Ascending-to-supraceliac abdominal aortic bypass for an adult coarctation of the aorta: a video presentation

Ujjwal K. Chowdhury, Niwin George, Lakshmi Kumari Sankhyan, Sukhjeet Singh, Abhinavsingh Chauhan, Sreenita Chowdhury

Department of Cardiothoracic and Vascular Surgery, All India Institute of Medical Sciences, New Delhi, India

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Among the variety of surgical options available for coarctation of the aorta, the resection and/or graft replacement of the diseased aortic segment and anatomical restoration without residual obstruction is the ideal option [1]. However, such a direct approach may be difficult to perform in late presenters with diminished elasticity and/or calcification of the vessels, extensive collateral formation at different anatomic levels, unusual anatomic features or previous operations [2-7]. Use of supraceliac segment of the abdominal aorta for ascending aorta-to-abdominal aorta bypass has been poorly documented in coarctation of the aorta or interrupted aortic arch presenting in adulthood [8-10].

We report a 42-years-old male patient presenting with isolated interrupted aortic arch undergoing ascending aorta-to-supraceliac abdominal aortic bypass without cardiopulmonary bypass. The postoperative recovery was uneventful.

We conclude that ascending aorta-to-abdominal aortic bypass in the supraceliac bare area is a versatile technique in late presenters with coarctation of the aorta and eliminates the complications associated with the anatomical repair.

Surgical procedure

1. A standard median sternotomy and upper median laparotomy are performed.
2. No cardiopulmonary bypass is used.
3. The supraceliac abdominal aorta is dissected by mobilizing the stomach, dividing the coronate ligament of the left lobe of the liver and mobilizing the right lobe of the liver from the diaphragm.
4. The left crus of the diaphragm is divided in between stay sutures, ensuring no injury to the esophagus.
5. The position of the aorta is to the left side of the esophagus which is identified by the transesophageal echocardiographic probe or a nasogastric tube.
6. After exposing a satisfactory segment of the supraceliac abdominal aorta, the aorta is encircled both proximally and distally for safety.
7. An adequate area of the proximal abdominal aorta is chosen for the distal anastomosis and a side-biting Satinsky vascular clamp is applied after heparinization at a dose of 100 units/kg. The length of the jaws of the clamp should be much longer than the width of the selected graft.

Address for Correspondence: Ujjwal K. Chowdhury, Department of Cardiothoracic and Vascular Surgery, All India Institute of Medical Sciences, New Delhi, India. E-mail: ujjwalchowdhury@gmail.com

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8. An 18 mm bovine-collagen-impregnated polyester-fiber graft (MedoxTM, Woven Hemashield, Meadow-Boston Scientific Corporation, Oakland, New Jersey) is used for the ventral aortic bypass.

9. The distal anastomosis is constructed in an end-to-side fashion using a continuous 4-0 polypropylene suture (Johnson and Johnson Ltd., Ethicon, LLC, San Lorenzo, USA) buttressed with Teflon pledges with a goal to obtain perfect hemostasis and maintain femoral arterial pressure of at least 40 mmHg to ensure adequate distal perfusion.

10. Due to the fragility of the abdominal aorta, utmost care is taken to avoid excessive traction of the suture through the delicate aortic tissue.

11. This distal anastomotic area is difficult to access once the proximal anastomosis is completed.

12. After ensuring meticulous hemostasis, the divided crus of the diaphragm is reapproximated around the graft-aortic anastomosis with a few tacking sutures to isolate the anastomosis from the adjacent esophageal wall.

13. The graft is de-aired and an aortic cross-clamp is reapplied on the graft away from the distal anastomosis to restore adequate distal perfusion.

14. An appropriately sized fenestration is created by making a cruciate incision on the diaphragmatic pericardium just anterior to the caval passage.

15. The graft is tunneled through the fenestration made in the diaphragm and is carried anterior to the inferior vena cava and pulmonary veins for the proximal anastomosis along the lateral border of the free wall of the right atrium.

16. The proximal anastomosis is preferentially positioned on the distal most portion of the lateral aspect of the ascending aorta. A fibrous pericardial flap is tacked anterior to the graft to protect it during any potential subsequent sternal re-entry.

17. The proximal anastomosis is positioned in the same manner as the distal anastomosis using a partially occluding clamp and a continuous 4-0 polypropylene suture (Johnson and Johnson Ltd., Ethicon, LLC, San Lorenzo, USA).

18. A pleuro-pericardial flap is tucked anterior to the graft to protect it during any potential subsequent sternal re-entry.

19. The operating time was 180 min and intensive care unit stay was 1.6 days.

20. Immediately after surgery, the upper body systolic pressure decreased from 160 mmHg to 108 mmHg at discharge.

21. At 12-months follow-up, the patient was in New York Heart Association class-I, blood pressure was 110/80mmHg on β-blocker and oral acetyl-choline esterase inhibitor. Magnetic resonance angiography performed at 11th-month revealed smooth, non-turbulent, pulsatile flow with wide, unrestricted proximal and distal anastomoses with no kinking, distortion and flattening of the bypass graft. There were no anastomotic aneurysms or dissections.

Conflict of interest
The authors declare no conflict of interest.

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References


