

Lumbar Disc Pathology Treatment with the Tissue Micrograft Technique in the Nucleus Pulposus, in a Patient with a Contained Disc Herniation

Inaki Arroategui*

**Department of Neurosurgery, Hospital General Universitario de Valencia, Spain.*

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REGENERATIVE MEDICINE

It is the field of research and clinical applications focused on the repair and regeneration of cells, tissues or organs in order to restore a damaged function. New techniques in regenerative medicine using the “Stromal Vascular Fraction” (SVF) of the perichondrium of the patient's own atrial cartilage [1].

The vascular stromal fraction is formed by different cells, with the capacity to regenerate those tissues damaged both by trauma and by the aging and cellular wear. In the SVF of the perichondrium of the auricular cartilage, we find large numbers and viability of cells to generate new adipose tissue and blood vessels as well as produce growth factors that and to the formation of the vascular network [2,3].

CHARACTERISTICS OF THE SVF

- Ability to differentiate in different lineages and are very useful for tissue replacement therapy (refers to multipotentiality) [4,5].
- They can be administered directly in the affected area where tissue regeneration is attempted or systemically/intravenously [6].
- They can secrete soluble factors that promote the paracrine effect and immunomodulators that facilitate the therapeutic effects [7,8].
- They are immunoprivileged that allows a minimal immune reaction due to the lack of expression of class II immunocompatibility. They present receptors and can be directed or migrate to the places of the lesion [9].
- When fresh ADSCs are isolated, a non-cultured heterogeneous population is obtained, which are the SVF (Vascular Stromal Fraction) cells with therapeutic qualities that are better adapted to the different clinical scenarios.

The principle on which this technology is based is to use healthy counterpart connective tissue of the same patient processed with KIT to regenerate its own damaged tissue.

The affinity of the donor and recipient tissue used contributes a high differentiation and potentiality obtaining as a result a great cellular regenerative efficiency.

The lumbar disc herniation is the result of a protrusion or prolapse of the nucleus pulposus of an intervertebral disc in the spinal canal, after perforation and partial or complete destruction of the posterior part of the annulus fibrosis. When this happens, the nerve root is compressed by the nucleus pulposus, causing various symptoms, such as pain in the lower limb, back pain and feeling of wheezing.

CLINICAL CASE

We know the different treatments of the pathology of the Lumbar disc herniation; we performed the first lumbar disc pathology treatment with the tissue micrograft technique in the nucleus pulposus, in a patient with a contained disc Herniation (fibrous ring without rupture).

Patients aged between 18 and 70 years, with degenerative disease: (Disc prosthesis: black disc) with predominant back pain after conservative treatment (physical and medical) for more than 6 months. Patients must have a fibrous ring capable of supporting the cellular implantation; as shown by the MRI image (exclusion of extruded material).

Corresponding author: Arroategui I, Senior Consultant in Neurosurgery, Department of Neurosurgery, Hospital General Universitario de Valencia, Avda Tres Cruces S/n 46014, Valencia, Spain, Tel: 0034627492961; E-mail: athbio@yahoo.es

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The technique consists:

With local anesthesia a 2.5 mm punch of the auricular cartilage (**Figure 1**), containing articular cartilage perichondrium, is obtained (**Figure 2**).



Figure 1. Punch technique.



Figure 2. Perichondrium of cartilaginous tissue.

The PERICONDRIO is constituted by dense connective tissue and covers the cartilages except for the free surface of the articular face. Its main functions are, to nourish the cartilage through the blood vessels, eliminate the waste products and of originating new chondroblasts from chondrogenic cells of its inner layer.

The extraction of cartilage is done with the punch making movements soft rotating to release cartilage but never going through the skin of the posterior zone.

When extracting the micrograft from the punch, the punch is rotated downwards to release the cartilage, in the case that

do not release, you would have to remove the cartilage with perichondrium, introducing a clamp in the hole.

The sample obtained must contain skin, perichondrium and cartilage; also it must be cylindrical, white and cartilaginous in appearance.

If there is bleeding, hemostasis can be done with different methods, the most used is mechanical pressure with sterile gauze made by a helper or the same patient. If the bleeding still persists, it will be used a fine-tipped clamp and electrocoagulation of the holes made by the punch (no surgical suture is needed, as it will heal by the second intention in a week) once obtained the SVF and through the

use of a needle the content is injected into the nucleus pulposus, following the same technique that is used in nucleoplasty and percutaneous techniques (**Figure 3**).



Figure 3. RX: Puncture of the nucleus pulposus.

Being an ambulatory technique; after a rest of about 30 min, the patient is discharged with the recommendations of the immediate postoperative period. So it is convenient that the patient take, if necessary, analgesics, but never anti-inflammatory pills as they can stop the process. Regarding rest, relative rest is recommended, allowing the patient to

walk progressively for about 7 days. After this period, you can start doing physical exercise and rehabilitation physiotherapy. When the ear heals, swimming exercises can also be done.

The pathology identical to that performed in any percutaneous lumbar procedure is monitored (**Figure 4**).



Figure 4. MRI after 6 months: L4 L5 hydrated nucleus pulposus.

DISCUSSION

The main treatment for lumbar disc herniation is conservative and the response is approximately 80%. Conservative treatment includes rest, bed rest,

pharmacological treatment (e.g. non-steroidal anti-inflammatory drugs, corticosteroids and muscle relaxants), use of a corset, traction therapy, thermotherapy, epidural block, nerve root block and physiotherapy. Between 20% and 50% of the patients, approximately, are tributaries of

surgical treatment (when no improvement is observed with a conservative treatment) [10].

To reduce the invasiveness of surgical procedures, new therapeutic approaches have emerged, including chemonucleolysis, percutaneous nucleotomy, percutaneous laser disc decompression and microendoscopic discectomy.

Degenerative disc disease (DDD) is a condition associated with the degeneration of one or more of the discs in the spine. DDD can cause severe chronic pain in the back at the level of the disc region and it can radiate to the hips and legs. There may be severe inflammation and degeneration of the fibrocartilage.

The perichondrium of the auricular cartilage is a new therapy for patients with degenerative disc disease. SVF injected directly into the disc can reduce inflammation and promote healing. SVF is an attractive therapeutic method since the collection process is safe and the cells are readily available in generally large quantities.

Clinical studies have demonstrated the safety and feasibility of using SVF in patients with degenerative disc. No major safety problems were observed and the procedures were well tolerated in all patients. In addition, patients showed statistically significant improvements in several parameters including flexion, pain classifications, VAS, PPI and questionnaires in abbreviated form. Although ODI and BDI did not show statistically significant changes due to the low number of subjects in the trial, the data allow verifying positive trends. In addition, most patients reported improvements in their Dallas Pain Questionnaire scores.

CONCLUSION

This percutaneous technique of regenerative medicine is beginning in our unit and our desire is to carry out prospective studies to make the comparison with other known techniques of the percutaneous type and see if the results are significant to be used within the existing techniques.

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