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**Case Report**

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## Off-Pump Coronary Artery and Aortobifemoral Artery Revascularization: A Combined Approach

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E-mail:[drkinnaresh@gmail.com](mailto:drkinnaresh@gmail.com)**Abstract**

Coexistent occlusive disease in the coronary and the aortoiliac arteries has been noted in relatively high incidence which affects the management plan. When there is concurrent aortoiliac occlusive disease, most often abdominal aorta is the place of proximal anastomosis for grafting to both lower extremities. However, the ascending aorta may also be used as the source of inflow to both the femoral and coronary arteries in patients who present with coexistent coronary artery disease and aortoiliac occlusive disease. Patients may need to undergo two separate procedures for the same. With this we are reporting a case where off pump coronary artery bypass grafting (OPCABG) was coupled with aortobifemoral artery bypass grafting via ventral extra peritoneal space using bifurcated dacron graft. OPCABG and a simple method of limb bypass procedure is a promising procedure for simultaneous revascularisation of myocardium and lower extremities.

**Keywords:** Off pump coronary artery bypass grafting, aortobifemoral, extra peritoneal, bypass, lower extremity ischemia.

**1.Introduction**

The incidence of severe correctable coronary artery disease (CAD) in patients undergoing surgery for lower extremity ischemia is 21% [1,2]. Simultaneous coronary artery bypass grafting with peripheral revascularisation is an option for patients with critical limb ischemia [3]. Successful limb revascularisation during an off pump coronary artery bypass grafting (OPCABG) should be a better alternative as it avoids risks and morbidity associated with second procedure [4]. It is also cost effective as both procedures are performed in the same hospital admission. OPCABG coupled with ascending aorta to bilateral femoral artery bypass grafting is an easy option in these patients, with no extra morbidity and mortality.

The operative strategy in patients of combined CAD and peripheral vascular disease

demand considerations of severity of cardiac symptoms, presence of rest pain/ischemic ulceration. If the ischemia is not limb threatening and the infra renal aorta is suitable for grafting, a staged approach may be preferable.

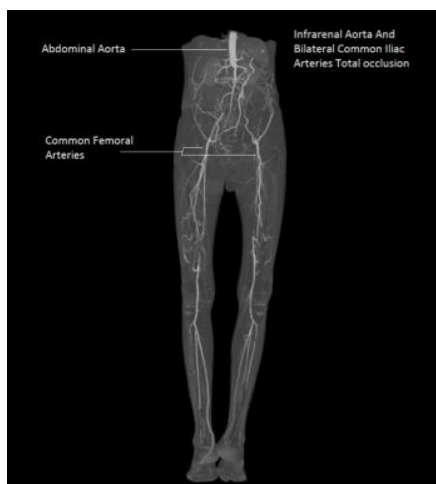
**2. Case Study**

A 60-years old male patient known diabetic and hypertensive, was admitted to the intensive care unit of our hospital with chest pain, progressive dyspnoea, rest pain and extremities trophic changes. He had history of acute myocardial infarction before one month, and was managed conservatively without any intervention. At the time of admission the EKG showed anterior and lateral myocardial ischemia accompanied by elevation of myocardial enzymes

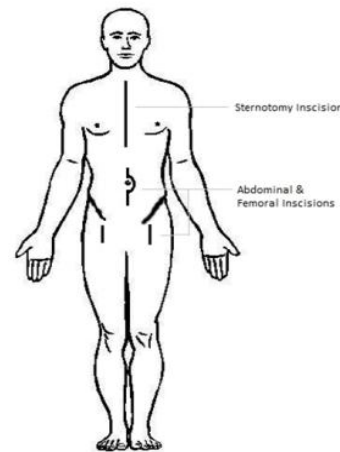
(CPK-MB = 124 IU/L, Troponin I = 0.54 ng/ml). The rest of his biochemical profile was normal. He was investigated with coronary angiogram and bilateral lower limb CT angiogram with abdominal aorta. He had triple vessel disease with total occlusion infra renal aorta and bilateral common iliac arteries (TASC- II, Type D) (Figure 1). Since he had recurrent episodes of angina, rest pain with ABI of 0.4 in right leg and 0.5 in left leg, he was considered for OPCABG coupled with ascending aortobifemoral artery bypass grafting via ventral extraperitoneal space.

OPCABG was done with left internal mammary artery graft to left anterior descending artery, and sequential reversed saphenous vein graft to obtuse marginal and posterior descending arteries. A dacron 16 mm graft was anastomosed to aorta in an end to side fashion, the other end of graft anastomosed to the stem of 14x7 mm bifurcated graft. Graft was routed in ventral extraperitoneal space via separate incision over abdomen i.e. midline approximately 5cm incision centered around umbilicus and bilateral groin regions (Figure 2). The distal limbs of the conduit were tunneled through the preperitoneal space. The bevelled ends of the two limbs of the bifurcated graft were brought into the groin incisions behind the inguinal ligament and anastomosed to the common femoral arteries. The graft thus reached from ascending aorta to femoral arteries without entering the peritoneal space (Figure 3). Heparin was reversed and haemostasis ensured. The patient had an uneventful postoperative stay with no postoperative bowel ileus and was discharged on the 7th postoperative day. On follow up doppler study and CT angiogram showed patent aortobifemoral graft (Figure 4A, 4B).

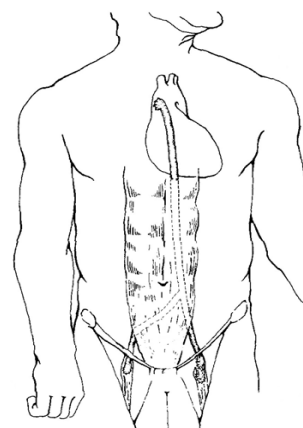
**Figure 1: Computerised tomography abdominal angiogram showing aortoiliac occlusive disease**



**Figure 2: Incisions used**



**Figure 3: Lie of aortobifemoral graft**



**Figure 4: Computerised tomography abdominal angiogram**

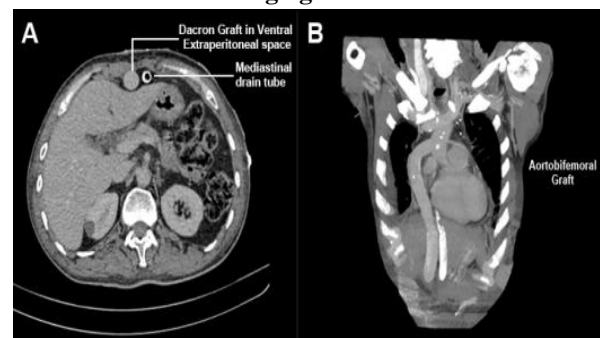


Figure showing dacron graft with mediastinal drain at the level of L2 (axial cut) with computerised tomography thoracic angiogram showing proximal end to side anastomosis of graft to ascending aorta.

### 3. Discussion

Coronary artery disease and aortoiliac occlusive disease frequently coexist. Coronary and peripheral revascularization is traditionally performed as a two staged procedure. However, the late presentation of limb ischemia during a coronary artery bypass grafting(CABG) and aim to reduce coronary risk before aortic surgeries are the main indications for a combined procedure[1].

Frantz *et al*[5]first described the ascending aorta as an inflow for limb revascularization for a

case of inaccessible abdominal aorta. Baird *et al*[6] performed ascending aorta to bifemoral bypass, placing the graft between rectus muscle and posterior rectus fascia, following the anterior anatomical axis of the internal mammary and inferior epigastric arteries anastomosis; thus the conduit is not visible, palpable, or compressible. Wolff *et al*[7] first to show that combined on-pump coronary and abdominal surgery is associated with a 15% 30-day mortality rate and 31% morbidity rates.

Combined procedures using the ascending aorta as an inflow for limb revascularization have been described by many authors[8], as a way to decrease morbidity and mortality of the procedure[9], as also the hospital stay. Gross obesity, large incisional hernias, impaired renal function, graft infection, and small aorta syndrome are some of the rare instances reported in which the ascending aorta has been used as an alternative site of proximal anastomosis for aortobifemoral bypass[10].

Although rarely performed, there are many advantages of using the ascending aorta as an inflow for limb revascularization during CABG[9,10]. Apart from simplicity of the procedure and ease of access to the ascending aorta during CABG, other advantages are 1) The ascending aorta is rarely involved with severe atheroma and is large enough to accommodate a partial occluding clamp, thereby avoiding undesirable effects of aortic cross-clamping; 2) it provides a large inflow to maintain an adequate flow and pressure in the graft; 3) it does not require an intraperitoneal procedure, obviating postoperative problems of bowel and bladder disturbances and thus reduces operative morbidity; 4) bowel handling and blood loss are minimal, there is no danger of renal dysfunction as compared to a repair involving dissection and clamping of the supra renal abdominal aorta; 5) no intraperitoneal adhesions making a future laparotomy if required simple; 6) the smaller abdominal incision and avoiding retroperitoneal exposure leads to early recovery and shorter hospital stay [9]; and 7) On follow up, graft patency and flow can be easily detected by doppler flowmeter [6]. Some authors have placed the graft in subcutaneous space, which results in complications like visibility of pulsation, potential risk of damage by external trauma and increased chances of infection [8].

OPCABG with ascending aortobifemoral artery grafting can be performed with ease and with minimal increase in the operating time. An additional procedure of limb revascularization with OPCABG did not prolong the ICU stay or increase morbidity in our patient. This also had an added advantage of avoiding a second intervention at a later date. Although axillofemoral bypass would be an

alternative method of limb revascularization during OPCABG, it would need additional exposure of the axillary artery; also, the higher occlusion rates reported with this procedure make the ascending aorta-to-femoral bypass a more favoured procedure. We strongly recommend this single procedure in place of routine two staged approach. Limb revascularizations can be done more frequently in patients undergoing CABG without extra morbidity, mortality and hospital stay.

## References

- [1] Hertzner N R, Beven E G, Young J R, O'Hara P J, Ruschhaupt W F, 3<sup>rd</sup>, Graor R A, *et al*. Coronary artery disease in peripheral vascular patients: A classification of 1000 coronary angiograms and results of surgical management. *Ann Surg* 1984; 199:222-233.
- [2] Jamieson WR, Janusz MT, Miyagishima RT, Gerein AN. Influence of ischemic heart disease on early and late mortality after surgery for peripheral occlusive vascular disease. *Circulation* 1982; 66(Suppl 1):92-7.
- [3] Inciura D, Benetis R. Simultaneous coronary artery bypass grafting and vascular operations: Early and mid-term results. *J Cardiovasc Surg (Torino)* 2006; 47:337-347.
- [4] Koksai C, Sarikaya S, Ozcan V, Zengin M. Simultaneous off-pump coronary revascularization with pulmonary resection or vascular surgery. *Middle East J Anesthesiol* 2004; 17:1069-1077.
- [5] Stephen L. Frantz, Martin J. Kaplitt, Arthur R. Beil Jr., Harry L. Stein. Ascending aorta-bilateral femoral artery bypass for the totally occluded infrarenal abdominal aorta. *Surgery* 1974; 75:471 - 475.
- [6] Ronald J. Baird, Glorianne V. Ropchan, Theodore K. Oates, Richard D. Weisel, John L. Provan. Ascending aorta to bifemoral bypass -a ventral aorta. *J Vasc Surg* 1986; 3:405-410.
- [7] Thomas Wolff, Doan Baykut, Hans-Reinhard Zerkowski, Peter Stierli, Lorenz Gürke. Combined abdominal aortic aneurysm repair and coronary artery bypass: Presentation of 13 cases and review of the literature. *Ann Vasc Surg* 2006; 20:23-29.
- [8] Manoj Moharana, Saket Agarwal, Himanshu Pratap, Aditya Singh, Sadashiv Tamagond, Deepak Kumar Satsangi. Efficacy and safety of beating heart coronary revascularization coupled with ascending aorta-bifemoral grafting: Analysis of short term results. *Ind J of Thorac and Cardiovascular Surg* 2010; 26: 11-14.
- [9] Victor A. Jebara, Jean Noel Fabiani, Christophe Acar, Catherine Chardigny, Pierre Julia, Alain Carpentier. Combined coronary and femoral revascularization using an ascending aorta to bifemoral bypass. *Arch Surg* 1994; 129:275-279.
- [10] Baird RJ, Madras PN. Ascending aorta to bilateral femoral artery graft via a ventral subcutaneous route. *Ann Surg* 1974; 186:210-212.