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A New Histological Scoring System for Partial Thickness Chondral Lesions

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Abstract

Despite the large number of papers about regeneration of articular cartilage, the good results achieved in small animals are not replicated in large animal models and in humans. One possible reason is the frequent use of the osteochondral model, with perforation of the subchondral bone plate. As the most frequent pattern of lesion in humans is the Partial Thickness, new therapies should be tested in this model. However, there is not a tool to evaluate the results of Partial Thickness model. Objective: to develop a new histological scoring system to be used in the Partial Thickness model of cartilage repair. Results: this paper describes in detail the new scoring system. It was divided in three main sections: repair tissue inside the lesion, cartilage around the lesion and degenerative changes in the base of the lesion.

Key words:

cartilage, histology scoring system, regenerative medicine.

Introduction

Articular cartilage is a tissue which covers the surface of bone joints, absorbing mechanical impact, and facilitating the movement between the bones, decreasing the friction and protecting them. If cartilage suffers an injury it will not heal properly, and it can predispose to an osteoarthritis (OA).

Trying to avoid such a result and improve the cartilage repair, there are a great number of experimental done in experimental animal models, with perforation of the subchondral bone and contamination of the articular cavity with autologous bone marrow cells. Once the most common injuries in patients are partial thickness lesions all the new techniques being studied are not reproducible in humans.

Through the years, a great number of scores were created according to the necessity of the study to evaluate the healing of the lesions. All the existing scores used to evaluate the cartilage histologically, in the animal model, were elaborated according to full thickness lesion repair. To advance with researches, it is necessary the use of partial thickness lesions models combined with the use of new histological scores to properly evaluate the new proposed model. The present study aims to describe a new semiquantitative histological score to be used in experimental animal model of partial thickness lesion.

Results and Discussion

Methods: histological sections of 30 ovine knees were reviewed to develop the new scoring system. They were stained with H&E, Safranin O, and Masson trichrome.

Results: this paper describes in detail the new scoring system. It was divided in three main sections: repair tissue inside the lesion, cartilage around the lesion and degenerative changes in the base of the lesion. The score ranges from 0 to 21. The greater the score, the best the result of the cartilage repair.

Chart 1 - The Unicamp Partial Thickness Score (UPT Score)

A) New repair tissue inside the lesion	Feature	Score
Horizontal filling	75 – 100%	4
	50 – 74%	3
	20 – 49%	2
	1 – 19%	1
	0	0
Vertical filling	75 – 100%	4
	50 – 74%	3
	20 – 49%	2
	1 – 19%	1
	0	0
Cellularity	Normal	2
	Mild hypocellularity and/or < 25% clusters	1
	Moderate to severe hypocellularity and/or > 25% clusters	0
Safranin staining	Homogeneous	2
	Heterogeneous	1
	Negative	0
B) Cartilage around the lesion	Feature	Score
Borders ingrowth or cartilage to cartilage integration	Bilateral	2
	Unilateral	1
	None	0
C) Degenerative changes	Feature	Score
Residual cartilage at the base of the lesion	Intact or integrated	3
	Fibrillation or fissure	2
	Focal erosion	1
	Severe disruption	0
Subchondral bone	Normal	4
	Mild cystic lesions and/or granulation tissue	3
	Moderate or severe cystic lesions and/or granulation tissue	2
	Remodeling and/or sclerosis and/or callus	1
	Fracture and/or necrosis	0
Total		

Conclusions

This new histological scoring system is the first one specific to Partial Thickness articular cartilage lesion model. Future studies will determine its correlation coefficient.

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