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Original Article

Early and mid-term results of minimally invasive coronary artery bypass grafting



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ABSTRACT

Introduction: Minimally invasive coronary artery bypass grafting (MICABG) is a less invasive method of performing surgical revascularization. This technique coupled with use of off pump technique of surgical revascularization makes it truly less invasive. This method is highly effective even in high-risk patients. Results of this procedure are comparable to standard off pump technique and are better than percutaneous coronary intervention utilizing drug-eluting stent. We present an early and mid-term result of the use of this technique.

Method: We enrolled 33 patients for analysis operated between 2008 and 2012. Operation was performed utilizing off-pump technique of coronary artery bypass grafting through a minimal invasive incision. Left internal mammary artery graft was done for single vessel disease and radial artery was utilized for other grafts if required. Median follow up of 2.5 years (6 months–4 years) is available.

Results: Median age was 58.5 years (41–77) and all were male. Single vessel disease was present in 7, double vessel in 14 and triple vessel disease in 12 patients. All the patients had normal left ventricular size and function. There was no operative and 30-day mortality. Conversion to median sternotomy to complete the operation was done in 6.6% (2 out of 33 patients). One patient had acute myocardial infarction and there were no deaths during follow up.

Conclusion: MICABG is a safe and effective method of revascularization in low risk candidates for coronary artery bypass grafting.

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Along with the establishment of off-pump coronary artery bypass grafting (OPCAB),¹ the initial attempts were made of performing the operation through a small anterior thoracotomy on left chest.^{2,3} Off-pump coronary artery bypass (OPCAB) techniques that circumvent the need for cardiopulmonary bypass were initially greeted with enthusiasm. Later, lackluster data on the results of OPCAB led to this procedure falling out of favor among most surgeons. Improvements in results compared with those for on-pump Coronary Artery Bypass Grafting (CABG) were judged to be insufficient to justify the added technical complexity of OPCAB. Recently, however, the Da Vinci robot and small incision in chest has opened the door for a procedure that is both off-pump and sterna sparing.

The advantages of this approach are early recovery and possibility of early discharge after multivessel coronary artery bypass grafting. This procedure also proves beneficial in patients with high risk who may be exposed to higher mortality. In these patients performing inadequate revascularization using this technique produces similar results.⁴ However incomplete revascularization has been associated with increased cardiac death, myocardial infarction, revascularization and readmission reported in treatment of multivessel disease with drug eluting stents.⁵ Minimally invasive coronary artery bypass grafting (MICABG) can be accomplished using a small anterior thoracotomy of 6–8 cm or with the help of Robotic assistance using the same incision or with performing the complete operation through endoscopic approach using robot (Total Endoscopic Coronary Artery Bypass). This incision has proved to be more beneficial than a standard sternotomy in reducing the complications.⁶ MICABG approach is less technology intensive and cheaper to perform. Its comparison with an OPCAB technique reveals equitable results.⁷ Though, safety of the procedure and reproducibility are also the important considerations,⁸ this approach is feasible in active CABG program and is being currently pursued as an alternative to sternotomy CABG.

1. Method

Patients operated in the department of Cardiovascular and Thoracic surgery at Sanjay Gandhi Postgraduate Institute of Medical Sciences using MICABG were enrolled in the study. The patients enrolled were operated between August 2008 and August 2012. This is a retrospective analysis of cases. The permission from ethical committee of the institute was taken to extract the information from patient case records and hospital information system. The ethics committee waived the need for informed consent. Informed consent for MICABG was obtained from the patients before operation. They were also informed about the need of conversion to median sternotomy if required.

2. Anesthesia and patient position

Regular general anesthesia protocol is followed with double lumen endotracheal intubation. This is required to deflate the left lung while the surgery is performed to improve the exposure. The patient position is supine with 30° right lateral.



Fig. 1 – Incision and its retraction.

3. MICABG procedure

A 6–8 cm incision is placed in the anterior chest wall straddling the nipple on left side. Site of incision was slightly altered depending on the number of vessel to be grafted and the habitus of the patient. Incision is placed on the 5th intercostal space and the chest cavity entered through 4th or 5th space or sometimes using both the spaces to improve the exposure of all the vessels. The undercutting of the skin incision is required to prevent the rib fracture. To limit the size of incision narrow blade retractors with variable depth were used. To improve the vision further the retractor to lift the sternum was utilized.

Left internal mammary artery (LIMA) was harvested under direct vision and then radial artery (RA) was harvested from left arm whenever multivessel grafting was intended. LIMA to RA “Y” was prepared using 8-0 polypropylene suture. Retraction of small chest incision was performed using Thoratrak retractor (Medtronic Inc, Minneapolis, Min), Fig. 1 and LIMA exposure was enhanced by Fehling retractor (Fehling, Germany). Stabilization of heart was done using octopus NS and octopus NS nuvo (Medtronic Inc, Minneapolis, Min) and for lateral territory grafts Starfish NS (Medtronic Inc, USA) Fig. 2, was also utilized to avail adequate displacement of heart for better exposure. LIMA was used for grafting left anterior descending artery and RA was used for grafting other vessels.

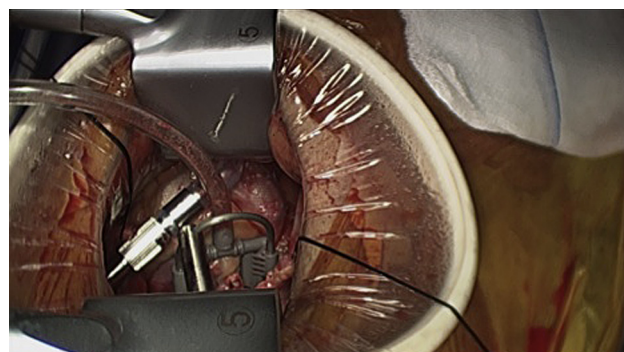


Fig. 2 – Grafting of lateral territory of heart.

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