

Title: Diaphragmatic reconstruction by tissue engineering: animal study
A new window to congenital diaphragmatic agenesis management

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Background: Outcome of congenital diaphragmatic hernia (CDH) is improved significantly in the light of advanced perinatal care and ECMO supports. This increased survival rate even among those with large diaphragmatic defects or complete agenesis causes more challenges in diaphragmatic reconstruction to reduce the recurrence rate and provide better functional results. Several articles observed high recurrence and inferior cosmetic and functional results in using prosthesis to reconstruct diaphragmatic defect.

Tissue engineering opens a new window in reconstructive surgery recently. CDH could be diagnosed in fetal period and this may provide the opportunity of further diaphragmatic reconstruction by stem cells and tissue engineering. In this study we practice this method in animal model.

Method and materials: We sacrificed a rabbit to harvest bone marrow stem cell and normal diaphragm tissue. Harvested diaphragm was cut to small parts (2 cm diameter) and underwent acellurization process. After providing acellular scaffolds, prepared and colonized stem cells were loaded on the scaffolds and maintain in sterile nourished environment. Stem cell coverage on the scaffold was observed microscopically and while the scaffold fully covered with stem cells they were prepared for transplantation. Tissue engineering phase took about 2 months and then we transplanted these loaded scaffolds to repair iatrogenic diaphragmatic defect in 4 rats.transplanted tissue was covered with omentom to augment circulation and diffusive nutrition of graft.

Rats were kept in animal room for 2 months and sacrificed to evaluate the transplanted diaphragmatic segment. Transplanted part was taken and underwent histopathological study.

Results: healing was occurred in all 4 rats. Angiogenesis and muscular transformation were observed in tissue engineered graft. Loaded stem cells were alive and partially transformed to local muscular tissue in microscopic studies.

Conclusion: tissue engineering may provide an animate and even functional tissue to repair organic defects even as heterologous fashion.

Biography

Reza Shojaeian, MD. Is an assistant professor and Head of pediatric surgery department in Mashhad University of medical sciences (Iran). He is 44 and held this academic position for near 6 years. Before joining Mashhad University he has completed a short course the colorectal care center in Cincinnati Children's Hospital (OH, USA) in 2014 to focus on colorectal congenital anomalies, Constipation and fecal incontinence in pediatrics. Also he has been involved in Sheikh Zayed Institute for Pediatric Surgical Innovation in Children's National Hospital (Washington DC) for one month. He also completed a short course in sick kids Hospital (Toronto, Ontario)

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