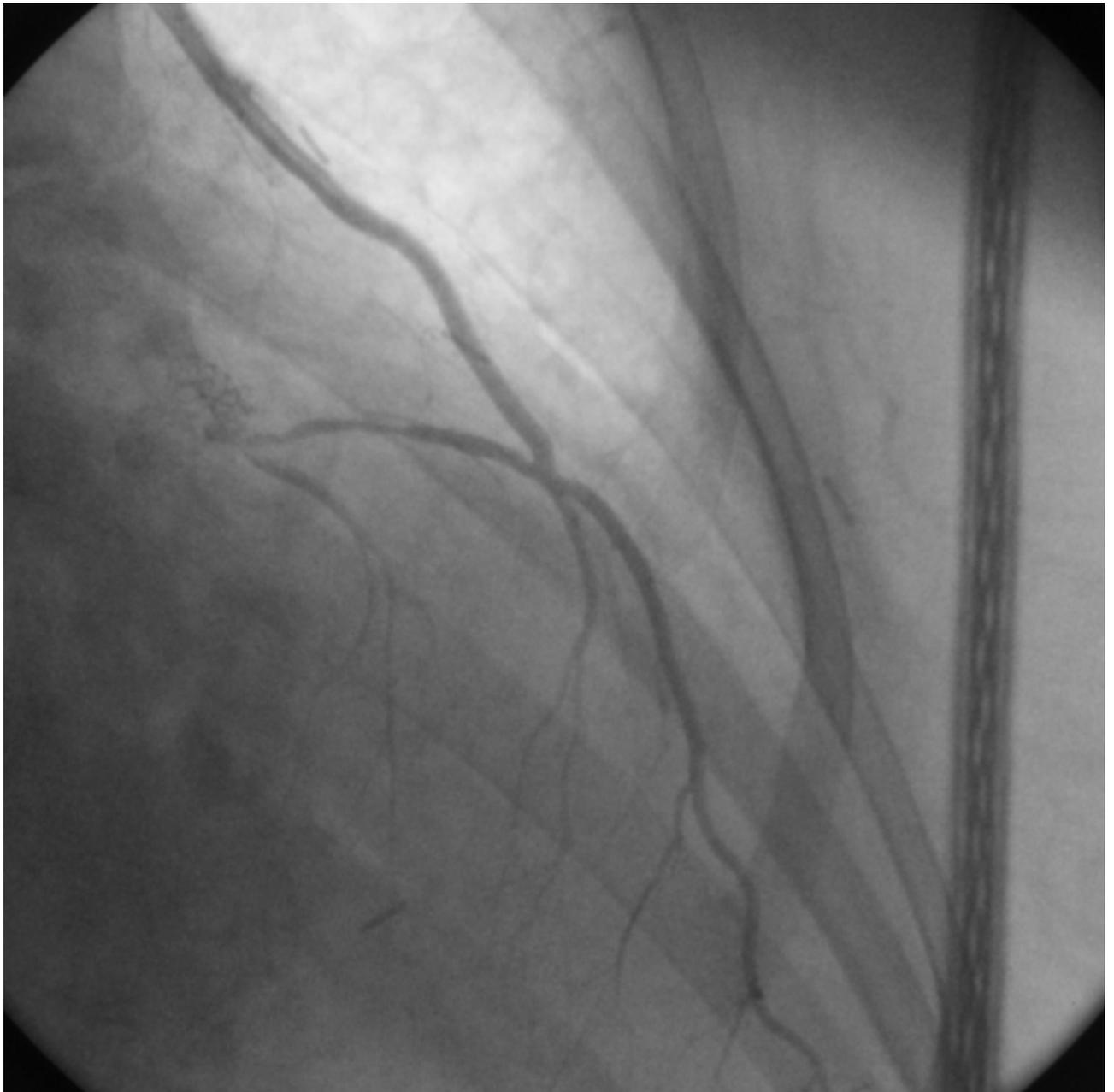

How to do a MIDCAB

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Introduction

Coronary artery surgery has been performed since the late 1960s utilising the mediansternotomy (MS) incision to obtain full exposure to all coronary territories. The use of the left internal thoracic artery (LITA) as the conduit of choice to revascularise the left anterior descending artery (LAD) followed compelling data showing excellent long term patency, associated with better short, medium, and longterm survival, published in the 1980s and 90s. Numerous studies reconfirm this and show patency and survival benefits over PCI for management of proximal LAD disease. The close proximity of the LITA and LAD, in combination with developments in “off pump” grafting techniques in the mid 1990s, allowed for the development of the Minimal Invasive Direct Coronary Artery Bypass procedure. This aims to perform the gold standard LITA-LAD graft utilising the Left Anterior Small Thoracotomy (LAST) incision to avoid the potential problems associated with MS and cardiopulmonary bypass (CPB), and hasten recovery and minimise discomfort. The MIDCAB procedure has been performed since the mid 1990s with excellent results around the world. Most centres however have limited experience though as referrals have been limited by dominance of PCI with Drug Eluting Stents (DES) over the last 10 years. There has pleasingly been some swing back to the MIDCAB procedure to manage proximal LAD disease in younger patients to avoid the need for long term dual anti-platelet therapy. Survival data would also support this approach in suitable candidates.

Technique.

Patient selection is critical. Access is limited giving exposure to the mid LAD only, so it is important that this part of LAD is suitable. Close inspection of angiogram to assess if LAD intra myocardial or diffusely diseased, in which case MS a better approach. Chest wall size can make procedure difficult. Weight over 100kg or large breasts may need to be avoided. Aspirin is stopped 2-3 days pre-op, clopidogrel at least 5 days. Pre op subcutaneous heparin. Double lumen endotracheal intubation helps greatly. Place a litre bag behind left scapula and let left arm lie more posteriorly and lateral to body. Keep patient warm with warming blanket.

The incision is a left sub-mammary incision of 6-10 cm, depending on chest wall thickness, just below nipple in males and in mammary fold in females. Look at CXR to estimate course of LAD - vertical heart means a more medial incision, whilst transverse heart a more lateral incision. Enter chest almost always via 4th ICS and incise space at least twice as long as skin incision. Do not run into LITA medially whilst doing this. Gentle rib spreading to expose pericardium, which is then opened and LAD assessed and

suitability for procedure confirmed. Open ribs further and find LITA over 3rd and 4th costal cartilages. May not be visible in which case mobilise fascia and innermost layer of thoracic muscle off chest to reveal LITA. It must be gently mobilised with diathermy to free it from the 4th and 5th costal cartilages before opening ribs too much which can tear branches. Mobilise off 3rd rib if good view. At this stage change thoracotomy retractor for LITA harvesting retractor (I use a Thoralift retractor) which is necessary to get vision of full length of LITA on chest wall. Continue to mobilise LITA off chest wall with diathermy, you will need medium and long extensions to do this. Long haemoclamp applicators are necessary though I avoid using clips as much as possible till LITA is down. Vessel can be mobilised all the way to subclavian vein, care to avoid phrenic nerve as usual. Heparinise with 10,000 units whilst changing retractor back to a medium Finochetto or other rib spreader. Divide LITA and treat with intra luminal blood buffered Papaverine. I then hold end of LITA with holder made of 2 alligator clips (from electrical store) joined by sternal wire - this keeps assistants hands out of field.

Critical at this stage is to place intercostal nerve blocks in as many spaces as visible, this will allow for painless extubation. Apply pericardial stays as necessary to bring LAD into centre of field, often pulling on stays moves heart the opposite way. Expose LAD with scalpel and CO2 blower. Place silastic Retractable tape above and below intended anastomotic site. Apply stabiliser. I use a Platypus (compression) stabiliser, but a suction stabiliser is fine if room. I open LAD and use an intra luminal shunt. The anastomosis is done with mirror image of your usual technique. De air then open graft. If any concerns use flow probe to check graft flow. Close pericardium as much as possible and/or cover with extra pericardial fat pad. Place 2 x 19 Blake drain then re expand left lung whilst protecting course of graft. I then use a 4/0 Prolene to suture the anterior edge of the lung to the chest wall at the medial end of the incision. This keeps the lung between the anastomotic site and the chest wall, and minimises atelectasis in this region. If you don't the lung retracts here and the anastomosis ends up stuck on the chest wall. The ribs are gently approximated with heavy PDS and soft tissues closed in layers. Patients are extubated on the table and transferred to ICU. All are given Aspirin that day. Colchicine as tolerated to minimise pericarditis. Mobilise and discharge between Days 3-5.

MIDCAB procedures are difficult more in the LITA mobilisation than in the grafting, but very rewarding in how quickly they recover post operatively. You need cardiology support if you want to get sufficient cases to do. The best way to achieve this is to have as many of your early cases angiogrammed post op as possible. This can be done via their left radial artery line that is already in place, and performed on day 1 as patient is on the way from ICU back to the ward. This visual feedback to your cardiology colleagues is

invaluable. The only feature to be aware of is ITA kinks which occur after grafting. These appear as tight lesions along the course of the LITA due to it changing from a slight concavity to a convexity. These are not flow limiting and remodel and go away in a few weeks, they also disappear if you place a guide wire across.

The MIDCAB procedure is an option as part of a hybrid approach, with angioplasty performed to other coronary lesions either before or after the MIDCAB. I prefer to do MIDCAB first before starting clopidogrel on day 2 and then PCI. Operating after PCI requires continuing clopidogrel (not always pleasant) or stopping it, which runs risk of stent thrombosis.

Case selection has been widened with the availability of the DaVinci robot. This allows for harvesting the LITA in larger patients (90-110 kg), as well as longer grafts to permit selective sequential grafting of the LAD and diagonal branches. Future development of anastomotic devices may further expand the cases possible for this approach.

