Incudomalleolar Joint Pathology in Human Temporal Bones with Rheumatoid Arthritis.

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ABSTRACT

Objective: Conductive hearing loss has been described in patients with rheumatoid arthritis (RA). This study was conducted to evaluate the histopathological findings of RA on the incudomalleolar joint.

Study Design: Retrospective histopathologic human temporal bone (HTB) study.

Methods: From the medical records of an otopathology laboratory in a tertiary academic medical center, six patients (12 ears) were found with RA. Four ears were excluded because the middle ear was damaged at removal. Eighteen age-matched ears (9 patients) of non-RA patients were used as controls. The incudomalleolar joint was analyzed for cartilage fraying, thinning, and calcification, and joint fixation under light microscopy. The width of the incudomalleolar joint at specified lateral, middle, and medial points was measured using ImageScope® software. Statistical analysis was performed with Stata®.

Results: HTBs with RA have significantly thinner of the incudomalleolar joint cartilage (RA 78 ears vs. control 018 ears, p=0.000 by Fischer’s exact test). There was no significant difference between groups in joint calcification and cartilage fraying. The mean joint width was significantly smaller at all three points in the RA group compared to controls using t-tests (lateral: RA 116.4um, control 151.7um, p=0.040; middle: RA 221.1um, control 299.3um, p=0.033; medial: RA 146.9um, control 227.2um, p=0.002).

Conclusion: Pathologic changes in the incudomalleolar joint in patients with RA resemble those found in other joints in the body and may account for mild conductive hearing impairment.

METHODS AND MATERIALS

The specimens used for this study belong to the human temporal bone collection of the Otopathology Laboratory of the University of Minnesota. The temporal bones were removed, decalcified, embedded in cellloidin, sectioned at 20 μm. Every tenth section was stained with hematoxylin and eosin and mounted on glass slides. The slides were examined under a light microscope, and the ones with processing artifacts were excluded.

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Histopathology of slides was examined under optical microscope, with 40x and 100x magnification. The incudomalleolar joint was analyzed for the presence of fraying, thinning of the cartilage, calcification, and fixation of the joint. Images at 20x magnification, of the incudomalleolar joint, were obtained with a camera attached to a microscope, and launched to a software (ImageScope®), and the widths at the lateral, middle, and medial points of the joint space were measured.

Comparisons between the RA and control groups were made regarding the qualitative analysis: appearance of the joint, and the quantitative: width of the joint. For the statistical analysis, STATA version 11.2 was used.

INTRODUCTION

Rheumatoid arthritis (RA) is a systemic disease of the connective tissue, of unknown cause, which is well known to affect many different organ systems. However, the most notable aberrations that occur are in the symmetrical peripheral joints, characterized by pannus formation, and bone and cartilage erosion resulting in a chronic inflammatory and destructive joint disease.

Hearing loss, sensorineural or conductive, has also been associated with RA, and can be caused by several mechanisms: inflammatory arthritis, vasculitis, autoimmune process, or even by drugs used for treatment of the disease. Although hearing loss associated with RA has been reported, and the auditory ossicle joints are subjected to the same lesions of other diarthroses, there have been only a few studies of the temporal bone regarding patients with RA.

The aim of this study is to evaluate the histopathology findings of RA in human temporal bones.

RESULTS

Eight temporal bones, five males and three females, composed the RA group, with ages between 55 to 83 years old (mean 67). The control group was formed by ten males and eight females, whose ages ranged between 55 and 83 years old (mean 66).

Qualitative analysis

The findings of the incudomalleolar joint assessment, in the RA and control groups, are shown in table 1 and figure 1. None of the specimens in either group presented with fixation of the joint.

Using Fisher’s exact test for the incudomalleolar joint analysis, we found that patients with RA have significantly thinner of the joint cartilage (p=0.000) compared to controls. We found no significant difference in regards to fraying and calcification.

DISCUSSION

Our results regarding the alterations in the articular cartilage and the widths of the joint are consistent with previous electron microscopic findings of destruction of articular surfaces, marginal cartilage, and the cortical part of ossicular bone in RA (Milisavljevic et al, 2010). Together, these results suggest that the incudomalleolar joint is subject to the same RA alterations as the other peripheral symmetrical diarthroses, and can be responsible for the conductive hearing loss associated with RA. In the same way, it can contribute to the sensorineural hearing loss, by the effect of the compression of the stiffened ossicular chain on the labyrinth, superimposed with the inflammatory mediators of the disease (Salvinieli, 2004).

CONCLUSIONS

This study showed that patients with rheumatoid arthritis are more likely to have alterations of the incudomalleolar joint, which may negatively affect their hearing.

REFERENCES


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