MORPHOLOGICAL ASPECTS OF THE WILD BOAR ARTICULAR CARTILAGE

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Abstract. Articular cartilage samples from wild boar’s femoral head and condyles; 1 - 10 years old; were examined. The samples were processed by the usual histological techniques. The examination of the articular cartilage of the wild boar shows normal and pathological aspects of the morphological structures. The normal morphology was similar to the already described morphology from the specialized literature. The morphopathological aspects of the articular cartilage emphasize the osteoarthritis as the main pathological state.

INTRODUCTION

The present paper tries to outline some data about the morphology of the wild boar articular cartilage; as a starting point for further studies. Taking into account the variability phenomenon in biology; we consider that this study is also necessary in order to offer a large data base for the morphology of the articular cartilage.

MATERIALS AND METHODS

The study was carried out on articular cartilage samples from wild boar femoral head and condyles; 1 - 10 years old; from the following slaughterhouses (abattoirs): Muvi Impex SRL and Scandia Română SA Sibiu. The samples were processed according to the usual histological techniques and stained with hematoxilin–eosin; and the Masson’s trichrome and Mallory’s trichrome methods (2). The samples were processed in the Histology laboratories of both the Veterinary Medicine Faculty and the Pharmacy and Medicine University from Timisoara.

RESULTS AND DISCUSSIONS

The study carried out on the normal articular cartilage of wild boars revealed that the cartilage has different thickness varying from 230 to 700 µ; depending on the age and the drawing place (Fig.1). The largest thickness is observed in areas with the maximum mechanic stress; as it has been observed by other researchers (8).

Both the variability of the matrix organisation (orientation of the colagen fibres and the distribution of proteoglycans) and the phenotype of the chondrocytes form the basis for the 4 zones; as follow:

a. The superficial zone has a few cells (3-5%) and is rich in colagen fibres. The chondrocytes were prolonged; discoidal; with the long axis parallel to the surface; regularly disposed; in a colagen fibre network tangential orientated to the articular surface (Fig. 2).
b. The transition zone (middle) has a reduced collagen network and a richer cellularity than the superficial zone (5-15%). The chondrocytes are round or spherical; dispersed heterogeneously; often grouped in two; and sometimes in three (Fig.2). In this zone the chondrocytes are relatively isolated from one another by a huge amount of extracellular matrix. In comparison to the superficial zone; a significant growth of the collagen content in the extracellular matrix is observed. The collagen is disposed in the form of basophile tapes that surround the cartilaginous cell (Fig.3).

c. The radial zone (deep)

The deep zone consists of polygonous hypertrophic chondocytes organized in chondrons. The chondron consists of 2-6 cells disposed in axial parallel tapes; and they are perpendicular to the cartilage surface. In the depth of the radial zone there is a second layer of cells in division. This layer; in which the chondrocyte groups are generated (Fig.4); is persistent both at the young and the adult animal. The study of the extracellular matrix reveals the circular disposal around each chondocyte and its arrangement in the three distinctive zones – pericellular territorial and interterritorial matrix – described in the specialized literature (5; 7).

d. The calcification zone. In this layer the disposal of the collagen fibres is radial - perpendicular to the surface; or circular - around the chondrocyte lacunae; like a muff.

The chondrocytes are small; or in a necrotizing process; rare; disposed at random; closed in nonmineralized lacunae or in those in course of mineralization (Fig. 5). In the adult the calcification zone is final and avascular. In young animals this zone is difficult to define
because the cartilage is in growth. The tidemark between the mineralization zone and the radial one is slim and irregular (Fig.5). In young animals the tidemark is less evident because of the existent chondrogenic activity as the formation of the articular cartilage is not closed. At adulthood when the chondrocyte division from the transition zone is closed; and the mineralization front progression is stopped; the tidemark becomes defined and clear; as it is described in the specialized literature for other species (10;13).

![Fig.5. Photomicrograph of the wild boar femoral head. The calcification zone. Mallory’s trichrome staining; 400x.](image)

![Fig.6. Photomicrograph of the wild boar femoral head. Chondrocytic clones in both superficial and transition layers. Mallory’s trichrome staining; 200x.](image)

The 4 zone description is according to the data found in the specialized literature for other species (6;12;13). The samples’ examination revealed also different stages of articular cartilage injury and various morphological aspects that suggest the osteoarthritis occurrence. At the microscopic examination the cartilage aspects were different; depending on the illness severity. Clones of 3-5 chondrocytes (Fig. 6) and extracellular matrix fragmentation of the upper layer were seen. Loss of chondrocyte organization; rarefaction and degenerescence of the extracellular matrix were seen only in advanced forms of the disease (Fig. 7; 8). The variability of the chondrocyte morphology emphasizes the degenerescence of the cartilage (9). In the deeper layers; depending on the severity of the injury; the extracellular matrix was dense and homogenous or emphasized variable chromic aspects (Fig. 7; 8). Multiple axial or coronar chondrons (Fig.7); necrotic chondrocytes or empty chondrocytic lacunae were also seen. These morphological and histochemical aspects confirm and demonstrate that synthesis of the extracellular matrix ceases while degradative activity remains elevated as osteoarthritis progresses (14).

![Fig.7. Photomicrograph of the wild boar femoral condyle. Extracellular matrix fragmentation in different layers and variable chromic aspects. Mallory’s trichrome staining; 40x.](image)

![Fig.8. Photomicrograph of the wild boar femoral condyle. Chondrocytic clones in the deep layer. Mallory’s trichrome staining; 400x.](image)
The tidemark was larger or multiple and sometimes the early degenerative lesions were accompanied by the thickening of the calcification layer (Fig. 9); suggesting the progressive increase of bone loading (Hunziker; 1999 and Muller-Gerbl; 1987; cited by Poole A.C.) (6). The progressive erosion of the articular cartilage may end with the exposure of the subchondral bone that allows injury spreading into the bone (Fig.7). Sometimes subchondral bone rarefaction was observed (Fig.5). The observed morphological aspects; according to the specialized literature (1;3;4;5;6;7;8;11;13;14); suggest that the main pathological state that characterizes the articular pathology in studied wild boars was osteoarthritis. This findings show that the wild boar articular pathology is semiable with those of the other species articular pathology; despite the environmental and behavioural differences.

CONCLUSIONS

The examination of the articular cartilage of the wild boar shows both normal and pathological morphological states. The normal morphological aspects of the wild boar articular cartilage were the four layers organization; that is analogous with the morphological aspects found in the specialized literature for the other species. The observed morphopathological aspects of the articular cartilage (chondrocytic clones; extracellular matrix alteration; cartilage fissures; fragmentations and erosions; subchondral bone exposure; epiphyseal bone rarefaction; tidemark multiplication) were the specific pathological lesions for osteoarthritis; as described in the specialized literature for other species.

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