the surgical procedure and is a major factor affecting the outcome of surgery [2,3].

In conditions where central cannulation of the aorta can't be done safely, whether in cases of Acute type A dissection, ascending aortic aneurysm, porcelain aorta or in cases of redo surgery with previous functioning grafts originating from ascending aorta, peripheral cannulation site is recommended, among these sites are Femoral artery, Axillary and Innominate arteries, each of which has its pros and cons [4,5].

2. Patients and methods

Between (January 2010 to October 2016), 30 patients had innominate artery cannulation for conducting CPB during surgery for various pathologies involving proximal Thoracic aorta [Table 1](#) at Ain Shams University Hospitals, Cairo, Egypt. Data was collected retrospectively from the patients' notes. Indication for surgery was: 23 patients (86.6%) had Ascending aortic aneurysms; of which 6 patients (20%) had associated aortic valve disease, 3 patients (10%) had concomitant Ischemic heart disease and 3 patients (10%) had concomitant Aortic root dilatation, 6 patients (20%) had type A aortic dissection of which 2 patients (6.7%) had associated ischemic heart disease (IHD) and finally 1 patient (3.3%) had aortic valve stenosis with porcelain Aorta.

Procedures performed were: 15 (50%) Ascending Aortic replacements, 6 (20%) Aortic valve replacements (AVR) concomitant with Ascending Aortic replacements, 3 (10%) Modified Bentall, 5 (16.7%) Ascending Aortic Replacements and coronary artery bypass grafting (CABG), 1 patient (3.3%) had aortic valve replacement (AVR) with endarterectomy of ascending aorta. Redo sternotomy was performed in 2 (6.7%) patients with previous biological AVR and 6 patients needed hypothermic circulatory arrest (HCA) period which ranged from 10 to 24 min with a mean time of 20.3 min \pm 3.5 at a mean core temperature of 17°C. Emergency procedures were 6 (20%) (all patients presented with acute type A dissection), [Table 1](#).

2.1. Inclusion criteria

Age more than 18 yrs. Both sexes were included. Patients undergoing surgery involving the proximal thoracic aorta with or without HCA. Patients requiring redo surgery.

2.2. Exclusion criteria

Patients with preoperative neurological dysfunction including transient ischemic attacks (TIA's) and previous cerebrovascular strokes as confirmed by history and CT brain, Patients with disease involving the innominate artery whether dissection, aneurysm or extensive calcification as shown in preoperative CT arteriography and intraoperative assessment of the artery.

Table 1
Aortic pathology and procedures performed.

Number of patients	Proximal aortic pathology	Procedure performed	Circulatory arrest used or not
11 (36.7%)	Ascending aortic aneurysm	Replacement of Ascending Aorta	Not used
6 (20%)	Ascending aortic aneurysm + Aortic valve disease	AVR + Replacement of Ascending Aorta	Not used
3 (10%)	Ascending Aortic aneurysm involving aortic root	Modified Bentall's procedure	Not used
3 (10%)	Ascending aortic aneurysm + IHD	Replacement of Ascending Aorta + CABG	Not used
4 (13.3%)	Type A aortic dissection	Replacement of Ascending Aorta	Used in all cases
2 (6.7%)	Type A dissection + IHD	Replacement of Ascending Aorta + CABG	Used in one case
1 (3.3%)	Aortic stenosis with Porcelain Aorta	Aortic valve replacement + endarterectomy of Ascending Aorta	Used

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