A NEW IDEA ON THE TREATMENT OF TEMPOROMANDIBULAR INTERNAL DERANGEMENT: REPAIRING THE DISC WITH CELL SEEDING

TEMPOROMANDİBULER EKLEM INTERNAL BOZUKLUKLARININ TEDAVİSİNDE YENİ BİR DÜŞÜNCE: HÜCRE EKİMİ YOLUYLA DİSK ONARIMI

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ABSTRACT

Internal derangement (ID) is the displacement and dysfunction of temporomandibular joint (TMJ) disc and is commonly seen TMJ disorder. Many treatment modalities developed for ID. We hypothesize that stem cells and chondrocytes harvested from adiposal mesenchymal and costachondral tissues can be seeded inside the intraarticular disc in late stages ID patients. This can be done after arthroscopic lavage and adhesiectomy. To our best notice, there are no studies about disc engineering invivo conditions. Therefore, we offer new therapy which include cell-matrix interactions invivo.

Keywords: Rehabilitation, Temporomandibular Joint Disc, Temporomandibular Joint Diseases

ÖZET

Yaygın görülen bir temporomandibuler eklem (TME) rahatsızlığı olan internal bozukluk (IB), TME diskinin yerdeğiştirmesi ve disfonksiyonudur. ID için pek çok tedavi modalitesi önerilmiştir. Hipotezimize göre geç dönem ID hastalarında intraartiküler disk içine adipozal mezenşimal ve kostakondral dokulardan elde edilen kök hücre ve kondrositlerle ekim yapılabilir. Ekim artroskopik lavaj ve adhesiyektomiyi takiben uygulanabilir. Bildiğimiz kadarıyla invivo şartlarda disk mühendisliği konusunda yapılan çalışma yoktur. Bu nedenle invivo hücre-matriks etkileşimini içeren bu yeni tedavi yöntemini öneriyoruz.

Anahtar Kelimeler: Rehabilitasyon, Temporomandibuler eklem diski, Temporomandibuler eklem hastalıkları

To the Editor;

At least 5% of the general population suffers from temporomandibular joint (TMJ) disorder (1). Internal derangement (ID) is the displacement and dysfunction of TMJ disc and is commonly seen temporomandibular disorder. It is a clinical condition where the disc is dislocated, most frequently anteromedially from the condyle (2). In the late stage of ID, the disc looses its natural structure (3). Finally, this process finishes with articular degeneration. Experimental studies have shown that is not only a mechanical problem but also that the induction of anterior disc displacement that results in neovascularization, fibrillation and vacuolization of the extracellular matrix in the condylar cartilage. Instead of normally existing type II collagen an increase in type I collagen is observed. In addition, depletion of keratan sulfate, chondrotine-4 and chondrotine-6 sulfate leads to loss of shock absorber function of the cartilage. All of thess processes are also known to occur in osteoarthritis of other joints (4,5).

Many treatment modalities developed for ID includes medical therapy, physiotherapy, intraarticular injections and surgical interventions (arthroscopy, discopexy, discectomy etc.). Although current therapies have some beneficial effects on pain relief, they do not prevent the progression of the disease nor do they achieve anatomical healing (6,7,8). Tissue engineering is a new alternative treatment option in TMJ disorders, especially in cases where the disc is damaged. Since the TMJ disc does not regenerate, it can be an ideal candidate for tissue engineering approaches (9).

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Recent studies have shown that synovial membrane secrete high proportion of synovial fluid into the joint space (10). The change of the collagen types and decreased amount of glycoseaminoglycans (GAGs) also have great pathologic role in the development of ID (11). In invitro TMJ disc engineering shown that chondrocytes secrete collagen and GAGs at approximately levels similar to the normal disc tissue (10).

We hypothesize that stem cells and chondrocytes harvested from adiposal mesenchymal and costachondral tissues. Harvested cartilage cells are cultered in monolayer to increase the cell number. Adiposal derived stem cells express multiple CD marker antigens similar to those observed on mesncymal stem cell. Adipose tissue can be harvested in large quantities with minimal morbidity from umblical region. Cultered cartilage and stem cell tisssue can be seeded in tmj disc. This can be done after arthroscopic lavage and adhesiectomy, and the joint must be splinted to avoid mechanical injury. Local anesthetic xylocaine with epinephrine may be placed and the superior joint space can be insufflated using a 18-gauge catheter with normal saline (1). A sharp trocar and a cannula can be introduced in the superior joint space. Surgical technique involves lysis and lavage together with release of adhesions. A complete irrigation of the joint may be done with removal of all debris. After visualization of the posterior disc attachments, stem cell and chondrocytes which are harvested from mesenchimal and costachondral tissue (9) can be seeded into the articular disc and appropriate mechanical load must be aplied to transform stem cell to turn in load bearing fibrocartilage (12,13). We believe that seeded cells also secrete synovial fluid and can improve the nourishment of the cartilage and lubrication of surrounding bony structures. Thus increased amount of collagen and GAGs can provide anatomical rearrangement.

The number of chondrocytes decreases in time in the experimental disc model. Their survival in the living tissue is still a question to be answered and unfavorable conditions like inflamation and excessive load on the joint may negatively affect the therapy.

Development of the tissue engineering provides different viewpoints. The researches mostly aimed invitro disc engineering in TMJD. Eventhough final purpose in the tissue engineering is provide the three dimensional tissue specific architecture, cell-matrix or cell-cell interactions have great importance in future therapy modalities. On the understanding of these interactions, we influnce the harvested cell invivo conditions more reliable. To our best notice, there are no studies about disc engineering invivo conditions, and we offer new therapy which include cell-matrix interactions invivo. It can provide anatomical rehabilitation rather than conservative therapies and less time consuming and cheaper than invitro disc engineering.

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