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SUPRAPATELLA IN RATS;
EFFECTS OF IMMOBILIZATION ON FIBROCARTILAGE OF SUPRAPATELLA

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ABSTRACT... Objectives: Researches have focused their attention on articular cartilage of various bones but neglected suprapatella so this study was designed to study the histological changes in fibrocartilage of suprapatella in rats while studying immobilization. **Data Source:** 20 male Sprague Dawley rats were procured from animal house NIH Islamabad. **Design of Study:** Experimental. **Setting:** The study was carried out at the animal house College of Physician and Surgeons Islamabad. **Duration:** The duration of study was 6 weeks from 01-06-2009 to 05-07-2009. **Materials & Methods:** A total of 20 male Sprague Dawley rats 3 months old were used. They were divided into two groups. Each group contained 10 animals. Group 1consisted of control animals that were not immobilized. Group 2 were immobilized for four weeks. The right hind limbs of rats were immobilized with plaster of Paris cast. Care was taken to cover the knee joint completely. At the end of experimental period the rats were anaesthetized with chloroform. The skin over knee joint was dissected and the joint along with supra patella was exposed. The knee joint was cut in sagittal plane. It was stored in 10% formalin for 48 hours. Specimen was decalcified using Ethylene diamine tetra acid (EDTA). After processing for making paraffin blocks 10µm and 7 µm sections were cut from the same block and stained as given below. Mallory Trichrome stain was used for 10µm thick sections to demonstrate collagen content. H & E stain was used for 7 µm thick sections to study routine histology of supra patellar articular cartilage. **Results:** On four weeks immobilization small necrotic areas were observed in the suprapatella and splits were also observed. **Conclusions:** It is therefore concluded that suprapatella can be as prominent as the patella itself. It shows necrotic changes on immobilization and is present in a number of animals that are highly significant in orthopedic research.

Key words: Suprapatella, Immobilization, Fibrocartilage, Rats.

INTRODUCTION

Researchers over the years have found a sesamoid cartilaginous structure known as the suprapatella, in the knee joints of many animals used in arthritis research[1]. It is characteristic of many mammals, including the mouse, rat, rabbit, cat, and dog but is absent in humans[2]. In the rat suprapatella is embedded in the deep surface of the quadriceps tendon immediately above the patella itself. It contacts the joint cavity, articulates with the femur, and is an integral part of the knee joint[3]. Suprapatella is one of the most striking examples of how tendons become fibro cartilaginous in regions where they are subject to compression. In some bats and kangaroos, it replaces the patella[4]. Until now focus of researchers has been articular cartilage of knee joint including patella[5].

On four weeks immobilization some of them have shown that there is reductions of collagen cross links in matrix of articular cartilage of knee joint[6].

Others have found decrease in Glycosaminoglycan content and the reduction being largest in the superficial zone[7]. Radial splitting of cartilage, if immobilized for four weeks in extension[8]. But features of the suprapatella on immobilization have not been studied in detail so the present study was conducted to study histological changes in suprapatella on immobilization.

AIMS AND OBJECTIVES

The present study was conducted to observe histological changes on immobilization in fibrocartilage of suprapatella in rat.

MATERIAL AND METHODS

20 male rats 2 months old belonging to Sprague Dawley strain were procured from National Institute of Health Islamabad and the study was carried out at the animal house College of Physician and Surgeons Islamabad. The animals were divided into two groups. Each group contained 10 animals. Group 1 consisted of control animals that were not immobilized. Group 2 were immobilized for four weeks. The skin over knee joint was dissected and the joint along with patella and

suprapatella was exposed. The knee joint was cut in sagittal plane. It was stored in 10% formalin for 48 hours. Specimen was decalcified using Ethylene diamine tetra acid (EDTA).

After processing for making paraffin blocks 10µm and 7 µm sections were cut from the same block and stained as given below.

- Mallory Trichrome stain was used for 10µm thick sections to demonstrate collagen content.
- H & E stain was used for 7 µm thick sections to study routine histology of supra patellar articular cartilage.

RESULTS

In the rat knee joint suprapatella can be seen superior to patella (Fig-1).

It articulate with the femur (Fig-2). Histologically, in Mallory Trichrome stained sections this structure is characterized by interwoven bundles of collagenous fibers, among which are enmeshed large cells containing prominent nuclei surrounded by large clear spaces in control animals(Fig-3) in the control group. In the group immobilized, in two animals the suprapatella was completely fissured (Fig-4). In all the animals the chondrocytes had lost nuclei and in three there was loss of chondrocytes (Fig-4).

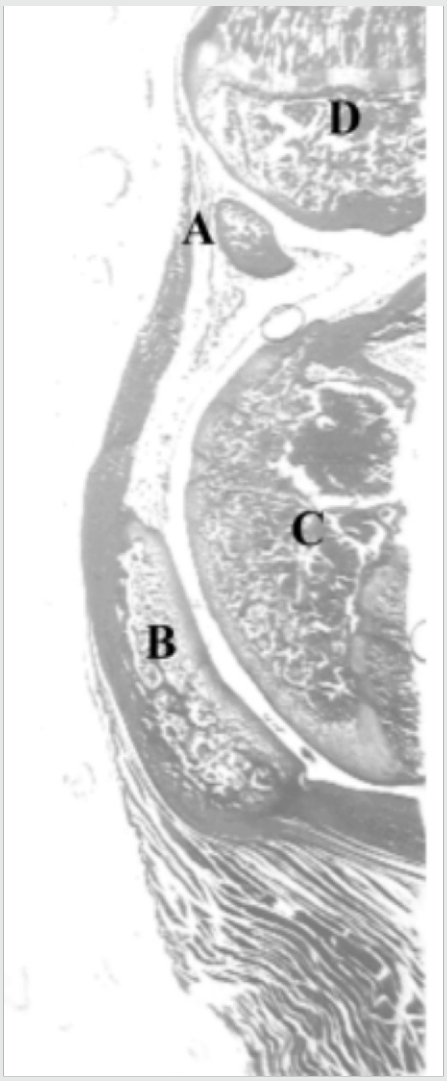

Fig-1. Sagittal section of rat knee joint showing (A) Patella, (B) Suprapatella, (C) Tibia and (D) femur. Mallory Trichrome stain.

DISCUSSION

In this study histology of patella was found to be fibro cartilaginous as has been proved by other researchers[9]. Little is known about its constituent collagens[3]. In the animals immobilized for four weeks suprapatella showed necrosis of whole cartilage .In animals immobilized in extension necrosis of femoral cartilage has also been reported[8]. In three of the immobilized animals the chondrocytes had lost nuclei. In past researchers have shown in the rat chondrocytes not only decrease in number but also become deformed even on immobilization few days in the femoral cartilage[10]. It was generally assumed only hyaline cartilage is capable of responding to immobilization changes but it is clearly seen that fibrocartilage equally responds to immobilization. Researchers have shown that that aggrecan plays a significant role in the rabbit' s patella in view of the load-bearing function of this organ[11,12]. But proteoglycans of suprapatella have yet not studied in detail.

CONCLUSION

It is therefore conclude that suprapatella can be as prominent as the patella itself. An integral part of knee joint it undergoes changes o immobilization and is

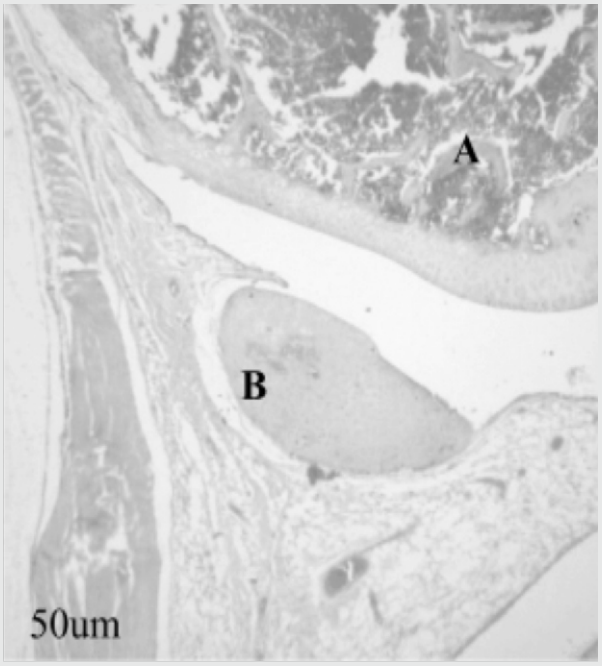

Fig-2. Sagittal section of rat knee joint showing (A) Patella, and (B) femur. H&E stain.

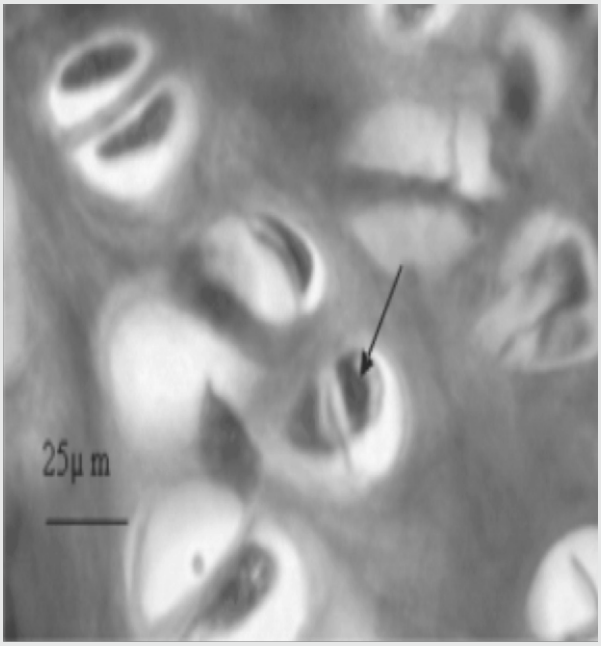

Fig-3. Microscopic picture of section of suprapatella in control rat. Arrow shows chondrocytes in lacuna. Mallory Trichrome stain.

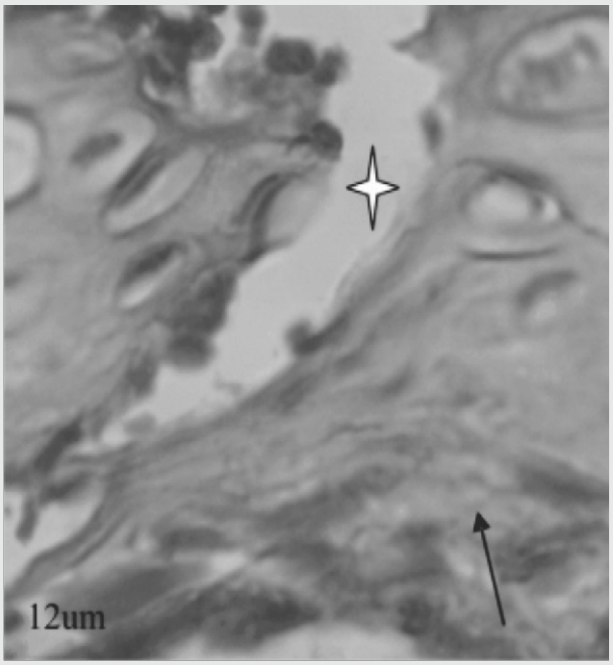

Fig-4. Microscopic picture of section of suprapatella in rats immobilized four weeks. Arrow shows absence of chondrocytes and star shows splits. H&E stain.

present in a number of animals that are highly significant in orthopedic research. Whether suprapatella has regenerative capability or not is the next question to be answered.

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"Education is a progressive discovery of our own ignorance."

Will Durant