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Clinical and histomorphological evaluation of the fresh ear cartilage transplantation impregnated with the mesenchymal cells & PRP for treatment of growth plate injury in lamb

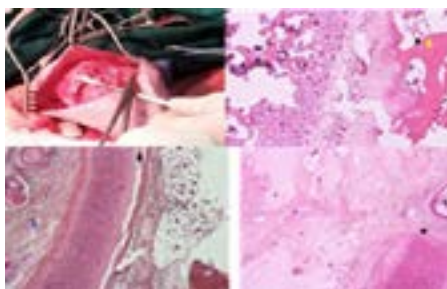
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Statement of the Problem: Growth plate injuries are problems occur in younger children causing bone growth defects and lifelong orthopedic problems. We investigated the histomorphological changes of autogenous fresh ear cartilage transplantation on preventing bony bridge formation and angulation deformities for treatment of growth plate injury in lamb.

Methodology & Materials : The right tibial growth plate in all 15 lambs of four months age were exposed and ½ length wise growth plate tissue was completely removed using dental bit under general anesthesia. Immediately the defect was filled using harvested autologous cartilage from ear. Subsequently these lambs were divided into 3 subgroups of 5 lambs each. The first group was acted as control whereas the second group the grafted cartilage was mixed with 1 ml of PRP and in the lambs of 3rd group, the cartilage was impregnated with mesenchymal cells (106) before closure of muscles and skin. After 2 months, All right tibial growth plate were resected completely with normal half part was intake. They were fixed 10% formalin and demineralized with ethylene diamine tetra-acetic acid. Paraffin-embedded sections (5-µm thick) were stained with Haematoxylin and Eosin (H&E).

Findings: Histomorphological findings revealed that the fresh autogenous ear cartilage covered with Mesenchymal Cells derived from Bone Marrow (BMMSCs) displayed tissue morphology similar to normal hyaline cartilage. The cells appeared like well-differentiated chondrocytes and are surrounded by a matrix that is comparable to those of the normal cartilage. Clinical outcomes indicated slight improvement in lameness and surgical site swelling by using MSCs.

Conclusion & Significance: This study showed prevention of bony bridge formation and growth plate disorders and suggests the growth plate has potential to be partially repaired by the transplantation of ear cartilage graft impregnated with MSCs. The ear cartilage graft is cartilage extracellular-matrix-rich and safe, and is a good interpositional biological material. Ear cartilage may therefore be a suitable biological graft for the treatment of growth plate injury.



Recent Publications

1. Yoshida K, Higuchi C, Nakura A, Nakamura N, and Yoshikawa H (2012) Treatment of partial growth arrest using an *in vitro*-generated scaffold-free tissue-engineering construct derived from rabbit synovial mesenchymal stem cells. J Pediatr. 32(3):314-21.

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2. McCarty R C, Xian CJ, Gronthos S, Zannettino A CW, and Foster B K (2010) Application of Autologous Bone Marrow Derived Mesenchymal Stem Cells to an Ovine Model of Growth Plate Cartilage Injury. *Open Orthop J* 4: 204-210.
3. Guo W, Zheng X, Zhang W, Chen M, Wang Z, Hao C, Huang J, Yuan Z, Zhang Y, Wang M, Peng J, Wang A, Wang Y, Sui X, Xu W, Liu S, Lu S and Guo Q (2018) Mesenchymal stem cells in oriented PLGA/ACECM composite scaffolds enhance structure-specific regeneration of hyaline cartilage in a rabbit model. *Stem Cells Int.*: 6542198.

Biography

Davood Sharifi has completed his Veterinary Graduation at PAU & HAU in year 1990, India. He joined as an assistant professor at the University of Tehran in year 1991 and was promoted to full Professor in year 2007. His master-plan was focused in orthopedic and spine surgery, lameness, physiotherapy and experimental surgery. He was selected as a distinguished and eminent researcher in year 2007 and 2009 at the University of Tehran. He has published three surgery books and having 119 publications. He participated in 62 national and international congresses with 109 research papers. He directly supervised 98 undergraduates and 30 post-graduate students. He has 41 applied research projects. He is an expert in PRT and PDC intervertebral disc treatment via CT Scan. Presently he is acting as Director of Research at the Faculty of Veterinary Medicine University of Tehran, Iran.

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