USE OF STEM CELL THERAPY IN ISCHEMIC HEART DISEASES

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Heart disease is one of the leading killer diseases in the world today. This is both in the developed and the developing countries. In the United States for instance, Ischemic heart diseases (IHD) have been ranked the number one killer every year with the aging population mostly affected. In light of this, IHD which results in acute myocardial infarction (AMI) and eventually chronic heart failure causes the heart muscles cells run out of oxygen hence killing the cardiac muscle cells. This makes the heart weaker and compromise its capacity to pump blood at its optimal strength and thereby causing the functional cardiac muscles to strain so much in an attempt to sustain the cardiac flow and this causes the heart to fail which could eventually lead to death.

Despite several major advances in medical and surgical therapy in recent years, the rate of deaths due to heart failures remains high. However since the discovery of the ability of bone marrow derived stems cells (BMSC) and tissue resident cardiac cells to differentiate into cardiac cells albeit the belief that heart was the terminally differentiated organ, a number of preclinical and clinical trials on the use adult bone marrow derived stem cells in order to see ability of stem cell to repair the myocardium and improve the heart function in AMI and chronic heart failure have shown some promising results in terms of safety and the ability to restore normal cardiac function.

Research on the use of stem cells therapy to treat heart diseases has been extensively done including in animals. Mice are an example that has been largely used in this research alongside other bigger animals such as dogs and sheep.

The use of stem cells in the treatment of heart diseases has been a very active area of research after the success in initial preclinical trials led to first true randomized controlled trials (RCT’S) evaluating the safety and efficacy, the results of which were encouraging. To date the largest clinical trial in patients with AMI has been REPAIR-AMI where BMSC therapy was reported to have an improvement of 2.8% in ejection fraction (EF) and Finelll trial reported a 5% increase in EF. A recent Meta-analysis on effect of BMSC after AMI whereby 13 RCT’s consisting of 811 patients was done, there was a consistent pattern of results in left ventricular ejection fraction (LVEF) which showed some improvement of 2.99%, a 3.51% reduction in myocardial scar and so was the cardiac wall motion improvement. With regard to chronic ischemic heart failure the STAR –heart study was the single largest study in which the BMSC therapy was shown to have brought a significant improvement in LVEF and exercise capacity. These trials shows notable improvements on patients’ cardiac functions once the stems cells are injected in coronary arteries or directly to the damaged heart tissues.

The clinical trials that have been done have shown a satisfactory degree of safety and moderate efficacy in treating IHDs and its manifestation, However some of the main drawbacks so far has been the inability to translate the same magnitude of results seen in preclinical trials into clinical results, inconsistency in findings in different clinical trials, exact dosages of cells, cell types, timing of treatment and a lack of understanding of clear mechanism of action of this therapy. Therefore a way forward in order to establish stem cell therapy as a novel treatment of heart disease is to address the above mentioned drawbacks by performing much larger multicentre RCT’s with long term follow up periods and much emphasis on close collaboration between preclinical and clinical trial groups for better understanding of the therapy.
REFERENCES


