

Case Report

Coronary Artery Bypass In Dextrocardia

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ABSTRACT

Situs inversus is a rare condition. There are few reports of this condition undergoing coronary artery bypass surgery. To the best of our knowledge this is the first case reported in Kuwait and the Gulf region. A 47-year-old male Indian with *situs*

inversus totalis and significant left main coronary artery disease underwent an emergency coronary bypass surgery using the right internal mammary artery and two saphenous vein grafts.

KEY WORDS: coronary artery bypass grafting, dextrocardia, right internal mammary artery

INTRODUCTION

Dextrocardia means that the heart is in the right chest. There are various forms of dextrocardia, ranging from a normally configured heart that is positioned further to the right than normal to the so called 'mirror-image dextrocardia' in which the positions of the heart chambers and major vessels are exactly the reverse of the 'normal' arrangement.

There are two types of dextrocardia. Isolated dextrocardia and mirror-image dextrocardia. In isolated dextrocardia associated *Situs solitus* (dextroversion), the body organs other than the heart are normal whereas in the mirror-image dextrocardia associated with *Situs inversus totalis*, all the body organs are a mirror-image of the normal arrangement.

Dextrocardia associated with *Situs inversus* is a rare condition. Its incidence is reported to be one in 10,000^[1]. Usually, only people with dextrocardia and *Situs inversus totalis* survive long enough to develop ischemic atherosclerotic heart disease. The incidence of coronary artery disease in those with *Situs inversus* is similar to that in the general population^[2]. Thus, there are only few cases of atherosclerotic coronary artery disease with *Situs inversus* throughout the world. This is the first report from Kuwait of coronary artery bypass surgery done on a patient with *Situs inversus totalis*.

CASE REPORT

This 47-year-old Indian male mechanic was a known case of *Situs inversus totalis* and coronary artery disease. He had sustained an inferior wall myocardial infarction (Q wave) in 1994 and another anterior wall myocardial infarction in January 2002 (non-Q wave) for which he received thrombolysis. He underwent dipyridamole stress test in February

2002, which showed a fixed inferior defect and no stress induced ischemia. He was doing well until August of the same year, when he noticed tightness in the chest associated with shortness of breath on moderate exertion that was relieved with rest.

His cardiac risk factors included hypertension, hyperlipidemia and past history of smoking. He denied any family history of coronary artery disease (CAD). Physical examination, chest and abdominal X-rays were normal except for typical signs of *Situs inversus* (Fig.1). He underwent cardiac catheterization on January 2003, which surprisingly showed a 99% distal left main artery disease (Fig. 2). The left anterior descending artery (LAD) had 80% proximal disease. The distal LAD was small in calibre. The first diagonal artery had 80% proximal disease. The circumflex artery was small in calibre with mild disease. The right coronary artery (RCA) was a large vessel with mild disease and collaterals to the LAD. Ventriculography indicated a left ventricular ejection fraction of 40% with severe apical and inferior hypokinesis. The left ventricular end diastolic pressure was 33 mmHg. After median sternotomy, the surgeon stood on the left side of the patient. The right internal mammary artery (RIMA) was harvested because it would lie closer to the LAD. The RIMA had a small calibre but good flow. The vein, which was harvested from the right lower leg, was also of a good calibre. Cardiopulmonary bypass was established by cannulating the aorta and the right atrial appendage. A non-pulsatile circuit (Sarns 9000), membrane oxygenator (Bard Quantum) and the Quest system for cardioplegia delivery were used. Systemic temperature was allowed to drift to 33-34 °C. Cold blood cardioplegia, both antegrade and retrograde, were

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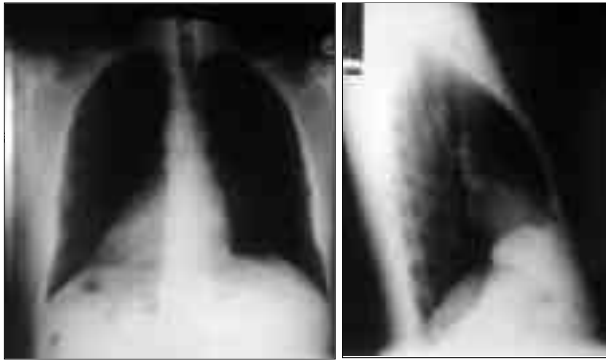


Fig. 1: Postero-anterior and lateral views of Chest X-ray showing dextrocardia



Fig. 3: Picture showing the two saphenous veins to LAD graft and intermediate artery (RAMUS)

used for myocardial protection with warm induction and hot shot at the end before removing the cross clamp. The procedure was conducted using single cross clamping technique.

The LAD, which in this case was the most medial vessel with the surgeon standing on left side, was of small diameter (1.5 mm) and tapered towards the end. The saphenous vein was anastomosed to the LAD. The intermediate vessel was 1.5 mm in diameter and another vein graft was anastomosed to it (Fig. 3). The first diagonal was of a better diameter (2.0 mm) and the RIMA was anastomosed to this vessel (Fig. 4). The cross clamping time was 69 minutes and perfusion time was 100 minutes. The patient came off bypass with no inotropic support. He was extubated in ICU after two hours. His post-operative course was unremarkable and the patient was discharged after seven days on anti-platelet therapy.

DISCUSSION

Fabricus described the first case of dextrocardia in 1606. Its incidence with *situs inversus* is between one in 10,000 and one in 20,000 and is equally distributed amongst the male and female patients^[2]. Dextrocardia with *situs solitus* is less common. The



Fig. 2: Coronary angiogram showing a long left main artery with 99% stenosis



Fig. 4: Picture showing the anastomosis of RIMA to the diagonal artery

incidence of congenital anomalies associated with the latter are higher (90 % vs 10% in *Situs inversus*)^[2]. Dextrocardia with *situs inversus* is also associated with lung anomalies including Kartagener's syndrome (15-20%). This is characterized by bronchiectasis, chronic sinusitis, nasal polyp and infertility secondary to immotile spermatozoa^[3].

Embryological dextrocardia is related to failure of the cardiac loop to migrate from the right apex to left apex, which normally takes place over 10 days starting from day 22-23 of fertilization^[4]. In *Situs inversus*, the liver and spleen are on the left and the gastric bubble is on the right. These differences can be seen on plain abdominal X-ray. In *situs solitus*, all body organs are on the same side as that of a normal person.

There have been few reported cases of myocardial revascularization in dextrocardia with such *Situs inversus* in the English literature. The first coronary artery bypass graft in dextrocardia was

performed in 1982^[5]. Isolated cases of revascularization using saphenous vein grafts have been reported^[6,7]. The use of the right internal mammary artery was also reported^[8,9]. Surgical treatment of multivessel disease in such cases is extremely uncommon^[10,11].

In our case, multi-vessel grafting was done for the first time in a patient with 99% left main artery disease and dextrocardia, using the right internal mammary artery and saphenous vein grafts. The use of RIMA is certainly more logical as compared to LIMA as the latter will have to cross the midline to reach the LAD territory. There is certainly an advantage of using the IMA as compared to the vein as far as the long-term patency is concerned. The use RIMA has been shown to have the same long-term patency as LIMA when used to perfuse the LAD territory in high-grade stenosis^[12].

In conclusion, while dealing with such patients intraoperatively, we recommend that the surgeon stand on the left side of a patient. This ensures that the relatively blind area of the pericardial well stays on the side of the surgeon, making surgery on the left side of the system easier. We also recommend changing the position of the CPB machine so that it is placed opposite the surgeon. However, we do believe that the team should do what is most comfortable to them on a daily basis.

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