OFF PUMP CORONARY ARTERY BYPASS GRAFTING - OPCAB

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INTRODUCTION

Over 8,00,000 Coronary Artery Bypass Surgeries are being performed every year worldwide. In India itself, more than 40,000 CABGs are performed every year. The annual perioperative mortality is reported to be 1-2% in almost all the reputed cardiac centers in India and abroad.

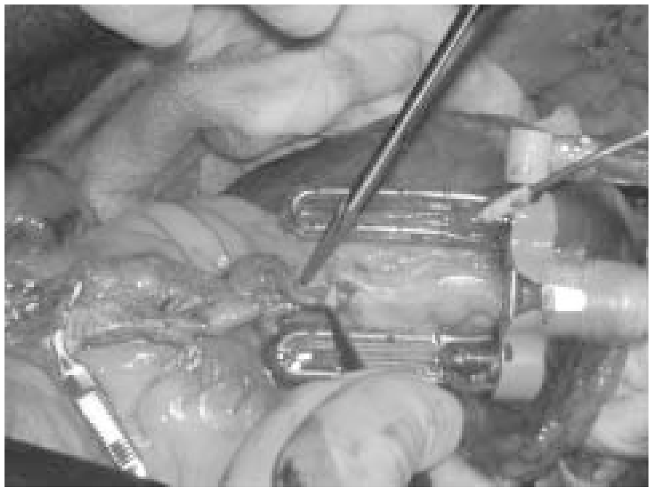
HISTORICAL BACKGROUND

Coronary Artery Bypass Surgeries (CABG) were first performed in the fifties on beating heart, as the heart lung machine was not yet invented. Later, the invention of heart lung machine (HLM) and introduction of Cardiopulmonary Bypass (CPB) revolutionized the concept of Open Heart Surgery (OHS). This provided the surgeon with a bloodless and motionless field for performing surgeries on the heart. With the improvement in techniques of myocardial preservation and modification of oxygenation and HLM, surgeons were able to achieve excellent results.

But in the early nineties few group of surgeons and researchers started performing these surgeries on beating heart, so as to avoid the incremental risk factors associated with the CPB. The research was aimed to avoid the neurological problems associated with it that varied from mild neurocognitive defects to frank stroke seen in 1-2% of patients undergoing CABG on pump. It was thought that the Heart Lung Machine (HLM) was the main culprit which caused this problem. Other complaints like respiratory problem, immunosuppression and injury to the blood products, prompted researchers to press on improving technique to prefer beating heart surgery.

STABILIZING THE HEART

Octopus is one of the dozen or so stabilizers (instrument used to stabilize the coronary artery to perform anastamosis) now in the market. This is a type of suction stabilizer. This has eight suckers on its arms, which helps in sucking the heart up and holding that bit of the heart immobile, while grafting the coronary artery. There are other types of stabilizers called compression stabilizers which hold the heart firm, thereby immobilizing that part of heart which remains between the prongs of these stabilizers.

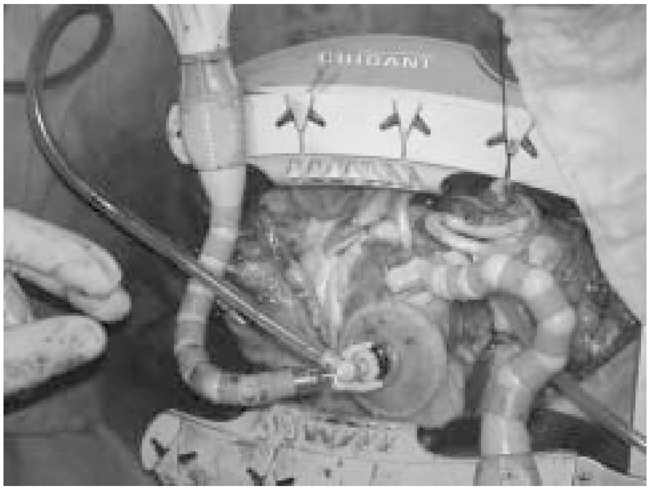


Nowadays, with these stabilizers, surgeons are able to perform coronary anastamosis on the front, behind and the side of the heart.

POSTIONING THE HEART

To position the heart with its apex up and also to the right, numerous techniques and aids have been developed, thus by applying stitches to the pericardium (covering of the heart) behind the heart and lifting them, the surgeon is able to flip the heart over, so as to access the arteries behind the heart. Along with this, maneuvering the table with a head down position and towards the right brings the coronary arteries directly under vision.

There are also newer ‘positioners’ called ‘Starfish’ and ‘Xpose’ devices, which will again act as suction cups on the apex of the heart. These also help in tilting the heart, allowing it to contract as usual and maintain haemodynamics.



Thus, with comfortable positioning and stabilizing, all the coronary arteries around the heart can be accessed to perform bypass surgery.

MYOCARDIAL PROTECTION IN BEATING HEART SURGERY

Now comes the issue of preventing ischemia (lack of blood supply to a region of the heart), when a coronary artery is snared or blocked while it being operated upon.

Snaring is performed by sutures or by silastic bands, proximal and distal to the proposed site of Arteriotomy (opening to be made on the artery). The snare isolates a segment of artery so that the anastamosis can be performed in a blood-less field. But in critically ischemic areas of the heart, snaring the coronary artery could aggravate ischemia, and cause a compromise in haemodynamics (fall in cardiac output and systemic perfusion). In such circumstances, we use Intracoronary shunts (intraluminal shunts across) or Aorto-Coronary shunts (shunts from the aorta to the distal coronary artery).

These help to maintain haemodynamics and allow surgeons to perform these surgeries with ease.

ADVANTAGES OF BEATING HEART SURGERY

In spite of performing surgeries on beating heart, it was found that in some centers, the risk of neurological complications have not come down. It was found that the risk was high when side clamps were used for proximal anastamosis of vein grafts onto the aorta – dislodging of plaques within the aorta being the major culprit.

Hence the use of Bilateral Internal Mammary arteries and the ‘T’ and the ‘Y’ graft procedures became routine, along with radial arteries for performing Total Arterial Coronary Revascularization (TACR) on beating heart.

Hence it was hypothesized that avoiding Cardiopulmonary Bypass and manipulation of aorta should definitely reduce the incidence of stroke in Coronary Artery Surgeries.

Last year more than 300,000 beating heart surgeries have been performed world wide and India has caught up with it in a big way. Most of the coronary centers perform the coronary surgeries on beating heart. We have also caught up quite well with the bandwagon. As of today we are one of the few centers in India performing almost all our Coronary Artery Bypass Surgeries on beating heart. This has definitely improved our postoperative management in a big way. We are able to extubate patients within six hours if there is no bleeding; mobilize them in 12 hours and discharge them within one week.

The perioperative Myocardial infarction is zero and morbidity is negligible and most of our patients are pain free quite early in their postoperative course. This has helped us in operating on elderly patients, with stroke, with renal and hepatic dysfunction and other blood dyscrasias.

The blood loss and transfusion requirements remain nearly the same in some of the patients. But in majority of the patients we are able to perform surgery without any blood loss at all.

We have now devised and fabricated couple of anastamotic devices for performing proximal anastamosis on the aorta without side clamping. This helps us in performing our top ends on calcified aorta and by not decreasing the systolic pressure.

CONCLUSION

Nowadays, OPCAB procedures are performed in almost all specialized cardiac centers in the country with excellent results. Different types of shunts, stabilizers and positioners are flooding the market and making the operating field more and more congenial for surgeons to operate conveniently.