SURGICAL REVASCULARIZATION IN WOMEN - AN OVERVIEW

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Cardiovascular disease is the leading cause of death worldwide especially in the developed world.[1] It is still considered as a disease of men. There is little recognition of its importance in women. The available data from World Health Organization indicate that about 17 million people die of cardiovascular disease in the world annually which is one third of all the deaths. One in seven women in Europe will die of Coronary Heart Disease (CHD) while there are more than 1.2 million women living in UK with CHD.[2]

Gender difference exists not only in disease presentation but how they are investigated and treated. Compared to men, at the time of presentation with CHD women tend to be 10 year older than men and at the time of their first Myocardial Infarction (MI) they are usually 20 years older.[3] This is largely because of the protective effects of estrogen until after the menopause. This protective effect also does not wear off immediately after menopause but gradually fades away in next ten years. However it is not only the older women who suffer from CHD-more than 20,000 women in USA have MI under the age of 65 years,[3] life-style & smoking may be to blame.

It has been consistently noted that women fare worse than their male counterparts after myocardial revascularization either by percutaneous intervention or Coronary Artery Bypass Grafting (CABG) with higher morbidity & mortality in short term. Even as far as 1975 studies[4,5] showed a higher immediate mortality & Morbidity amongst women. Since then further studied have confirmed that this difference still persista.[6,7]

This excess mortality has been attributed to various reasons like females presenting late in the disease stage, more urgent and emergent CABG amongst women, greater technical difficulty in operating on women and more severe coronary artery disease amongst women. They also tend to have more co-morbid factors like Diabetes mellitus, hypertension, obesity, congestive heart failure and New York Heart Association functional class.[8] Partiality in diagnosing & treating has also been noted between genders.

Many reasons are given for these differences from socio-political to medical. Things have changed slowly for the better over the decades but the difference in outcome still remains against women. Women younger than 50 years of age who undergo CABG are three times more likely to die than men (3.4% vs. 1.1%).[9] The relative risk for operative mortality remains in the range of 1.4 to 4.4.[10] Cardiac operative risk stratification score EUROSCORE count female gender as an independent risk factor accounting for 1.2% logistic risk of mortality.

It has been noted that female population for surgery is older, mostly requiring CABG on urgent basis & have higher co-morbidity scores. However, even after adjustment for theses variables, there remained 75% higher risk for women. Also to note is that women present more in unstable condition with greater severity of angina & symptoms of congestive heart failure at he time of CABG, despite similar (or less severe) angiographic disease and similar (or better) left ventricular function.[11]

Body surface area (BSA) emerges as one of the significant reason for adverse outcome of CABG. An individual with BSA less than 1.6m2 is five times as likely to die as someone with BSA of greater than 2.0 m2.[11] This smaller BSA is also correlated with smaller vessels that females have. Studies have shown a significant difference in the size of left anterior descending (LAD), diagonal & obtuse marginal arteries; being smaller in females. A direct correlation between BSA & luminal diameter has been confirmed. The independent con-

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tribution of vessel size to the risk of hospital mortality is seen if mid LAD is less than 2.5mm versus greater than 2.5mm.[11]

Gender bias is also notable in the use of the best conduit for revascularization i.e. Left internal mammary artery (LIMA). It has been shown that LIMA usage is associated with decreased risk of morbidity & mortality. In general the LIMA usage in females is less, 65% compared to 76% in males.[11] CABG without use of LIMA has higher operative mortality.[12] But it must be said that despite normalizing LIMA usage females still show higher mortality. Also to note that it has been shown that IMA grafting can be successfully undertaken even among patients of small body size.[13]

All these factors go against the female population along with the clinical biases leading to delayed referral for surgical intervention. This shows through higher percentage of non elective procedures in multiple studies, and also older age group. Other studies have shown the females to have different rates of referral for coronary angiography compared with men in the presence of, non invasive testing results of coronary artery disease, the same hospital discharge diagnosis and similar clinical history & prior cardiac events.[14,15] An important thing to note that females have the same risk factors as males but their weightage is different to risk factor.[16] Also to note that in very high risk group this difference disappears.

In terms of intra and peri-operative complications several studies have demonstrated a higher incidence of stroke, postoperative hemorrhage, prolong mechanical ventilation & heart failure.[17,18] Women not only have higher operative mortality, their long term results of surgical revascularization are different as they also remain more symptomatic compared to men,[19] with a greater rate of graft occlusion[19] and at follow up require more revascularization which could be explained by the fact that women receive less internal mammary artery conduits compared to men. Post operatively, women have a worse functional status & mental health compared to men.[20]

We must remember that mortality rate of women in the setting of acute myocardial infection is higher as compared with men[21] and there are other distinct gender differences in autonomic reactions to abrupt coronary occlusion.[22] The role of estrogen is logically implicated to explain these observations. Estrogen does confer several cardioprotective effects by decreasing low-density lipoprotein levels, increasing high-density lipoprotein levels, enhancing endothelial function & improving anti-oxidant activity. Estrogen replacement therapy has been shown to decrease the risk of re-stenosis after coronary atherectomy & to improve long term outcome after percutaneous transluminal angioplasty in post menopausal women. Its role needs to be confirmed in surgical group.

The major studies like Coronary Artery Surgery Study (CASS) and Bypass angioplasty Revascularization Investigation (BARI trial)[23] included too few females at best 25% of the investigated group yet the results concluded from these studies are extrapolated and applied to the female population. The aim to explain the risks & benefits of CABG in female population using standard data is misleading. Now we have studies that give us a better understanding on the differences of risk profiles, their impact both on short & medium term on the female patients. We should not compare the females with the same yardstick as males as they are a different group with their own characteristics.

Despite all their poorer out come in immediate per-operative period the long term survival is same in females.[24] Currently there is increasing interest in off pump CABG because studies are showing reduced mortality, respiratory complications & length of hospital stay.[25] However time & experience will confirm or refute this. Until such time women for CABG should be given the benefit of LIMA as conduit of choice.

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