

Evaluation of Histopathological, Ultrastructural Changes and Role of IL-17 in Synovium of Osteoarthritis and Rheumatoid Arthritis

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Abstract

Purpose: Rheumatoid arthritis (RA) is a chronic autoimmune disease causing degradation of cartilage and bone with significant ultrastructural changes. Hyperplastic synovial membranes mediate inflammation by invading deep into articular cartilage and bone. Therefore, it is very important to study ultrastructural changes.

Material / Methods: Osteoarthritis(OA) and rheumatoid arthritis (RA) synovial tissues were obtained from patients undergoing total knee replacement surgery. Paraffin blocks were made and stained with Hematoxylin & Eosin and to determine the severity histopathological scoring was done. For ultrastructural analysis, Electron microscopic blocks were made for studying ultrastructural changes through electron microscopy and presence of IL-17 through immunoelectron microscopy. To analyze Hematoxylin/eosin ratio, cell counting, average length and width of different cells and Ferret diameter in scanning micrographs, Image pro plus and Image J software were used. Immunohistochemistry was performed to study the presence of IL-17 in synovium of both RA and OA.

Results: Mean histopathology score, Cell count, and nuclear/cytoplasmic ratio were significantly higher in RA as compared to OA ($p < 0.01$). Presence of activated type A and type B synoviocytes, plasma cells and macrophage were found in RA. Signs of inflammation like multilayered synovium, hyperplastic nature with villi like outgrowth, perivascular infiltration, stromal cell proliferation and neo-vascularization were observed in RA tissue. Whereas, OA shows necrosed areas with well-stacked collagen fibers along with very few number of cells. IL-17 positivity was widely seen in RA as compared to OA through immunohistochemistry. Immunolabelling of IL-17 was also observed in RA samples.

Conclusion: Ultrastructural observations illustrates distinct interactions with different inflammatory cells and show severe inflammation among RA tissues than in OA. It demonstrates significant presence of IL-17 in chronic inflamed synovium RA. These findings may play an important role for diagnostic criteria and can have prognostic value for different arthritis.