CLINICAL STUDY

CHRONIC OTITIS MEDIA-EVALUATION OF THE CONTRALATERAL EAR

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SUMMARY

Objective: To evaluate the contralateral ear changes (CLE's) in chronic otitis media (COM).

Material and Methods: A retrospective medical chart review of subjects which were diagnosed and surgically treated for COM. This study was undertaken the dates between 2003 and 2009. All subjects were evaluated for the presence of CLE changes. In addition, according to the pathologic examination subjects were also divided either chronic otitis media with cholesteatoma (CCOM-group A) or chronic otitis media without cholesteatoma (NCCOM-group B). Otomicroscopic and Computerized Tomography (CT) findings of CLE for each group were noted and compared.

Results: Stage 1-2 and Stage 3-4 pars tensa retraction, Stage 1-2 and Stage 3-4 pars flaccida retraction and presence of cholesteatoma were found statistically significant high in the group A (p=0.005, p=0.129 p=0.004, p=0.001, p=0.029 respectively). In contrast perforation of the CLE ear was statistically significant high in group B (p=0.001).

When compared the CT findings, soft tissue in the tympanic cavity, soft tissue in the mastoid cavity, ossicular chain defect, scutum erosion were found statistically significant high in the group A (p=0.001, p=0.001, p=0.001, p=0.001 respectively). Poor mastoid pneumatization did not differ between the groups (p=0.642) but normal CLE findings were found statistically significant high in the group B (p=0.012).

Conclusion: Although some limitations exists, the results indicate that both ears will be regarded as pairs and disease in one ear, especially cholesteatoma, will be indicative for close follow up of contralateral ear.

Keywords: Chronic otitis media, cholesteatoma, contralateral ear

KRONİK OTİTİS MEDİA-KARŞI KULAĞIN DEĞERLENDİRİLMESİ

ÖZET

Amaç: Kronik otitis media'da karşı kulağın durumunu değerlendirmek

Yöntem: Kronik otitis media tanısı alan ve cerrahi olarak tedavi edilen olguların medikal kayıtları geriye dönük olarak değerlendirildi. Çalışma 2003 ile 2009 yılları arasını kapsamaktaydı. Tüm olgular opere edilmeyen kulaktaki değişikliklerin varlığı açısından değerlendirildi. Ek olarak, patolojik inceleme sonucuna göre olgular kolesteatomlu kronik otitis media (Grup A) ve kolesteatomsuz otitis media (Grup B) olarak gruplarına ayrıldı. Otomikroskopik ve bilgisayarlı tomografi (BT) bulguları her grup için kaydedildi ve karşılaştırıldı.

Sonuçlar: Evre 1-2, evre 3-4 pars tensa retraksiyonu, evre 1-2, evre 3-4 pars flaccida retraksiyonu grup A' da istatistiksel olarak anlamlı derecede yüksek bulundu (p=0.005, p=0.129 p=0.004, p=0.001, p=0.029). Zıt olarak diğer kulakta perforasyon ise grup B' de anlamlı derecede yüksek bulundu (p=0.001). BT bulguları değerlendirildiğinde timpanik kavitede yumuşak doku, mastoid kavitede yumuşak doku, kemikçik zincir defekti, skutum erezyonu grup A' da istatistiksel olarak anlamlı derecede yüksek bulundu (p=0.001, p=0.001, p=0.001, p=0.001). Kötü mastoid pnömatizasyonu açısından gruplar arasında farklılık yoktu (p=0.642). Normal karşı kulak bulguları grup B' de anlamlı derecede yüksekti (p=0.012).

Sonuç: Bu çalışmanın bazı kısıtlılıkları olsa da çalışma sonuçları her iki kulağın bir çift olarak değerlendirilmesini ve bir kulaktaki hastalığın, özellikle kolesteatomun, diğer kulağın daha yakın takibi için bir gösterge olabileceğini göstermektedir.

Anahtar Sözcükler: Kronik otitis media, kolesteatom, karşı kulak

INTRODUCTION

Development of cholesteatoma is one of the main interest areas in the field of otolaryngology. Recent knowledge is that the pathogenesis of cholesteatoma is a complicated subject and effected by several factors[1].

Acute otitis media (AOM) is high in childhood which its prevalence will rise up to 75% in first 3 years of life[1]. AOM will be resulted with OM with effusion (OME)[2]. OME is regarded the initial event which may progress more chronic changes in the middle ear[3]. These chronic changes include mastoiditis, atelectasis of the middle ear (with or without retraction pocket), cholesterol granuloma, ossicular discontinuity or fixation, adhesive OM, tympanosclerosis, perforation of the tympanic membrane (TM) and acquired cholesteatoma[4].

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The literature showed that OME is mostly occurs bilaterally. If this is the case; more chronic changes also have to occur bilaterally. This hypothesis will only be clarified with the evaluation of the contralateral ear. This evaluation will also answers some questions including ''Is the contralateral ear effecting from the other ears condition? If a serious condition e.g. cholesteatoma exists in one ear is it effecting the other ears disease severity etc.?"

Few studies evaluated the condition of contralateral ear (CLE) changes in the past[3,5,6]. This study is aimed to determine CLE changes in surgically treated COM.

MATERIAL and METHODS

A retrospective medical chart review of subjects who were diagnosed and operated for COM were enrolled for the study. This study was undertaken the dates between 2003 and 2009 at Bakırköy Dr.Sadi Konuk Hospital ENT Clinic. A complete ENT examination was made. Otomicroscopic examination findings of both ears were noted. A coronal and axial computerised tomography (CT) scans were obtained from all subjects. CT findings were also noted.

All subjects in this study were treated with surgical approach. Subjects who were underwent a previous operation did not included for the study. Surgical interventions were made for tympanic membrane perforation, retraction pockets and mastoid pathology including granulation tissue and cholesteatoma. These subjects were evaluated for the presence of CLE changes. If tympanoplasty without mastoidectomy was performed a histopathological examination was not done. When attictomy/ atticoantrotomy or mastoidectomy was performed, all middle ear and mastoid specimens sent for pathological examination and cholesteatoma differed from the granulation tissue. Then subjects were also divided groups according the presence of cholesteatoma. According to the pathologic examination subjects were divided either chronic otitis media with cholesteatoma (CCOM-Group A) or chronic otitis media without cholesteatoma (NCCOM-Group B) group.

Otoscopic and CT findings of CLEs were noted for either group A or group B. CLE findings on otoscopic examination were noted as fallowing: normal, fluid in the middle ear, myringosclerosis, retraction, perforation and cholesteatoma. Pars tensa retractions were classified according to Sade[7] and pars flaccida retractions were classified according to the Tos and Poulsen[8]. Retraction classification is summarized in Table 1. Stage 1-2 retractions and Stage 3-4 retractions were grouped. A stage 5 retraction which reflects attic cholesteatoma for pars flaccida and atelectatic otitis media was added to perforation and cholesteatoma findings. CT findings were noted as soft tissue in the tympanic cavity, soft tissue in the mastoid cavity, ossicular chain defect, scutum erosion, poor mastoid pneumatization and normal.

Table 1: Tympanic membrane retraction classification.

Retraction classification	Attic retraction classification (Tos and Poulsen)[7]	Pars tensa retraction classification (Sade)[8]
Stage 1	Slight retraction towards neck of malleus but airspace is visible	Slight retraction of the tympanic membrane (TM) over its annular fold
Stage 2	Retraction onto neck of malleus - no airspace is visible behind TM	TM touches ossicular chain (incudostapedial joint)
Stage 3	Retraction extends beyond bony annulus- full extent of retraction pocket is seen	TM touches promontorium
Stage 4	Erosion of outer attic wall	Adhesion of pars tensa to promontorium
Stage 5	Attic cholesteatoma	Atelectatic otits media

Statistical analysis was performed using NCSS (Number Crunching Statistical System) 2007&PASS 2008 Statistical Software (Utah, USA). During the evaluation of the study data, along with the descriptive statistical methods (mean, SD), comparison of quantitative data were evaluated by using Student t test. Qualitative data was evaluated by using Chi-square and Fisher's Exact test. Confidence interval was 95% and p value less than 0.05 was considered to be significant.

RESULTS

Surgery was performed to 412 subjects during the study period. 243 of these subjects were grouped as Group A whereas remaining 169 subjects were grouped for Group B. Male predominance was observed in group A and female predominance was observed in the group B. Demographic data of the both groups were presented in Table 2.

Normal otoscopic findings, presence of fluid in the middle ear and myringosclerosis did not showed statistically significant difference between the groups (p=0.260, p= 0.122, p= 0.718 respectively). Stage 1-2 and Stage 3-4 pars tensa retraction, Stage 1-2 and Stage 3-4 pars flaccida retraction and presence of cholesteatoma were found statistically significant high in the group A (p=0.005, p=0.129 p=0.004, p=0.001, p=0.029 respectively). In contrast perforation of the CLE ear was statistically significant high in the group B (p=0.001). Distribution of the otomicroscopic findings in COM subjects were presented in Table 3 and Figure 1.

When compared the CT findings, soft tissue in the tympanic cavity, soft tissue in the mastoid cavity, ossicular chain defect, scutum erosion were found statistically significant high in the group A (p=0.001, p=0.001, p=0.001, p=0.001 respectively). Poor mastoid pneumatization did not differ between the groups (p=0.642) but normal CLE findings were found statistically significant high in the group B (p=0.012). Distribution of the CT findings in COM subjects were presented in Table 4 and Figure 2.

Table 2: The demographic data of the groups.

	Group A(CCOM,n=243)	**Group B(NCCOM, n=169)**	**p**
•*Age (Mean±SD)*	31.35±15.76	30.17±11.52	*0.406*
◆*Gender n (%)*			*0.022**
Female	113 (46.5%)	98 (58.0%)	
Male	130 (53.5%)	71 (42.0%)	
◆*Side*			*0.423*
Right	115 (47.3%)	73 (43.2%)	
Left	128 (52.7%)	96 (56.8%)	

•: Student t test. ◆: Chi-square test

Table 3: Distribution of the otoscopic findings in the CLEs of subjects with COM (Group A and B)

	COM (N=412)	Group A (CCOM, n=243)	Group B(NCCOM, n=169)	◆p
Finding	**n (%)**	**n (%)**	**n (%)**	
Normal	179 (43.4%)	100 (41.2%)	79 (46.7%)	***0.260***
Fluid in the middle ear	11 (2.6%)	4 (1.6%)	7 (4.1%)	***0.122***
Myringosclerosis	24 (5.8%)	15 (6.2%)	9 (5.3%)	***0.718***
Stage 1-2 pars tensa retraction	33 (8%)	27 (11.1%)	6 (3.6%)	***0.005****
Stage 3-4 pars tensa retraction	14 (3.4%)	11 (4.5%)	3 (1.8%)	***0.129***
Stage 1-2 pars flaccida retraction	16 (3.9%)	13 (9.1%)	3 (1.8%)	***0.004****
Stage 3-4pars flaccida retraction	38 (9.2%)	38 (15.6%)	0	***0.001****
Perforation	118 (28.6%)	49 (20.2%)	69 (40.8%)	***0.001****
Cholesteatoma	10 (2.4%)	10 (4.1%)	0(0.0%)	***0.001****

◆ : *Chi-square test* *p<0.05 **p<0.01

Table 4: Distribution of the CT findings in the CLEs of subjects with COM *(Group A and B)*

	COM(n=412) n (%)	Group A(CCOM,n=243) n (%)	Group B(NCCOM,n=169) n (%)	◆p
Soft tissue in the tympanic cavity	89(21.6%)	69(28.4%)	20 (11.8%)	***0.001****
Soft tissue in the mastoid cavity	111 (26.9%)	90 (37.0%)	21 (12.4%)	***0.001****
Ossicular chain defect	28 (6.8%)	27 (11.1%)	1 (0.6%)	***0.001****
Scutum erosion	19 (4.6%)	18 (7.4%)	1 (0.6%)	***0.001****
Poor of mastoid pneumatization	164 (39.8%)	99 (40.7%)	65(38.5%)	*0.642*
Normal	206 (50.0 %)	109 (44.9%)	97(57.4%)	***0.012****

◆ : *Chi-square test* *p<0.05 **p<0.01

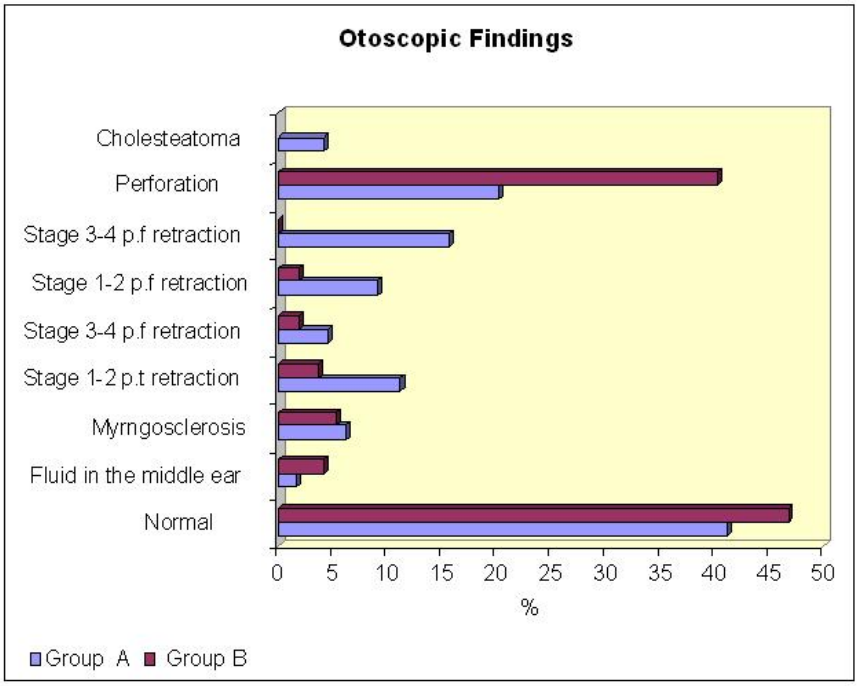

Figure 1: Comparison of otoscopic findings according to groups.

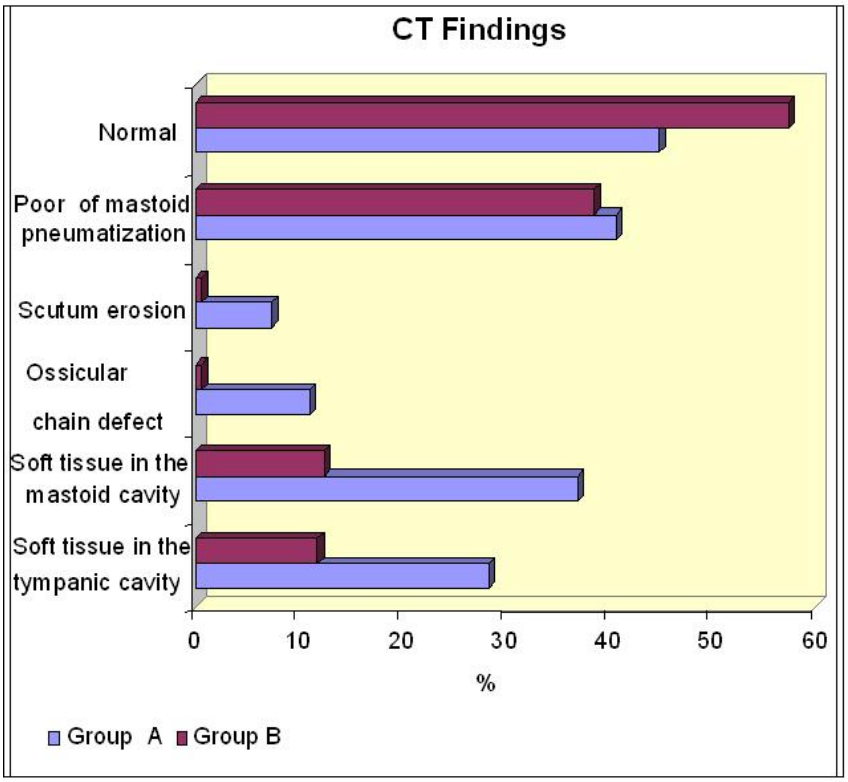

Figure 2: Comparison of CT findings according to groups.

DISCUSSION

When compared both CCOM and NCCOM groups, results showed similar prevalence's for CLE changes (58.8% vs. 53.3%). This is in contrast with a previous publication by Selaimen da Costa et al.[3] which found a high prevalence of CLE changes in CCOM group. The severity of retractions between CCOM and NCCOM groups are also different from this study. Selaimen da Costa et al.[3] used a classification system which was modified from Sade and Berco[9] which was made in 1976. Pars tensa and Pars flaccida retractions did not reported separately in this study. Besides; retractions classified as mild, moderate and severe retractions. The statistical analysis was made after exclusion of solely mild retractions. The results indicate a high prevalence of mild retractions in NCCOM group whereas both moderate and severe retractions were found high in CCOM group. It was not reported that whether these differences were statistically significant or not. In our study stage 1-2 pars tensa, stage 1- 2 and stage 4 pars flaccida retractions were found statistically high CCOM group ($p<0.01$) whereas stage 3-4 pars tensa retractions did not differ between the groups ($p=0.129$). The difference between studies will be a result of different classification systems or racial differences.

Vartiainen et al.[5] presented 493 subjects who were treated for COM. Subjects were divided either CCOM, chronic granulating otitis media without cholesteatoma (subjects undergo mastoidectomy) and subjects with sequeale of otitis (subjects undergo tympanoplasty without mastoidectomy). Although such kind of design will be useful, we prefer to divide subjects according to cholesteatoma presentation. Therefore subjects undergoing surgery for granulating otitis were included to NCCOM group. In that study atrophy and tympanosclerosis were the most common findings. Contralateral ear was found as normal in 37% of the subjects. The prevalence of normal ear findings between groups did not showed statistically significant results. Attic retraction was regarded as a retraction which leads to outer attic wall erosion (Tos and Poulsen Type 3-4). Pars tensa retraction was noted if the retracted TM adherent to promontory or its surrounding structures. Attic retraction and adhesive otitis was found significantly high in cholesteatoma group ($p<0. 01$) where as distribution of pars tensa retractions between groups were approximately equal. In this study a major difference was exists from ours, which was dry perforation. Dry perforation was observed only 7 out of 493 subjects. Our study demonstrated more high prevalence of perforation. It is observed 117 out of 412 (28.4%) subjects in our study.

A histological study on 85 pairs of human temporal bones demonstrated that the prevalence of CLE changes will be as high as 91.8%[6]. Authors noted 77.6% of the changes will be considered as significant. Granulation tissue, effusion and tympanic membrane retractions were the most common findings (prevalence 69%, 49%, 30% respectively) in this study. Cholesteatoma was found in 19 (22.4%) of the temporal bones. Although the prevalence of CLE changes did not differ between CCOM and NCCOM group, the extent of granulation tissue and cholesteatoma was correlated with the presence of these conditions in more damaged ear and in the CLE ($p<0.04$, $p<0.01$ respectively). This report presented different results from ours for several aspects. The prevalence of CLE changes was high. This is why a histopathologic examination allows detecting the changes which will not be observed in otomicroscopy. As similar; histopathologic examination allows evaluating the whole middle ear regions which is not possible to evaluate with otomicroscopy. Timpanic membrane perforations were observed less from our study (3.53% vs. 28.4%) and none of the CLE changes were correlated with presence of cholesteatoma.

Our study presents an additional data which is not presented previously. This is the CT findings of CLE. CT findings indicate that a normal finding was found significantly high in NCCOM group ($p<0.05$). Both CCOM and NCCOM groups shows similar results for poor mastoid pneumatization (40.7% vs. 38.5% $p=0.642$). A strong correlation exists with the presence of CCOM and presence of soft tissue in the tympanic, soft tissue in the mastoid cavity, ossicular chain defect and scutum erosion ($p<0.01$).

Since the most advanced stage of COM is cholesteatoma, pure perforation seems a better form of COM. This suggestion is supported by Sudhoff and Tos[4] whose did not observed any development of cholesteatoma in perforated ears. Our study indicates that development of cholesteatoma will be a tendency which affects both ears. The CLE's of CCOM showed more serious conditions such as retraction and cholesteatoma. For contralateral ear, although cholesteatoma was occurred significantly high in CCOM group (4.1%), it is not obvious if this prevalence is high from the normal population in Turkey. There is no study exists in the English literature which shows the prevalence of cholesteatoma and, indeed, this will be limitation for present study. Another limitation of our study is we

did not make a follow up. Any significant CLE change, such as retractions, will progress to cholesteatoma which will increase the prevalence.

Present study demonstrates that both ears are pairs and a condition in one ear will indicate some changes in CLE. Since the OME and tubal dysfunction is relevant with a high prevalence of attic or tensa retractions, and retraction pockets are regarded as precursors for cholesteatoma[4], careful observation and early intervention is helpful to control the disease and to prevent potential sequelae.

At this point an additional question will be '' Why approximately 40% of the CLE's are normal?" It is known that development of cholesteatoma is a multifactorial subject which several factors involving to this process. A limitation of this study is, we did not focused on the factors which will have an impact on development of cholesteatoma. Another limitation is; we also did not evaluate and present the audiological data since we focused on the physical condition of the contralateral ear.

CONCLUSION

The data on the condition of CLE changes in COM is limited to a few studies. Our study presents a large serie of 412 subjects. Although some limitations exists, the results indicate that both ears will be regarded as pairs and disease in one ear, especially cholesteatoma, will be indicative for close follow up of contralateral ear.

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