Amniotic membrane patching promotes ischemic rat heart repair.


Cargnoni A, Di Marcello M, Campagnol M, Nassuato C, Albertini A, Parolini O.

Centro di Ricerca E. Menni, Fondazione Poliambulanza-Istituto Ospedaliero, 25124 Brescia, Italy.

Abstract

The amniotic membrane has long been applied for wound healing and treatment of ophthalmological disorders, even though the mechanisms underlying its actions remain to be clarified. Recently, cells derived from fetal membranes of human term placenta have raised strong interest in regenerative medicine for their stem cell potential and immunomodulatory features. Our study aimed to investigate the possible utility of amniotic membrane to limit postischemic cardiac injury. A fragment of human amniotic membrane was applied onto the left ventricle of rats that had undergone ischemia through left anterior descending coronary artery ligation. Echocardiographic assessment of morphological and functional cardiac parameters was then performed over a 3-month period. We demonstrated that application of an amniotic membrane fragment onto ischemic rat hearts could significantly reduce postischemic cardiac dysfunction. The amniotic membrane-treated rats showed higher preservation of cardiac dimensions and improved cardiac contractile function in terms of higher left ventricle ejection fraction, fractional shortening, and wall thickening. These improvements were apparent by day 7 after application of the amniotic membrane, persisted for at least 2 months, and occurred independently of cardiac injury severity. No engraftment of amniotic cells was detected into host cardiac tissues. Our results suggest that use of amniotic membrane may constitute a convenient vehicle for supplying cells that produce cardioprotective soluble factors, and reinforce the notion that this tissue constitutes a cell source with clinical potential that has yet to be completely revealed.