

Case report

# Post-coronary artery bypass grafting left internal mammary artery to pulmonary artery fistula: a 6 year follow-up following successful surgical division

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## Abstract

We report a case of young male patient who developed left internal mammary artery to pulmonary artery fistula 9 years following the coronary artery bypass grafting operation. The clinical signs and symptoms were very subtle including recurrence of angina and heart murmur. Surgical division of the fistula and re-grafting of blocked coronary arteries resulted in satisfactory long term outcome. © 2001 Elsevier Science B.V. All rights reserved.

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## 1. Introduction

Pedicle left internal mammary artery (LIMA) is a very commonly used conduit for coronary artery bypass grafting (CABG) due to its proven long term patency. The development of fistula between LIMA and pulmonary artery is rare complication of this operation which can result in recurrence of angina. We report a case of young male patient where such malformation was diagnosed 9 years after the operation and was treated with surgical division of the fistula. The long term follow-up over another 6 years have revealed complete absence of any further recurrence.

## 2. Case report

In January 1985, a 42-year-old male patient was admitted in our unit for elective coronary artery bypass surgery. His angina status was CCA class III and NYHA status was Class II. He had previously suffered from two myocardial infarctions over the past 6 years.

There were no abnormal findings on physical examination. Coronary angiogram showed blocked left anterior descending coronary artery (LAD) distal to the first diagonal and a blocked circumflex artery. The right coronary artery

was dominant and it was 70% stenosed in its middle part. The left ventricle (LV) function was reported to be moderately impaired. The anterior and apical areas were dyskinesic. Coronary bypass surgery was carried out using pedicle left internal mammary artery for LAD and long saphenous vein grafts for intermediate coronary artery and posterior descending branch of right coronary artery. The LIMA was non-skeletonized and all its branches were clipped close to their origin. He was extubated after 12 h. However, he required reventilation after 6 h due to poor blood gases and chest infection. Further recovery was slow but persistent and he was sent home on the eighth postoperative day. Six weeks later he was reviewed in the outpatients' clinic and he was found to be free from angina and dyspnoea. No auscultatory abnormalities were reported at that time and he was discharged to the care of his family doctor.

He did well until 1992 when he started to feel anginal pain on moderate exertion. Exercise test was negative and he was put on atenolol 50 mg a day. His symptoms improved for a year before his angina became worse and he was reviewed by the cardiologist for assessment. On examination an unexpected physical sign was found. There was a systolic murmur in the pulmonary area and to a lesser extent at the left sternal edge with an accompanying short early diastolic murmur. A peculiar squeak in systole was audible when resting very quietly, and it seemed to disappear with a little exercise.

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The angiogram was done which showed blocked venous grafts, LIMA was found to be patent but communicating with the pulmonary vasculature (Fig. 1). The disease in his native vessels had progressed further, now showing total blockade of left main coronary artery and 80% stenosis in the right coronary artery. Ejection fraction was 30%. It was not clear how much the LIMA to pulmonary artery fistula was contributing to angina. The endovascular occlusion of the fistula with coil was not considered because the fistula was relatively peripheral and the patient also required coronary bypass operation due to blocked vein grafts. The patient was therefore referred for surgery.

In April 1994, a redo CABG was done through median sternotomy. There were dense adhesion between the pedicle of LIMA and medial surface of left upper lobe and left pulmonary artery. The fistula between the LIMA and a small branch of the pulmonary artery was identified, clipped and divided. Short saphenous veins were used to graft the first diagonal, distal right and the posterior descending branch of the right coronary artery. LIMA was preserved. post operative period was uncomplicated and he was sent home on the 7th post operative day. Six weeks later he was seen in the out patients' clinic for follow up and was found to be in satisfactory clinical condition and free from angina. Since then, he is being reviewed annually. He has been kept on aspirin 75 mg once daily, simvastatin 40 mg once daily, and perindopril 20 mg a day. In January 2000, he had one short-lived episode of chest pain without ECG changes or enzyme elevation. Atenolol 25 mg was added to his medication and angiogram was repeated which demonstrated that all his new grafts were patent and there was no recurrence of fistula. The patient has remained asymptomatic thereafter.

### 3. Comments

Communication between internal mammary artery and pulmonary artery is rare entity. It could be congenital or acquired. Congenital variety is extremely rare [1]. The acquired fistula can result from trauma, inflammation, neoplasia or surgical operations. Since LIMA is the conduit of choice for coronary bypass grafting, it is used very commonly by the coronary surgeons around the globe. One could therefore expect that there will be an increase in the occurrence of these fistulae. However, the presentation of such a fistula could be so subtle that they can be missed very easily.

The commonest mode of presentation is recurrence of angina due to coronary steal phenomena [2]. Most of these present very late i.e. 2–5 year after CABG. Amongst the cases reported in the literature the earliest presentation was within 5 months after the operation [3]. Most of the previous authors have treated these patients conservatively with good results, except one case where surgical staple division of lung was undertaken [4]. Since recurrence of angina after CABG is mostly regarded as a feature of

progression of disease in the native vessels and is also treated initially with medications, there is a theoretical possibility that many such fistulae remain undiagnosed. We emphasize, however, the importance of good clinical examination. Any abnormal heart sound especially a continuous murmur should be investigated thoroughly. An early coronary angiogram not only helps in evaluating the extent of coronary disease, it also helps in diagnosing such rare malformations.

Very little is known about the pathogenesis of this malformation. It has been speculated that diathermised but unclipped side branches of internal mammary artery could result in recanalisation into the pulmonary artery or the lung parenchyma [5]. However, there is not enough evidence to support this theory. Blanche et al. have recommended to interpose pericardial flap between lung and the LIMA to prevent fistula formation [6]. This view again lacks any solid evidence to support it. In our case the patient had post-operative chest infection and required reventilation. There is therefore a theoretical possibility of neovascularization in the localized inflammatory adhesions which we noticed during reoperation.

We treated our case by surgical dissection, clipping and division of fistula. This can, of course, be considered if fistula is the only cause of angina or a re-do CABG is also under consideration. In cases where re-do CABG is not appropriate, the symptoms should be treated initially with medications, and endovascular intervention for closure should be considered before deciding upon open procedure. The long-term follow-up in our case has however, confirmed that surgical division of fistula is an effective method of treatment.



Fig. 1. LIMA to pulmonary artery fistula.

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