

Transmyocardial Laser Revascularization In Septa And Octagenarian Geriatric Population*

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Introduction

The treatment of Ischaemic Heart Disease is the improvement of blood flow to underperfused myocardium. The mainstay of this treatment are Coronary Artery Bypass Graft surgery (CABG) and Percutaneous Transluminal Coronary Angioplasty (PTCA). Even with the success of these interventions, there remain many patients with disabling angina who are not candidates for these procedures because of diffuse and small vessel disease, endstage coronary vascular disease, low LVEF or elderly population over 65 patients of age with associated reversible risk factors like anaemia, Congestive Heart Failure, Systemic Hypertension respiratory or Hepato-renal Dysfunction who can pose high early post op mortality¹ of 16% and a late mortality of 12%. There is also a reported higher incidence of morbidity in this subgroup of patients such as higher incidence of perioperative morbidity². The reasons for higher morbidity and mortality have been described mainly due to advanced disease, poor general health and worsening of functional class³. The goal is to relieve ischaemia, improve functional class with minimal rate of complications and avoidance of aggravating the reversible risk factors. Increasingly sophisticated treatment alternatives are being utilised for those with Coronary Artery Disease (CAD) and technological advancement continues in the areas of surgery. still there remains a large number of patients who are limited with anginal symptoms but do not qualify for CABG either due to the nature of the pathology, size of vessels or poor general health. Elderly

population of age 65 years above are always at more risk than their younger counterpart due to their advanced disease, poor tolerance and their being prone to complications. Transmyocardial Laser Revascularization (TMR) may offer a viable treatment alternative⁴. Studies suggest that channels made on the beating heart with high power CO² laser can protect the muscle from injury⁵. Hence laser energy can be used safely on the beating heart. The channels have been proven to remain patent⁶.

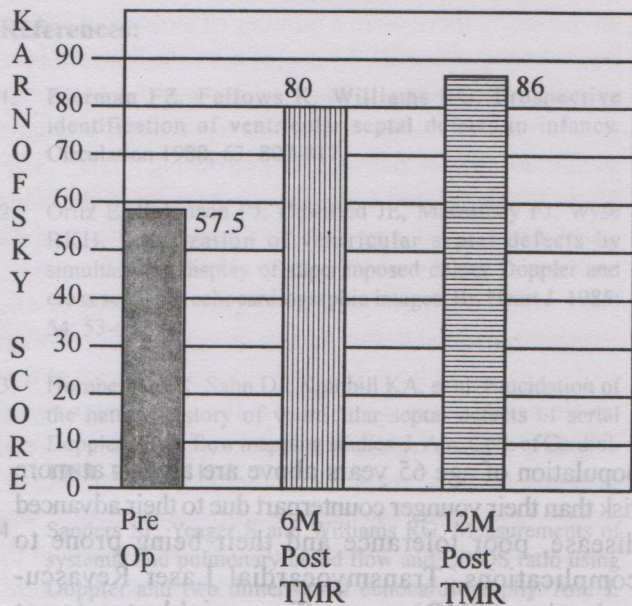
Material & Methods

To benefit the older population from the highly sophisticated technology of TMR we have evaluated 23 patients retrospectively. This analysis revolves round the pre and post-operative date and results with view to follow up regarding clinical improvement, regression of anginal class, complications in a detailed analysis. There are 18 males and 5 females with age range of 65 years - 83 years and a mean average age of 69.08 years. 21 are Saudi national. 20 patients belonged to stable angina group while 3 had unstable angina. The coronary angiograms revealed 20 patients with 3VD, 2 patients with 2VD and only 1 patient had single vessel. 14 patients had non graftable diffuse small vessel disease while 9 were graftable. 17 patients underwent left anterior thoracotomy while 6 underwent sternotomy. Risk factor evaluation revealed that 17 patients were hypertensive, 15 were diabetic and 5 were obese, 3 patients had hypercholesterolaemia and 1 patient had peripheral artery disease of both legs. We looked into morbidity at pre operative evaluation and found 3

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TABLE I

KARNOFSKY SCORE



patients in congestive heart failure, 1 patient in acute pulmonary oedema and 1 patient with left lobe pneumonia. 1 patient had subclinical hypothyroidism and 1 patient with relative polycythemia.

Follow Up Studies

Follow up ranges to 12 months at which we were able to evaluate 18 patients. 3 patients were lost to follow up. The operative mortality was 1/23. This patient died intra operatively due to progressive LV dysfunction while there was 1 late reported death due to non cardiac cause 6 months after the TMR procedure. Morbidity encountered was fortunately minimal as only 1 patient developed wound infection which responded quickly in 10 days to antibiotics.

Results

All the patients were followed up at 6 months and 12 months and were compared to their values of pre TMR level and data were analysed.

6 Months Follow Up

At 6 months follow up on clinical evaluation by Karnofsky score the patients showed the mean value of 80% where at baseline it was 57.5% (Table I). Baseline

pre TMR LVEF by MUGA was 45% and at 6 months improved to 51.2% (Table II). While similar improvement of LVEF on ECHO was also documented were the baseline LVEF was 54.88% and at 6 months increased to 61.33%. (Table III). The exercise time at pre TMR status was mean of 6.8 Min. while it improved to 8.9 Min. at 6 months with an increase in work load formed from the pre TMR level of 3.7 METS to 5.65 METS at 6 months. The VO² max at baseline was 10.7 ml/kg/min and it increased to 14.54 ml/kg/min at 6 months.

12 Months Follow Up

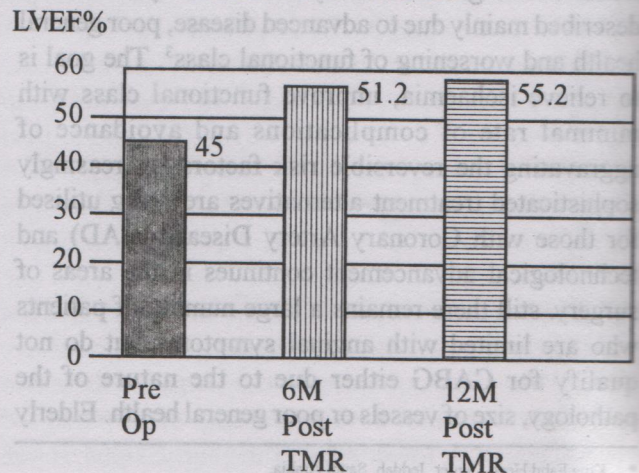
When these patients were seen at 12 months, they showed dramatic improvement in their functional class, clinical status and symptomatology that were documented. The Karnofsky Score at 12 months was 86%. LVEF by MUGA Scan improved to 55.2% and was statistically significant (P<0.0001). The patients underwent exercise stress test and documented an increase in exercise time to 11.07 min, (Table IV) highly significant (P>0.0001) and an increase in work load was also observed being 7.53 MET, highly significant (P<0.0001). (Table V) The VO² Max metabolic test was also improved to 18.86 ml/kg/min and was statistically significant (P<0.0001).

Morbidity

Ischaemic patients when revascularized through CABG could potentially carry certain risk of

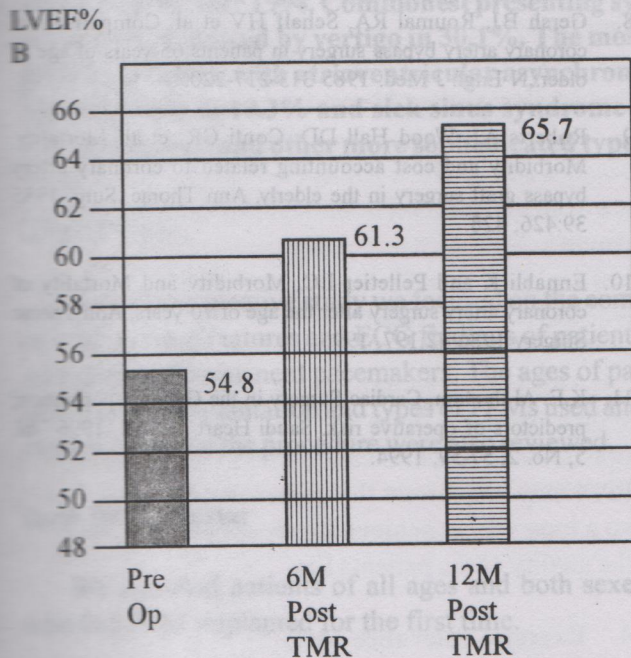
TABLE II

LVEF % BY MUGA



complications due to the fact of them being subjected to Cardiopulmonary bypass. Elderly population is also at risk of developing complications sooner than younger age group and are prone not only to infection but rather quick assault to their target organs leading to renal failure, respiratory failure and metabolic complications. Keeping in view when this elderly population at risk is referred for CABG their incidence to postoperative complications do increases manifold.

TABLE III
LVEF BY ECHO



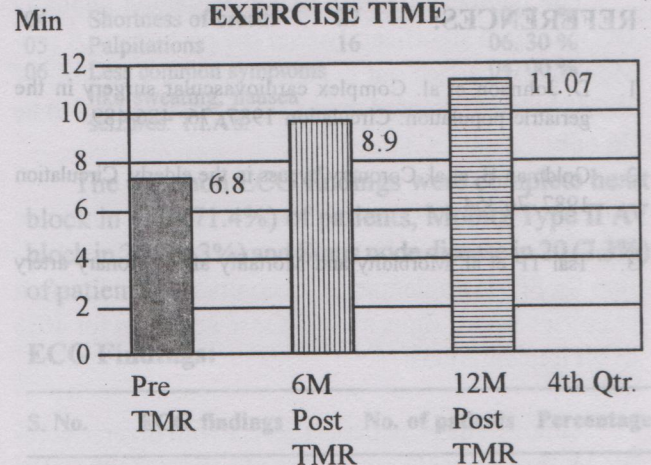
While in our study when this fragile geriatric group underwent TMR surgery, their recovery was spectacular. There was no incidence of hepatorenal failure nor did we encountered any respiratory infection which is commonly seen in this age group post operatively. These patients were weaned off ventilator within 24 hours and were mobile on their feet on day 2 in the intermediate care unit. Averagely they were discharged on 5th day to be followed on outpatient basis.

Conclusion

The prevalence and severity of coronary atherosclerosis increases so dramatically with age that more than one-half of all deaths in people aged 65 years of older are due to coronary disease and about three fourth of all deaths from ischaemic heart disease occurs

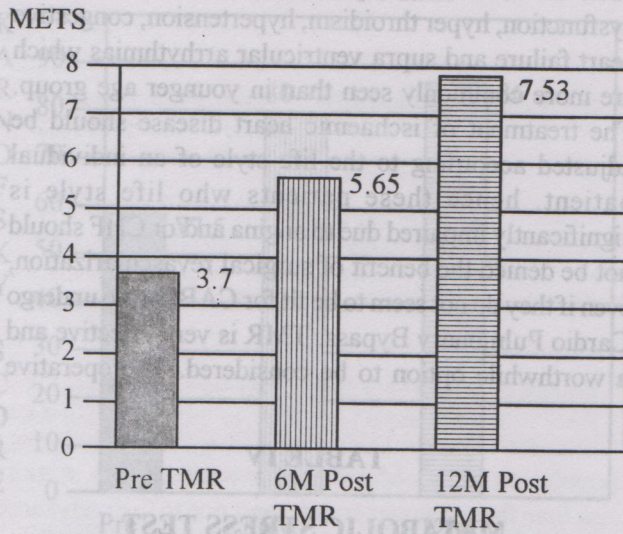
in the elderly⁷. The elderly population is fragile, prone to infection and involves certain reversible risk factors such as anaemia, hepato-renal and respiratory dysfunction, hyper thyroidism, hypertension, congestive heart failure and supra ventricular arrhythmias which are more commonly seen than in younger age group. The treatment of ischaemic heart disease should be adjusted according to the life style of an individual patient, hence these patients who life style is significantly impaired due to angina and/or CHF should not be denied the benefit of surgical revascularization, even if they do not seem to be fit for CABG or to undergo Cardio Pulmonary Bypass. TMR is very effective and a worthwhile option to be considered. The operative

TABLE IV
METABOLIC STRESS TEST EXERCISE TIME



mortality for coronary artery bypass surgery in patients over 65 years old is between 2.7% to 7.7%⁸, compared to young patients, elderly spend more time in hospital⁹ and their complications include Cerebro Vascular Accident (CVA), sternal dehiscence and respiratory failure¹⁰. These patients have also decreased immunity which makes them more vulnerable to for infection, their tolerance to any complication is very poor compared to the younger age group and hence warrants early interference¹¹. Hence TMR could be a promising alternate to CABG in elderly population as the procedure is less invasive. It is faster than the technically complicated CABG procedure and as well obviates the need to use Heparin and Cardiopulmonary Bypass and the need for cardioplegic arrest of the heart and cardioplegic arrest of the heart.

TABLE V
WORKLOAD (METS UNITS)



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