MICROSCOPIC FINDINGS IN RHEUMATOID SYNOVIAL TISSUE OF DOG KNEE JOINT

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Köpek Diz Ekleminin Romatoid Artritli Sinoviyal Dokusunda Mikroskobik Bulgular

ÖZET

Diz ekleminin sinoviyal membranındaki değişiklikler, ışık mikroskobik olarak romatoid artritli köpeklerde çalışıldı. Romatoid artritin, sinoviyal dokuyu etkileyen, çok sayıdaki mekanizmaların sonucu olduğu düşünülür.

Bu çalışmada da sinoviyum dokusundaki değişiklikleri değerlendirdik. Doku örnekleri histolojik değişiklikleri incelemek için romatoid artritli köpeklerin sinoviyal membranından alındı. Sinoviyumun intimal ve subintimal tabakasında yoğun olarak infiltre olmuş mononükleer hücreler ve mast hücrelerine rastladık. Ayrıca, Sinoviyal hiperplazi de bulunmaktaydı. Sinoviyal dokuda çoğunlukla granüllerini boşaltmış olan çok sayıdaki mast hücreleri yoğunlaşmaktaydı. Synoviyal membran, fibrin pıhtı materyalini içeriyordu.

Anahtar Kelimeler: Romatoid artrit, sinoviyal membran, mikroskobi, köpek, diz eklemi.

SUMMARY

It is suggested that rheumatoid atrhritis is the result of a number of mechanisms affecting to the synovial tissue. The changes in synovial membrane of the knee joints were examined in dogs with rheumatoid arthritis by light microscopic.

In this study, we evaluated changes in synovium. Tissue samples were taken from synovial membrane of dogs with rheumatoid arthritis . We found that the intimal and subintimal layer of the synovium, were heavily infiltrated by mononuclear cells mast cells. Hence, the synovial hyperplasia was also found. Increased numbers of mast cells mostly degranulated were present in the synovial tissue. Synovial membrane was containing fibrin clot materials.

***Key Words:** Rheumatoid arthritis, synovial membrane, microscopy, dog, knee.*

INTRODUCTION

Rheumatoid arthritis is a multisystem, chronic inflammatory disease of unknown origin (1,2,3,4). This disease can be produced experimentaly in animals by injection of antigen into a joint (5,6). Some investigators have studied the histologic changes of the synoviyal membrane after the induced arthritis (7,8).

The pathogenesis of rheumatoid arthritis has still not been satisfactorily explained (9). Rheumatoid

arthritis is one of the commonest causes of disability in developed countries, affecting approximately 1% of the population. Disability is due to chronic inflammation in the synovial lining leads to destruction (5).

Much of the works directed towards elucidating the changes of rheumatoid arthritis are experimental. Studies of human joint tissue with rheumatoid arthritis have been published (10,11). The results show, however, a striking resemblance with the findings in animals in rheumatoid arthritis and experimentally induced arthritis (12).

Alterations in synovial lining metabolism also closely resemble those in human tissue (11).

A study of tissue from dog rheumatoid arthritis joints have been not published hitherto.

In human the studies that belong to patients with rheumatoid arthritis are present (12). The aim of the present study was to provide detailed histologic information regarding with rheumatoid arthritis in dogs.

MATERIALS AND METHODS

Adult male and female dogs, weighing between 15 and 18 kg were used. Synovial tissues were taken from three healthy dogs and five dogs with rheumatoid arthritis. The dogs were anaesthetized with ketamine before removel from their cages. Joint filling was confirmed by observation of lateral and medial bulging of the articular capsule. The specimens were taken femorotibial joint of each animal as experimental and control group.

Dogs were sacrified by decapitation after ketamine anaesthesia. Immediately after decapitation, the skin and superficial muscle layers were removed, and both knee joits were dissected out for histologic studies. The tissues were obtained from medial and lateral articular capsule and fixed in 10% formaldehyte and alcohol absolute processed routinely for paraffin embedding, sectioned 5 µm thick, and stained with Dominici method for mast cell. Furthermore, tissue samples were stained with Hematoxylin and eosin (H.E.), Masson trichrome, Periodic acide schifft (PAS).

RESULTS

In the control group, synovial membrane of dogs were composed of an intima one to three cell layers thick and a subintimal layers (Fig. 1).

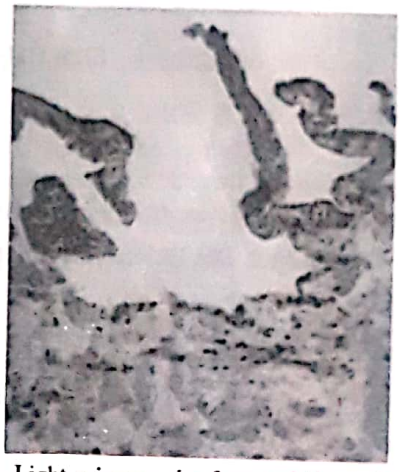

Figure 1. Light micrograph of control tisue of synovium one to three cell layers thick from the knees of dogs. Absent the basal membrane the underlying of intimal cells (i) with PAS stain. s: subintima. 20 X.

The intimal layer of the joint of dogs with rheumatoid arthritis were showed a three to six cell layers thickness (Fig. 2).

Figure 2. Synoviocytes (s) from the knee showing a three to six cell layers thicker than that of the control joint in the rheumatoid arthritis of dog. M: monocytes, l: lenfocyt, c: capillaries, si: subintima. Masson Trichrome Stain. 40 X.

Synoviocytes containing mostly type A cells were lining the joint lumen. Cytoplasmic vacuolisation was markedly increased and tended to occupy the majority of the cytoplasm of the type A cells (Fig. 3).

Type A cells were usually more superficial and more abundant and larger than subjacent type B

cells. Type B cells with flattened nucleus were increased in the some areas of the synovial membrane (Fig. 4).

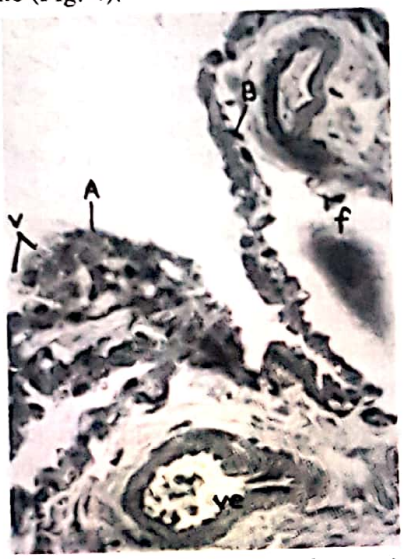

Figure 3. Synoviocytes containing mostly type A cells (A) lining the joint lumen. Cytoplasmic vacuolisation (v) increased and tended to occupy the majority of the cytoplasm of the type A cells. F: the fibrin clot in the subintima. B: Type B cell, ve: vessel. H.E. 40 X.

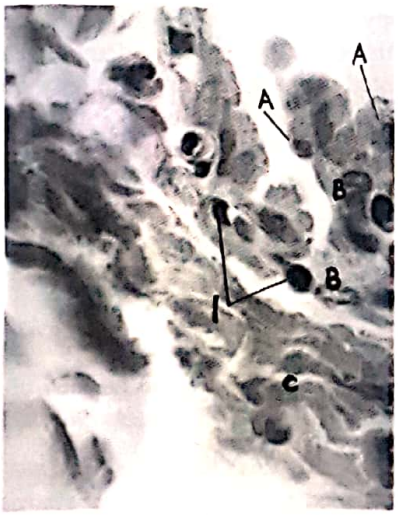

Figure 4. Type B cells with flattened nucleus (B) increased in the some areas of the synovial membrane. A: type A cells, l: lenfocyt, c: collagen fibers. Masson Trichrome Stain. 100 X.

In the some areas of synovial intima were scattered with inflammatory cells, increased capillaries (Fig. 2,5). Also, subintimal layer were infiltrated with these cells (Fig. 6).

Synovial villi were not increased in number, but were more prominent and some what larger due to the thick intimal layer covering them (Fig. 4).

In some synovial lining between borders of synoviocytes seperations and the fibrin clot were present in these areas (Fig. 7).

Therefore, fibrin clot materials were also present in subintima (Fig. 3,7). Increased mast cells were found around the fibrin clot materials. Most of the mast cells were degranulated (Fig. 7). Mast cells were but also dispersed (Fig. 7) not only in clusters (Fig. 6) in inflamed synovia.

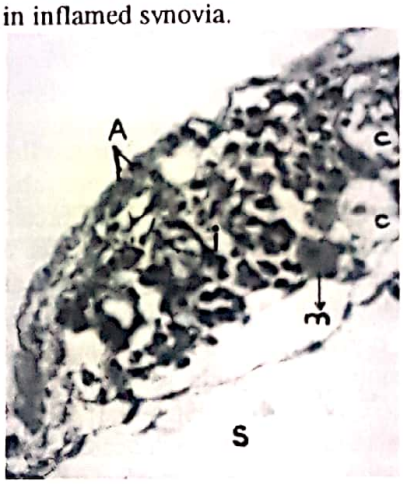

Figure 5. In the areas of synovial intima, scattering mixed inflammatory cells (i), increased capillaries (c). A: type A cell, m: mast cell, s: subintima. H.E. 40 X.

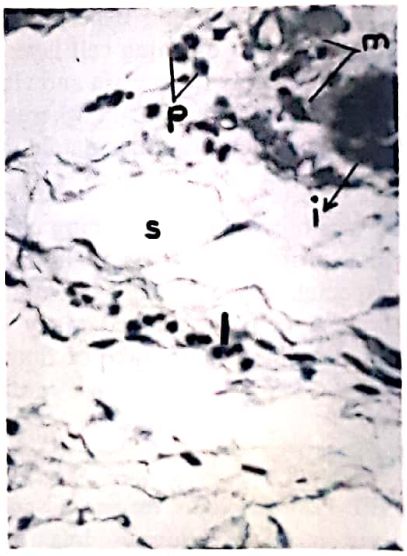

Figure 6. The subintimal layer of the synovium infiltrated with inflamatory cells (i) and mast cells (m) surrounding inflamatory cells. p:plasma cells, l: lenfocyt, s: subintima. H.E. 40 X.

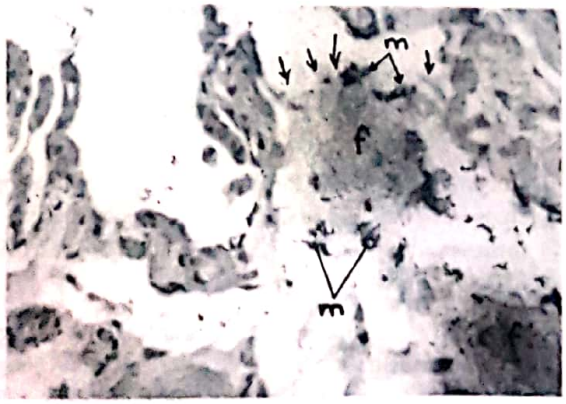

Fig. 7. In some synovial lining between borders of synoviocytes present seperates (arrows) and appeared the fibrin clot (f), degranulated mast cells (m) in this sites of

the inflamed synovium. The stain with Dominici method for mast cells. 20 X.

DISCUSSION

Synovium is composed of three cellular lining and underlying connective tissue, the subsynovium, which can be areolar, adipose, or fibrous. Normal synovial lining, or intima, is 2-3 cells thick and consists of 2 distinct types of cell and some intermediate form. Type A macrophage-like cells have the organelles of a macrophage, with many large vacuoles, pinocytotic vesicles, lysosomes and filopodia. Type B fibroblast-like cells have the organelles of a cell, that synthesizes and secretes protein, much granular endoplasmic reticulum (GER) and a well developed Golgi complex (13).

In the synovium with rheumatoid arthritis is seen synovial hypertrophy and hyperplasia (14). It has been suggested that in lining cell layer is found alpha V integrin, namely fibronectin and vitronectin, in normal and osteoarthritic synovia, whereas it is not expressed in the proliferating rheumatoid lining cell layer (15).

Also we observed that the lining cell layer of the synovium proliferated strongly in rheumatoid arthritis. Especially type A cells were increased. Enlarged type A cells contained many vacuoles. Investigators examined the uptake of fluorescence-labeled acetylated low density lipoprotein (ac-LDL) as well as the surface expression of CD4 using flow cytometry. In order to identify macrophage-like type A synoviocytes in the synovium of patients with rheumatoid arthritis; Type A cells had high percentage of ac-LCD uptake. This method is helpful in determining macrophage-like type A synoviocytes in the synovium of patients with rheumatoid arthritis Type A cells has high percentage of ac – LDC uptake. This method is helpful in determining macrophage-like type A synoviocytes (10). Fibrin material (5) and heavy infiltration (16,17,18) in the synovial matrix were observed.

Findings the fibrin clot in the synovial tissue supported the concept that develops fibrin clot in rheumatoid atrhritis.

Many mast cells degranulated. Mast cells usually is showed a peripheral distribution around lymphocytic/ mononuclear cells infiltrations (19).

Similar observations were made in our study. Alterations in rheumatoid arthritis in synovial lining microscopy closely resembled those of human tissue. This histological study demonstrated that degranulated mast cells are commonly observed in the rheumatoid lesion. Such observations added weight to the concept that mast cells may contribute to the processes of inflammation and tissue remodelling.

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