

Rheumatoid Arthritis and Hearing Impairment

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Rheumatoid arthritis (RA) is an inflammatory, autoimmune disease that, in addition to primary articular manifestations, affects multiple organs, including the auditory system. Sensorineural hearing loss (SNHL) is the most prevalent type of hearing impairment (HI) affecting patients with RA, noting a prevalence of 25-75 percent, followed by conductive (CHL) and mixed hearing loss (MHL). (Emamifar. *Open Rheumatol J* 2016;10:26). The objective of this study was to discuss possible pathologies, associated factors, and management of HI in RA patients. Therefore, a comprehensive literature search of available databases including Pubmed, Embase, Cochrane, and ComDisDome was performed.



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PATHOLOGY OF HEARING IMPAIRMENT IN RHEUMATOID ARTHRITIS

The exact mechanism of hearing impairment in patients with RA is not completely understood. However, a number of possible pathologies has been discussed that are summarized as follows:

1. Synovial destruction of incudostapedial and incudomallear joints due to an inflammatory process, though this may occur without any clinical presentation since they are functionally fixed during sound transmission (Figure 1);
2. Rheumatoid nodules in the ear, which may be triggered by methotrexate (MTX);
3. Auditory neuropathy as a part of mononeuritis multiplex;
4. Cochlear hair cells or the inner ear destruction because of disposition of the immune complex;

5. Drug-induced ototoxicity: Salicylates, non-steroidal anti-inflammatory drugs, antimalarial, and some disease-modifying antirheumatic drugs (DMARDs); and

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6. Other causes such as pro-inflammatory cytokines e.g., interleukin-6 and matrix metalloproteinases-3.



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ENVIRONMENTAL FACTORS

Smoking, alcohol, and noise exposure can affect the auditory system. Cigarette smoking can cause harmful effects on external hair cells, leading to decreased cochlear function. Additionally, it increases the risk of developing vasculitis and

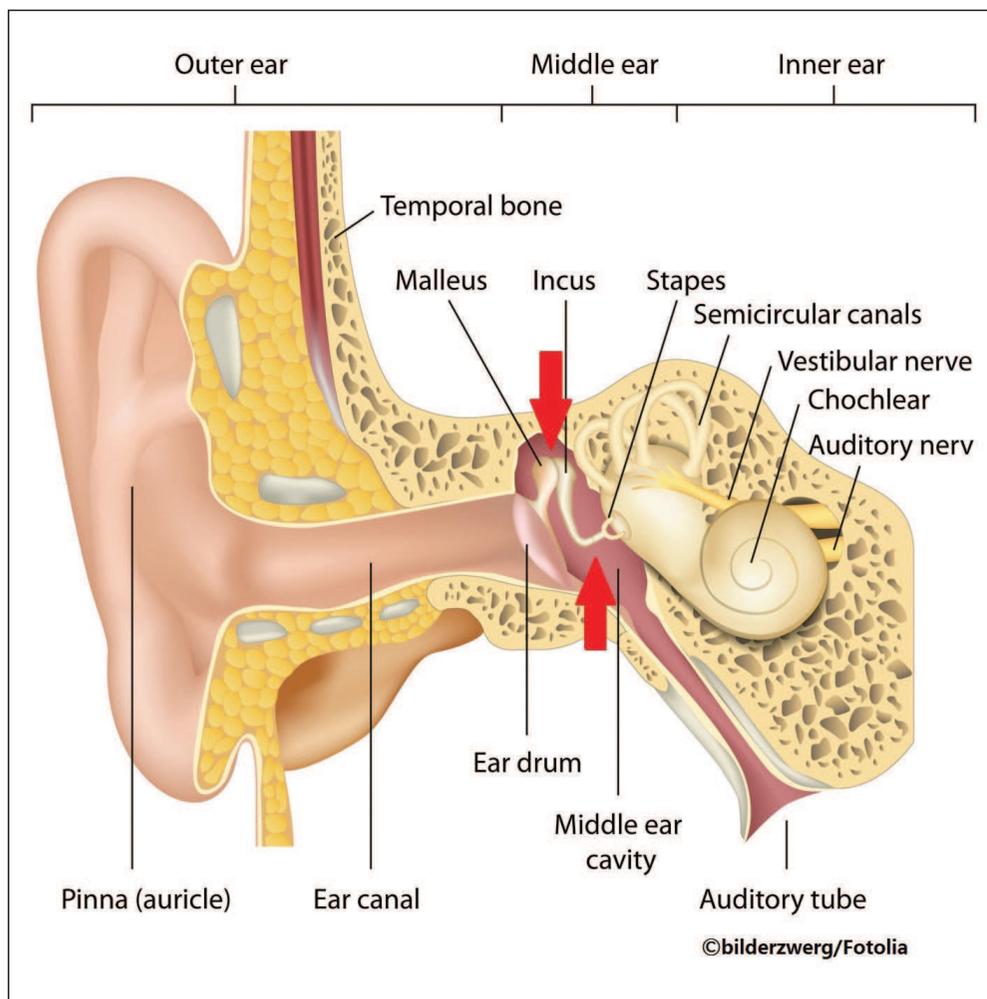


Figure 1: Possible sites of synovial destruction due to inflammatory process.

rheumatoid nodules, resulting in SNHL and CHL. Both active smokers as well as passive smokers are at risk of HI. Alcohol consumption may also harm external hair cells in both the healthy population and RA patients, leading to SNHL. Noise exposure is a preventable cause of metabolic and mechanical damage to the cochlea.

FACTORS ASSOCIATED WITH CLINICAL DISEASE CHARACTERISTICS

Age, gender, rheumatoid nodule, disease activity, disease duration, rheumatoid factor (RF), and acute phase reactants are associated with hearing impairment. However, the results of previous research were not in agreement. There is a high probability that HI develops in elder RA patients and those with long disease duration, active disease, positive RF, rheumatoid nodule, and elevated acute phase reactants.

HI AND RA MANAGEMENT

Regular audiometric test and Transiently Evoked Otoacoustic Emissions (TEOAEs) should be taken into account. Pure tone

audiometry is the most frequently used test to evaluate HI and may detect different levels of hearing loss for low to very high frequencies in RA patients. TEOAEs test has been extensively used to assess cochlear function and is capable of detecting various amounts of decreases in cochlear function at an early stage. Radiologic evaluation of affected ears in patients with clinical suspicion of serous otitis may provide a lead to diagnose rheumatoid nodules. Immunological assessment may be useful to clarify HI pathogenesis and to diagnose the disease promptly.

Treatment of HI in RA is based on empirical grounds. In most cases, oral steroids are the first line therapy. Ototoxic drugs should be discontinued. Intratympanic application of steroids with adjusted dosage may generate better response under special circumstances. Patients will benefit from cessation of cigarette smoking and alcohol consumption.

Other treatment options are steroid sparing agents (e.g., MTX and tumor necrosis factor inhibitors), vasodilators, surgery for patients with CHL and MHL to repair sound conduction, and the use of hearing aids and implantable devices.

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Hearing impairment is a multifactorial disease that can present concurrently with RA, significantly affecting quality of life and long term prognosis of patients. Efforts should be made to clarify the pathogenesis of HI, which may lead to better treatment options. Previous studies suffer from small sample sizes which could be limited by conducting a meta-analysis. [\[1\]](#)