Histologic Study in Adhesive Otitis Media

ADEZİV OTİTİS MEDİA'DA HİSTOLOJİK ÇALIŞMA

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Summary

Adhesive otitis media (AOM) is a complication of secretuar otitis media, which is classified according to the tympan membrane (TM) movements. AOM was first described by Politzer in 1908. Research on this subject still continues.

This study was done at Ankara Numune Research and Education Hospital, Department of Otolaryngology, Head and Neck Surgery and Ankara University Medical Faculty Department of Histology and Embryology. This study aims to elucidate the morphological differences in TM and middle ear mucosa between normal human and patients of chronic adhesive otitis. Materials were obtained during the surgery of eleven ears and histologic examination was done to compare similarity and differences between the pathologic changes in adhesive otitis and normal human middle ear and TM. The correlation between the pathologic TM and MEM (Middle Ear Mucosa) in AOM was also investigated. The biopsy material was fixed at 4°C for a period of 12 hours in 2.5% phosphate buffered gluteraldehyde solution and post fixed in 1% osmium tetroxide. After staining with Toluidin blue- azur II, the semithin sections were examined with light microscope.

Histologic examination of atelectatic TM revealed increase of keratin on the outer surface of the TM, thickening of the squamous ephitelium and various degrees of papillary ingrowth towards the lamina propria which are in accordance with Sade's report. In 8 of the 11 cases ephitelium couldn't be detected. Similar to Sade's observation lamina propria was eodematous and infiltration with round cells, mostly Iympocytes and plasmocytes was present in most of the specimens. In this study we observed no glands, which was different from that of Sade's results.

Evaluation of the specimens obtained from the middle ear revealed the absence of ciliated epithelium and goblet cells, which could be attributed to the anatomic localization or to the terminal stage of the AOM.

In 8 cases lamina propria of the specimens, showed thickened collagen fibers, where in 3 cases it was thinner than normal. A different finding in our study from previous studies was that the MEM showed congestion, stasis and erytrocyte extravasation in the lamina propria.

As a conclusion; AOM is not only the atrophy of the TM but also a process concerning soft tissue of the middle ear.

Key Words: Adhesive otitis media, Histology

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Özet

Adeziv otitis media (AOM), sekretuvar otitis mediyanın bir komplikasyonudur ve timpan membran (TM) hareketlerine göre sınıflandırılır. AOM ilk kez 1908'de Politzer tarafından tarif edilmiştir Günümüzde bu konudaki çalışmalar devam etmektedir.

Bu çalışma Ankara Numune Hastanesi Kulak Burun Boğaz Kliniği ile Ankara Üniversitesi Tıp Fakültesi Histoloji-Embriyoloji Anabilim Dalı tarafından yapılmıştır. Bu çalışmada amaç normal ve AOM'lı kulaklardaki TM ve orta kulak mukozası arasındaki morfolojik farklılıkların ortaya konmasıdır. Onbir hastadan ameliyat sırasında alınan tüm materyaller histolojik olarak incelenmiş adeziv otitis mediada meydana gelen patolojik değişiklikler değerlendirilmiştir. AOM'da TM değişiklikleri ile orta kulak mukozası değişiklikleri arasında bir korelasyon olup olmadığı araştırıImıştır. Biyopsi materyalleri +4°C'de 12 saat %2.5'lik gluteraldehid solüsyonunda fikse edilmiş daha sonra %1'lik osmium tetroksit ile post fiksasyon yapılmıştır. Toluidin blue azur II ile boyanarak ışık mikroskobu ile incelenmiştir.

Histolojik değerlendirmede atelcktatik TM'da Sade'nin bildirdiği ile uyumlu olarak dış yüzde keratinizasyonda artma, skuamoz epitel kalınlaşması ve çeşitli derecelerde lamina propriaya doğru papiller girinti belirlenmiştir. Onbir vakanın 8'inde epitel saptanmamıştır. Sade'nin çalışması ile uyumlu olarak lamina propriada ödem, sıklıkla lenfosit ve plasmosit olmak üzere yuvarlak hücre infiltrasyonu örneklerin büyük bir kısmında saptanmıştır. Sade'nin çalışmasından farklı olarak gland yapısı saptanmamıştır.

Alınan örneklerde orta kulak mukozasının incelenmesinde siliyalı epitelin ve goblet hücrelerinin olmadığı saptanmıştır. Bu bulgu AOM'nın terminal evresi için karakteristiktir. Lamina propriada 8 vakada kollagen lifler kalınlaşmış diğer 3 vakada ise incelmiştir. Bu çalışmada diğer çalışmalardan farklı olarak orta kulak mukozasında lamina propriada konjesyon, staz ve eritrosit ekstravazasyonu gösterilmiştir.

Sonuç olarak adeziv otitis mediya sadece timpan membranın değil orta kulağın tüm yumuşak dokularının atrofisidir.

Anahtar Kelimeler: Adeziv otitis media, Histoloji

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The pathology of adhesive otitis was thoroughly described by Politzer in 1908. A more recent description was given by Ojala (2) in 1953 and by Siirala (3) in 1964. Later on Sade (4) described his classification of TM retraction. Adhesive otitis is the bacterial inflammation of middle ear. It has a tendency to chronicity and is characterised by tubal occlusion and adhesions in the middle ear. The TM is retracted with the mobility decreased. Three phases may be distinguished; at subacute or initial stage, the exudate in the middle ear is often sticky and the changes in the mucous membrane are reversible; at the adhesive stage adhesions form in the middle ear and inflammation is in progress; at the terminal stage resolution of inflammation has already occured (5).

Atelectasis or retraction of the pars tensa is divided into 5 categories by Sade(6), according to the severity of TM retraction : In grade I, TM is slightly retracted, in grade II it is reclined over incus, in grade III it is reclined over promontory. Once atelectatic membrane is adherent to promontory, Sade term this; grade IV and when fine athelectatic membrane is perforated, it is termed grade V.

At the initial stage of adhesive otitis the mucous membrane becomes thickened and hyperplastic. Goblet cells and mucous glands develop. The exudate is later organized and mucous membrane becomes fibrotic and adhesions arise. In older cases tympanosclerosis or cholesterol granulomas with crystals are often encountered at the terminal stage, showing absorbtion of exudate adhesions only remain (3).

Material and Methods

Eleven patients (8 female and 3 male) were included in our study and mean age was 24.15. Six patients had bilateral A O M . A11 of them were grade IV according to the Sade's classification, 7 was left ear and 4 was right ear. Intact canal wall tympanoplasty was performed in all of the patients.

The biopsy material was fixed at 4°C for a period of 12 hours in 2.5% phosphate buffered gluteraldehyde solution and post fixed in 1% osmium tetroxide. After dehydrated in graded ethyl alcohol, the tissue samples were embedded in Araldite CY212. The sections were held on L K B ultratome III with a glass knife, stained with toluidin blue azur II and then examined under a Zeiss axioscope photomicroscope.

Results

A11 of our patients were grade IV according to the Sade (6) classification. Specimens were obtained from adhesive portion of TM and over the promontorium of the middle ear. After staining with Toluidin blue - azur II, the semithin sections were examined under light microscope. Light microscopy of TM revealed an increase in keratinization in the outer surface, hypertrophy of squamous ephitelium and (Figure 1) an increase in connective tissue papilla.

Figure 1. Ligth microscope photograph of TM. Keratinization in the outer surface (star) Toluidin blue-Azur II x 250.

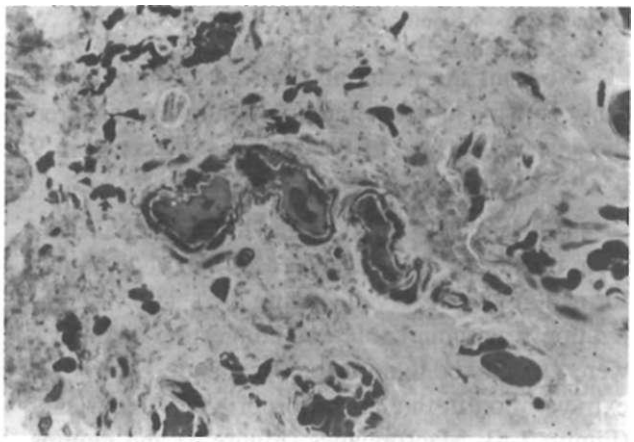


Figure 2. Lamina propria presented eodematous formation. Extravasation of erytrocytes (arrow)Toluidin blue- Azur II x 250.

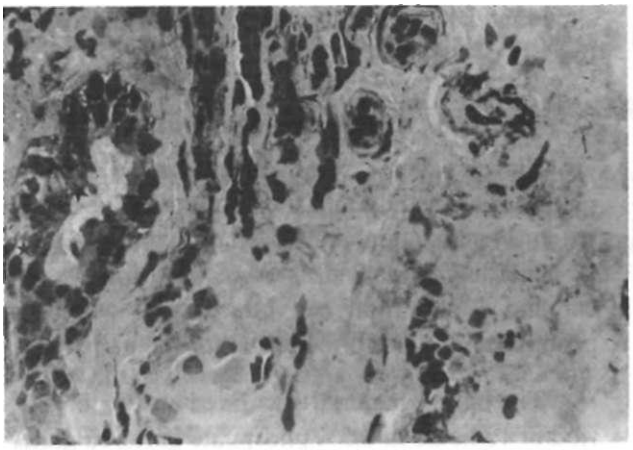


Figure 3. Epithelium of MEM (star) congestion in the vessels (long arrow head) , thickening of collagen fibers (thin arrows) Toluidin blue-Azur II X 250.

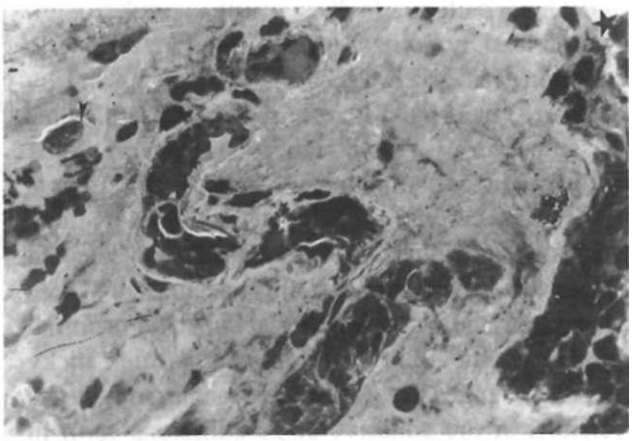
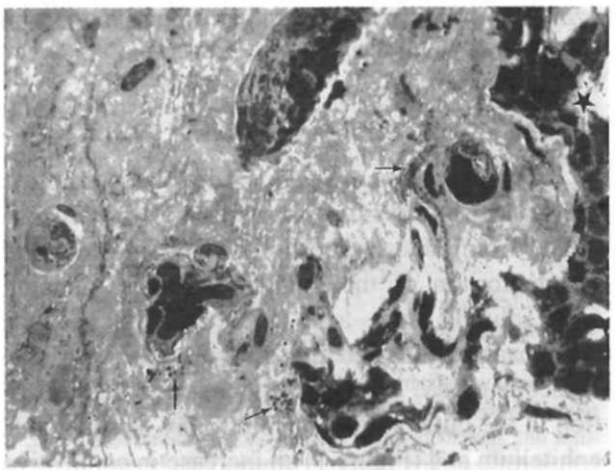


Figure 4. Lamina propria of MEM. Macrophage (arrow head) congestion Small star) and epithelial destruction (big star) Toluidin blue Azur II x 250.



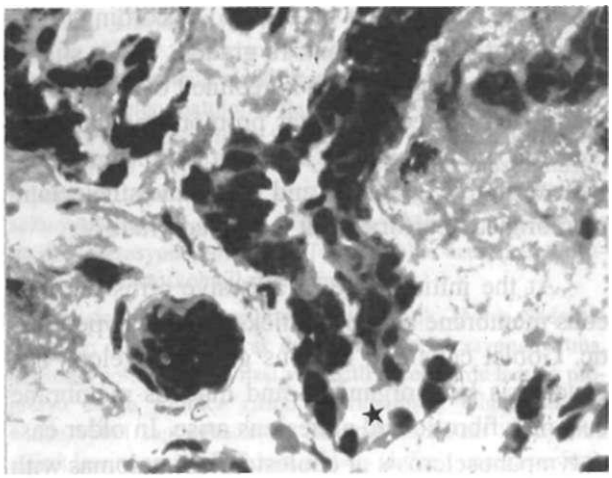


Figure 5-6. Epithelium of M E M . Destruction of epithelial cells (Star), clumps of thick collagen fibers (arrows). Toluidin blue-Azur **II** X 250.

None of the materials showed curling formation of T M . The stratified ephitelium that covered the external surface of the TM was thickened in 9 of the cases.

The lamina propria under the epithelial cells were thickened in all of the cases and eodematous formation was observed (Figure 2-6). The vascularization was remarkable and congestion and stasis were found to be in noticable frequency. Erytrocyte extravasation in the lamina propria was significant (Figure 2-4). Macrophages (Figure 4) and clumps of thickened collagen fibers were seen (Figure 3,5).

Neither flat ephitelium nor respiratory epithelium was detected in the T M . The epithelial tissue of the middle ear could only be seen in three of the cases and it was consisted of destroyed cuboidal cells (Figure 5,6).

Discussion

Normal TM consist of three layers. An outer ectodermal layer composed of keratinizing squamous epithelium, an intermediate mesodermal fibrous layer and an inner endodermal mucosal layer. Many authors claimed the normal lining of M E M as nonciliated flat or cuboidal epithelium.

Polvogt (7) states that cilia pass at times from the eustachian tube into the tympanum; Kolmer and Mellendorf (8) saw cilia in the hypotympanum. Buch and Jorgensen (9) as well as Lawson (10) state that the tympanic cavity may be ciliated in places.

Maximov and Bloom (11) state near the opening of the auditory tube and TM, the epithelium is cuboidal or columnar and provided with cilia. The existence of glands is generally denied. Senturia (12) described cilia and goblet cells in the tympanic cavity of dogs near the tube.

On histologic examination of atelectatic TM similir as Sade's (6) findings we observed increasing of keratin on the outer surface of the TM, thickening of the squamous epithelium and various degrees of papillary ingrowth towards the lamina propria. In 8 of the 11 cases we couldn't detected epithelium. Similar to Sade's observation the lamina propria was eodematous and most of the cases presented impressive infiltratrion with round cells, mostly lymphocytes and plasmocytes. In this study different from Sade's results, no glands were observed so, we didn't need to use periodic asid-schiff method.

Incidance of absence of TM epithelium was found to be 8/11. On the other hand, eodematous structure of lamina propria and round cell infiltration was not seen, contrary to the findings of Sade.

Evaluation of the specimens obtained from middle ear showed the absence of ciliated epithelium and goblet cells, which could be attributed to the anatomic localization or to the terminal stage of the AOM. In the middle ear, ciliated epithelium and goblet cells are located especialy in the orifice of tuba auditiva.

When we examined the specimens taken from the promontorium of the MEM neither ciliated epithelium nor goblet cells were observed. This might be a result of the anatomical region from where the specimens were taken or it was just because the characteristic results of the terminal stage of adhesive otitis media. The lamina propria of the specimens, 8 cases showed thickened collagen fibers, where in 3 cases they were thinner than normal. A different finding in our study from previous studies was that the MEM showed congestion, stasis and erythrocyte extravasation in the lamina propria.

Conclusion

Adhesive otitis media is a complication of secretuar otitis media, which is classified according to the TM movements (13). In the early grades (grade I-II) findings are generally related to infection.

Athropy resulting from pressure difference is observed of the TM and MEM(2,3,4). As a conclusion the term of the adhesion does not describe the whole pathology of the middle ear and tympan membrane. The term of adhesive otitis media shows only the movement of the tympan membrane. AOM is an athropic otitis media concerning all of the soft tissues of the middle ear and tympan membrane.

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