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Opinion

Otitis Media. Inflammation or Infection?

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Abstract

Acute otitis media-infection or inflammation? The answer to this philosophical question has real practical consequences. Initially, otitis can be an infection followed by an organism's reaction in the form of inflammation. Or it is primarily inflammation, which is associated with a bacterial pathogen or proceed without the addition of a pathogen. In the case of "otitis-infection", further therapeutic tactic is clear- an antibiotic is needed. In the case of "otitis-inflammation" there are three possible scenarios of the subsequent development of process-self-healing, attachment of bacterial infection or gradual transition to otitis media with effusion. In clinical practice, it is important to distinguish between these scenarios in order to choose the right treatment strategy.

Keywords: Otitis media; Inflammation; Infection; Middle ear

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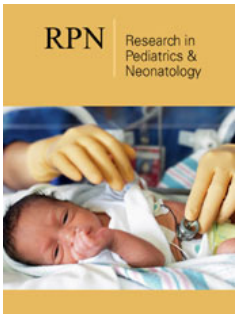

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Introduction

What came first-chicken or egg? In other words, what comes first in case of otitis-infection or inflammation? This article will explore the difference between infection and inflammation as a cause of development of "infectious otitis" or "inflammatory otitis". Both cases of otitis will be examined and explained whether a pathogen (virus or bacterium) first gets into the body and causes inflammation or it is the inflammation that develops first with or without infection following.

Discussion

How to distinguish between inflammation and infection? Infection is the penetration and reproduction of microorganisms in body tissues. Body responses to penetration of microorganisms by developing antibodies and inflammation [1]. As a rule, there is always inflammation when there is infection, however the latter is not always present in case of inflammation [2,3]. Inflammation is a protective response of the body aimed at elimination of traumatizing factors and initiation of recovery/healing processes. Pathogens, damaged cells or irritants might belong to traumatizing factors [4]. Inflammation is a fundamental pathological process that includes a dynamic complex of cytological changes, cellular infiltration and release of mediators [5]. Its course includes destruction or removal of pathogenic factor, with its response leading to tissue restoration [5]. Inflammation is not synonymous to infection even if it is usually caused by it. Since infection is caused by a microorganism, inflammation is one of the host responses to this pathogen. Inflammation is a stereotype response, and as such is considered the mechanism of innate immunity [6]. On the other hand, ear inflammation may occur without any infection as well. Otitis as infection. It is also called "infectious otitis". Bacterial infection from nasopharynx getting into the middle ear via the auditory tube is the natural cause of inflammatory response of the middle ear tissues and development of classical bacterial otitis media. In this case otitis is an infection, with microorganism being the dominating factor which has to be properly impacted during treatment. Infection may be viral or bacterial.

Otitis as inflammation. It is also called "inflammatory otitis". If inflammation plays the primary role in otitis, what causes this response in the case where infection is not present? "Otitis is a phenomenon of pressures" says John Pauers, assistant professor at George Washington University [7]. What does this mean? Impaired auditory tube function results in

the change of pressure in the middle ear. Auditory tube blockage leads to impaired middle ear ventilation and drainage, changes in gas composition of cavities, mucosal edema, tissue damage (due to hypoxia, edema, microcirculation disorders). Thus, inflammation is the reaction of the middle ear mucous membrane to this tissue damage. Therefore, in otitis with the inflammatory onset the host response to tissue damage and changes in pressure in the middle ear prevails.

What happens next in "inflammatory otitis"? There are three possible scenarios of the subsequent development of inflammation in the ear.

A. Scenario 1: Inflammation can be self-limiting-the body will "take care" of the blockage and damaged tissues (inflammation will eliminate damaged tissues and facilitate their recovery, auditory tube will unblock and restore its normal function).

B. Scenario 2: A bacterial infection develops and grows. Clinical situation gets worse. Sometimes complications might develop.

C. Scenario 3: Aseptic inflammation results in mucus formation in the middle ear. Mucus thickens, gets stuck in the mid-ear and inflammatory activity decreases. Secretory otitis media starts developing.

How to distinguish "infectious otitis" from "inflammatory otitis"? How can one clinically "identify" the "infectious otitis" scenario? Bacteria's entering the middle ear and actively multiplying there leads to the fulminant onset of otitis with its typical manifestations and deterioration of the patient's general condition. In this case otitis is an infection where microorganism plays the leading role. Thus, treatment should be antibacterial. What is the evidence of "otitis inflammation"? There is a large proportion of otitis that tend to be self-limiting or subside during antibiotics free anti-inflammatory treatment. Nonsteroidal anti-inflammatory drugs (systemic and local), as well as symptomatic treatment (local anesthetics) play the major role in this treatment. Distinguishing between "otitis inflammation" and "otitis infection" is often quite challenging. Patient's history, severity of manifestations, their dynamics and tympanic findings may come in useful. And of course, one should not underestimate physician's experience as well.

Conclusion

Ear infection does not exist without inflammation, but there may be inflammation without any infection. Determining whether the cause of otitis, is infection or inflammation is not a mere play with notions, but a matter of quite important concepts that have a specific practical implication. Understanding the difference between these two notions in each individual clinical case will result in your ability to choose the relevant treatment strategy. Otitis-inflammation, go for anti-inflammatory treatment with careful observation. Otitis-infection-choose antibiotics.

Conflict of Interest

The authors do not report any financial or personal connections with other persons or organizations that might negatively affect the content of this publication and/or claim authorship rights thereto.

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