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Case Report

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# Facile Midcab in PectusExcavatum

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## 1. Introduction

Heart surgery in patients with Pectus Excavatum (PEx) is technically challenging due to posterior displacement of the sternum causing marked rotation of the heart to the left. Yet such operations have been performed successfully either as a concomitant or a staged procedure, usually through an anterior sternotomy approach and on cardiopulmonary bypass (CPB). Since the advent of the left thoracotomy approach for the performance of primary or redo coronary revascularization, this mode of action has also become a safe and effective alternative to traditional median sternotomy in patients with PEx presenting with a variety of cardiac defects. We hereby present such a patient with critical ostial left anterior descending (LAD) coronary artery stenosis not amenable to percutaneous coronary intervention (PCI) whose PEx had been "corrected" using a silicone implant and who underwent an off-pump left internal mammary artery (LIMA) to LAD bypass through a small left anterior thoracotomy, commonly Known as MIDCAB (minimally invasive direct coronary artery bypass).

## 2. Case Presentation

This 58 year old male presented with a history of intermittent chest pains of 3 months duration, usually occurring with exertion but also sometimes at rest and not infrequently associated with shortness of breath. Aside from a history of treated hypertension and hyperlipidemia he was born with a PEx that he had elected, in early adulthood, to "hide" using a cosmetic silastic implant. On examination his severely sunken breastbone was not noticeable due to the cosmetic prosthesis implanted through a small vertical lower sternal incision **(Figure 1)**.

**Figure1:** Pre-operative lateral and frontal view of the chest. Note the lower sternal scar.

A preliminary gated CT scan of the heart without contrast showed a total coronary calcium score of 170.41. It also identified a prominent PEx deformity **(Figure 2)** causing mass effect on the heart in the lower sternum.

**Figure 2:** Chest CT scan shows deep indentation of the sternum by a calcified silastic implant as well as right heart compression and rotation of the heart to the left.

This concavity was leveled with an anterior midline partially calcified implant. An exercise stress test showed ST segment depression in the inferior leads while he was experiencing chest pressure with maximal exertion. At Cardiac catheterization a tight ostial LAD stenosis was found in a system with a short left main that trifurcated and gave rise to a large ramus branch and left circumflex (**Figure 3**).

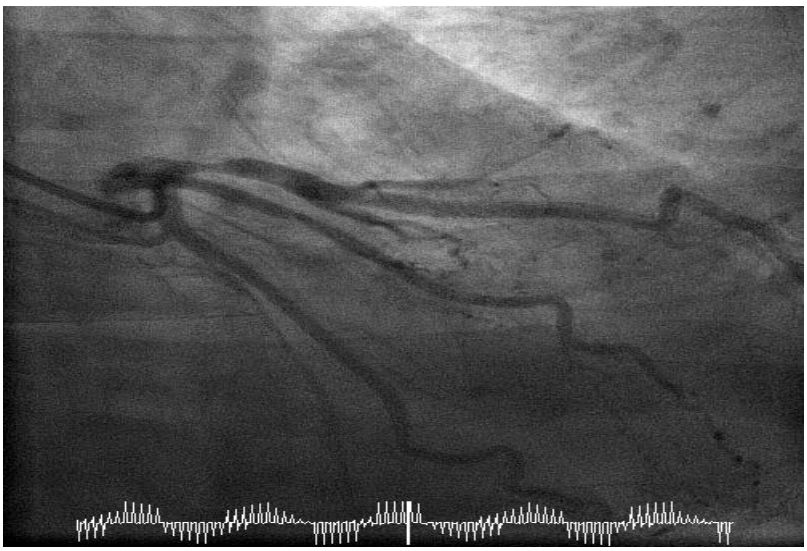

**Figure 3:** Tight ostial LAD stenosis and short trifurcating left main that gives rise to large ramus branch.

It was felt that the percutaneous approach to the LAD might compromise the ramus branch or the left main and require bifurcation or trifurcation treatment of the latter. Consequently it was felt that a MIDCAB (LIMA to LAD) procedure would provide a safe and more durable result.

## 3. Surgical Procedure

With a double lumen endotracheal tube in place to temporarily collapse the left lung and with the left chest elevated 30 degrees, a 4" left anterolateral thoracotomy was performed in the 5$^{th}$ intercostal space extending from

the midclavicular to the midaxillary line. Using the Rultract Skyhook retractor (Pemco Inc., Cleveland, OH) hooked on the Thoralift (Autosuture, US Surgical Corp, Norwalk, Conn) the LIMA was easily visualized and harvested as a pedicled graft from its origin to the 6th intercostal space. After heparinization it was divided distally and appeared to have an excellent forward flow. Its end was clipped temporarily. The Rultract/Thoraliftretractor was then switched to a CTS chest retractor (Cardiothoracic Systems Inc., Cupertino, Cal.) with an immobilizing footplate. Due to the marked rotation of the heart to the left, the pericardium was incised just anterior to the phrenic nerve based on our suspicion that the LAD was so displaced that it was sitting at the usual posterior location of the marginal branch of the circumflex artery. With appropriate retraction of the pericardial edges it was presented and exposed in its middle portion and immobilized using the CTS foot plate. This was a 2.25 mm soft vessel. Using a temporary 2mm Flo-Rester internal shunt (Synovis Life Technologies, St.Paul, MN) inserted in a small mid LAD arteriotomyan end-to-side LIMA to LAD anastomosis was performed with a continuous 7-0 Prolene (Ethicon Polypropylene) suture without any difficulty or hemodynamic instability (**Figure 4**).

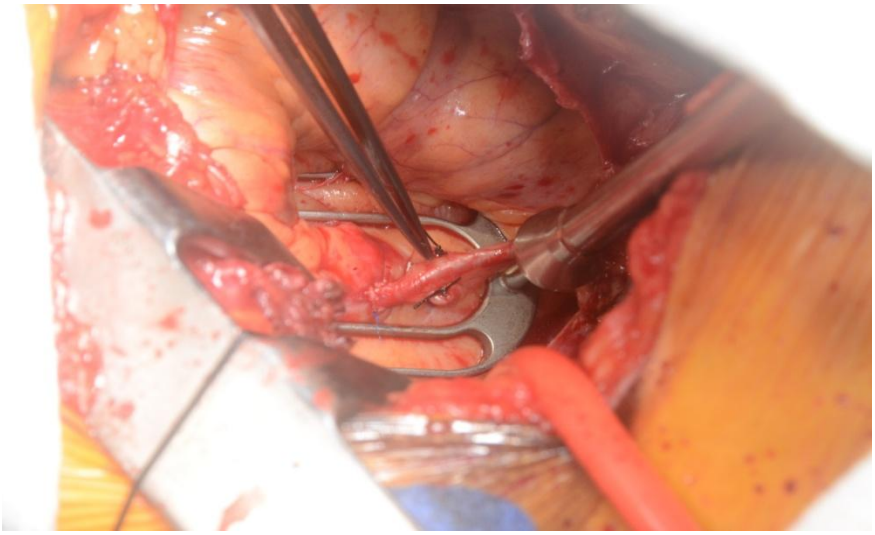

**Figure 4:** Completed LIMA to mid LAD anastomosis off-pump using the immobilizing footplate.

Flow measurements showed excellent diastolic flow in the graft. The chest was closed in the usual fashion over a pleural drain. Patient tolerated the procedure very well and was discharged 5 days later in good condition (**Figure 5**).

**Figure 5:** Post operative view of the left thoracotomy incision, slightly more lateral than in a classic MIDCAB.

## 4. Discussion

Pectus Excavatum (PEx) is a common birth anomaly consisting of a significant concavity of the sternum and costal cartilages. It occurs in 1 in 300-400 births with a 3-1 male predominance. It is not infrequently associated

with congenital heart disease thereby causing a major surgical challenge when corrective open-heart surgery is required. In such situations concomitant repair of the chest deformity (using the Nuss or Ravitch technique) and heart defect, or a two-stage repair continue to be performed successfully using an anterior approach on the arrested heart **[1,2]**. In a rare case report **[3]** simultaneous repair of PEx and an atrial septal defect was performed through a 3cm right sided mini-thoracotomy on the beating heart, without sternal osteotomy, using an appropriate septaloccluder inserted in the right atrium under transesophageal echocardiography (TEE); this was followed by minimally invasive insertion of a retrosternal bar (NUSS procedure). PEx can also be associated with the entire spectrum of acquired heart diseases.As with associated congenital heart diseases, simultaneous **[4]**or staged repair of both entities have also been done successfully. There is however a segment of this population who, for one reason or another, either prefers cosmetic repair using silastic implants, refuses the high risk of a sternal entry or re-entry, or presents with a contra-indication to sternotomy such as prior radiation therapy, prior multiple sternotomies, mediastinal, tracheostomy, etcUnder such circumstances and based on positive experience with left thoracotomy for reoperative coronary bypass procedures in patients with patent LIMA to LAD grafts **[5]**, this approach proved to be a valuable alternativewhen planning on leaving the pectus uncorrected. Thus valvular re-operations using this technique were done in patients with Marfan disease to replace the aortic root after homograft surgery, or to replace an infected mitral or aortic valve after root replacement **[6]**. Similarlya62-year-old patient **[7]** underwent complete revascularization using the LIMA and 3 vein grafts. All these surgeries however required institution of CPB.

After Benetti described his experience with myocardial revascularization without extracorporeal circulation **[8]**. Calafiore extended this technique to include a LIMA to LAD bypass through a small left anterior thoracotomy **[9]**, the so-called MIDCAB procedure. This technique was completed successfully in 4 patients with PEx**[10]** and in a 49 year old who had a cosmetic prosthesis hiding his pectus **[11]**. Similarly our patient who presented with severe symptomatic ostial LAD stenosis had elected, several years earlier, to correct his pronounced pectus deformity with a cosmetic silastic implant. Despite significant displacement and left lateral rotation of his heart into the left hemithorax, exposure and harvesting of the LIMA were easy. Exposure of the LAD was facilitated by a slightly more lateral thoracotomy incision than in the classic MIDCAB, a pericardiotomy immediately anterior to the phrenic pedicle, and elevation of its edges with several traction sutures so as to rotate the heart anteriorly. This allowed immobilization of the LAD with the footplate and completion of an off-pump secure LIMA to LAD anastomosis **(Figure 6)**.

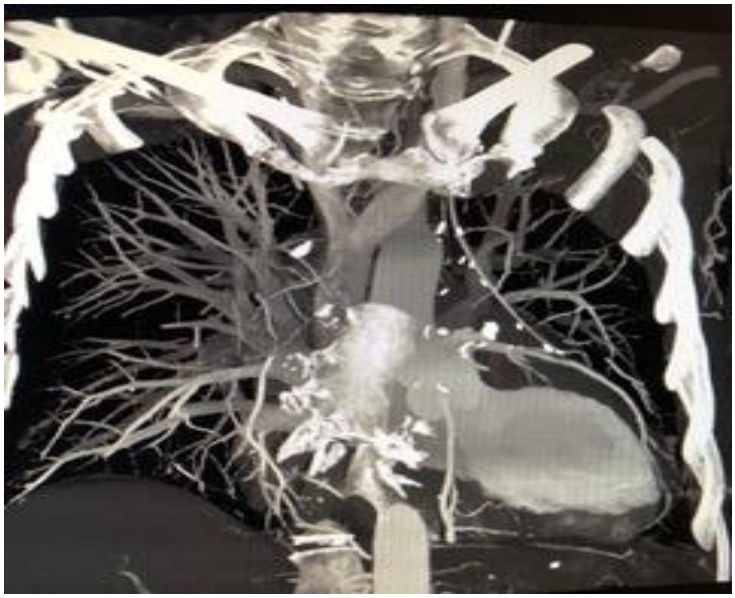

**Figure 6:** Post operative coronary CTA demonstrates patency of the LIMA to LAD anastomosis.

## 5. Conclusion

In patients with uncorrected PEx and significant left-sided coronary artery disease, particularly an ostial LAD stenosis, coronary revascularization through a small left antero-lateral thoracotomy(MIDCAB) can be easily achieved off-pump using appropriate pericardial retraction.

## References


1. Willekes CL, Backer CL, Mavroudis:A 26-year review of pectus deformity repairs including simultaneous intracardiac repairs. Ann. Thorac. Surg 67:511-518.
2. Hysi I, VBincotelli A, Juthier F, Benhamed L,Banfi C, et al.(2015) Cardiac surgery and repair of pectus deformation: When and How?Int.J.Cardio. 2015; 194:83-86.
3. Sun Y, Zhu P, Zheng S (2014) Simultaneous repair of PectusExcavatum and Congenital heart Disease without cardiopulmonary bypass or sternal osteotomy.Journal of Cardiothoracic Surgery 9:168.
4. PevniD, Lev-Ran D, Shapira J, Mohr R (2000) Combined repair of PectusExcavatum and coronary bypass grafting.Eur.J.Cardiothoracic Surg 17: 495-497.
5. Ungerleider RM, Mills NL, Wechsler AS (1985) Left Thoracotomy for reoperative coronary artery bypass procedure Ann. Thorac. Surg40: 11-15.
6. LeMaire SA, MacArthurRG, CoselliJS (2006)Valvular reoperations by left thoracotomy in patients with PectusExcavatum. Ann.Thorac.Surg 82: 733-738.
7. Choghari C, Heymans O, Green M, Joris M (1996)Left Thoracotomy for coronary bypass in a patient with pectusexcavatum. Ann. Thorac. Surg 62:1182-1183.
8. Benetti FI, Naselli G, Wood M,Geffner, L (1991)Direct myocardial revascularization without extracorporeal circulation. Chest 100:312-316.
9. Calafiore AM, Giammarco GD, Teodori G, Bosco G, D'Annunzio E, et al. (1996) Left anterior descending coronary artery grafting via left anterior small left thoracotomy without cardiopulmonary bypass. Ann.Thorac.Surg 61:1658-1666.
10. Kim PY, Wittwer T, Haverich A, Cremer JT (1999)Coronary revascularization without cardiopulmonary bypass in patients with pectusexcavatum. Ann.Thorac.Surg 68:470-472.
11. Massi F, Manca M, Muretti M, Portoghese M (2016)Off-pump minimally invasive direct coronary bypass in patients with cosmetic prosthesis for pectusexcavatum. Interactive Cardiovascular and Thoracic Surgery 23: 332-334.