

Paper of the month - August 2005

Paper: Percutaneous Coronary Angioplasty Compared with Exercise Training in Patients with Stable Coronary Artery Disease: A Randomized Trial

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Coronary stent procedures are becoming the therapy of choice for patients with coronary artery disease (CAD), even those with stable CAD states. But, it is also true that this is an invasive procedure which does carry its own level of risk. It is hypothesized that exercise programs might independently benefit patients with CAD, even if exercise does not directly affect the atherosclerosis process. In this context, Hambrecht and his colleagues from Leipzig in Germany conducted a randomized control trial comparing an exercise program with a traditional clinical treatment such as coronary angioplasty and stent procedure.

Male patients aged ≤ 70 years were randomized to either receive a stent angioplasty (n=50) or 12 months of exercise program (n=51). Patients in the exercise group performed a structured exercise program, starting in hospital with six sessions per day for 10 minutes on a bicycle ergometer, and then after discharge patients were asked to exercise on the bicycle for 20 minutes per day and to attend one weekly 60-minute group aerobic training session. The outcomes assessed included the physiological changes that might be expected by a stenting, which is an increase in the coronary artery diameter, and the physiological changes that might be expected following an exercise program which is an increase in fitness as measured by sub-maximal oxygen uptake.

The results showed that randomization was effective, in that the baseline clinical characteristics were almost identical between the exercise group and the stent group. Drop-outs were infrequent, and were similar in both groups, and adherence with the exercise training protocol remained high throughout the study period.

As expected both groups produced the physiological effects that they were supposed to. For example, after 12 months of exercise sub-maximal oxygen uptake improved significantly among exercisers, where as it did not change among stent patients. Similarly, the stent group increased their mean coronary artery diameter significantly, but this did not change in the exercise group and this was exactly as expected. However, in looking at endpoint health events, there were 21 adverse CAD events in the stent group, compared to only 6 in the exercise group. That is, the event-free survival after 12 months was significantly higher in the exercise group than in the stent group (88% vs. 70%, respectively, $P=0.023$), with the stent group reporting more adverse cardiovascular events.

Commentary: The study shows that both programs achieved their physiological outcomes, but that the health outcomes were better in the exercise group than in the stent group. It also demonstrates that the exercise intervention was substantially cheaper and more cost effective, owing to reduced hospitalizations and repeat revascularisations. The challenge for this study is working out whether the exercise group achieved a cardiovascular benefit through other mechanisms such as alternative [collateral] coronary circulation or other physiological reasons such as effects on cardiac artery endothelial cells to make them less likely to be prone to cardiac events. Hambrecht and his group have previously done work on cardiac endothelial cells to demonstrate that exercise stabilizes cell membranes which could protect against ischemic CAD events. If this is true then exercise is a potent therapy for people with stable CAD in preventing them from having major cardiovascular events. An alternate perspective is that stenting these uncomplicated CAD patients could be a slightly more hazardous procedure, than an exercise program, with no additional benefits.

Overall, the study provides a strong case for secondary prevention using exercise programs in improving the quality of life of people with stable CAD, and indicates again the lifestyle or prevention approach as highly beneficial, perhaps one that in some settings may even be superior to some clinical interventions. There are some issues of generalisability in this study, and this observation would ideally need to be replicated in larger studies in other populations with longer follow-up, and with women and ethnic groups. Nonetheless it is a compelling study for both advocacy for exercise programs, and possibly for caution in considering the stent procedure as the first treatment choice for patients with stable CAD. It is therefore a provocative study, and one which is worth thinking about and having discussions about in a clinical setting, given that exercise programs may be more cost effective as well as producing superior outcomes.