

Because of the inner ear damage, we hypothesize that cholesteatoma may be also associated to posterior labyrinth alterations.

Methods: Transversal, descriptive and comparative study. We included consecutive patients with cholesteatoma and no previous ear surgery. As control group, we included patients with ears without any alterations and normal audiometric thresholds. The patients were submitted to an ENT evaluation, digital videotoscopy and a video Head Impulse Test (v-HIT), to detect peripheral vestibular deficits through an objective measure of the vestibular ocular reflex (VOR) gains.

Results: The research group was constituted by 72 ears and the control group by 62 ears. When we analyzed the semi-circular canals (SCC) through the v-HIT, we observed that the average gain of the lateral SCC of the research group was significantly lower than the average of the control group ($p = 0,050$). Regarding the age of the research group, we found in pediatric population a gain of VOR in the anterior SCC significantly lower when compared to the average of ears with cholesteatoma in adults ($p = 0.037$). When we analyzed only the pediatric group, we observed that ears with cholesteatoma had VOR gain significantly lower than normal ears in posterior SCC ($p = 0,026$).

Conclusions: Ears with cholesteatoma demonstrated a lower average gain of VOR than the control group in the three SCC. Considering the age, pediatric patients with cholesteatoma had more alterations in the labyrinthine evaluation than those over 18 years.

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Tympanic membrane retraction and cholesteatoma: study of the pathogenesis through an analysis of the contralateral ear

Presenting Author: **Leticia Rosito**

Leticia Rosito, Inesangela Canali, Sady Selaimen da Costa, Fábio Selaimen, Jady W. Xavier, Ricardo Brandão Kliemann, Andressa Bernardi

Hospital de Clínicas de Porto Alegre

Learning Objectives: To investigate the cholesteatoma growth pattern and location of TM retraction in the CLE of patients with acquired middle ear cholesteatoma.

Introduction: Theories of acquired cholesteatoma pathogenesis involving previous tympanic membrane (TM) retraction are the most widely accepted. Since prospective studies are very difficult to perform, the study of the contralateral ear (CLE) in patients with cholesteatoma seems to be a good alternative to understand its pathogenesis. Our previous studies had demonstrated that TM retraction is the main alteration in the CLE of patients with cholesteatoma. We now propose to analyze these alterations in greater detail and correlate the observations with the cholesteatoma growth pattern in the main ear.

Methods: Our cross-sectional study included 242 consecutive patients diagnosed with posterior epitympanic (PEC) or posterior mesotympanic cholesteatoma (PMC) in at least one ear between August 2000 and March 2013. The patients had no surgical history. We performed videotoscopy in both ears and analyzed the videos independently in a blind manner. The prevalence of PEC and PMC and moderate-to-severe *pars tensa* and *flaccida* retractions in the CLE was evaluated. The observed alterations in the CLE were compared with the cholesteatoma growth patterns in the main ear.

Results: Cholesteatoma and TM retraction were observed in 17.8% and 42.6% of the CLEs, respectively. In instances where the primary ears displayed PEC or PMC, identical cholesteatoma growth pattern was observed in 89.5% and 64% of the CLEs, respectively ($p < 0.0001$). A similar phenomenon was observed in cases of *pars tensa* and *flaccida* retraction ($p < 0.0001$).

Conclusion: Patients with cholesteatoma have a greater probability of having both cholesteatoma and TM retraction at the same site in the CLE. Our findings validate the hypothesis that cholesteatoma pathogenesis is associated to previous TM retraction, with a high prevalence of bilaterality.

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Age-based differences in cholesteatoma in children

Presenting Author: **Leticia Rosito**

Leticia Rosito, Inesangela Canali, Sady Selaimen da Costa, Jady Wroblewski Xavier, Andressa Bernardi, Mauricio Noschang Lopes da Silva

Hospital de Clínicas de Porto Alegre

Learning Objectives: To analyze the differences in the prevalence of cholesteatoma growth patterns between children below and over 12 years of age. We also aim to study the effect of age on the observed alterations in the CLE.

Introduction: Some controversy still exists about the pathogenesis of cholesteatoma in children. Classical definitions of congenital cholesteatoma are being debated and the study of cholesteatoma based on age can be useful in improving our knowledge of this disease.

Methods: In a cross-sectional study, videotoscopy data of 148 pediatric patients were analyzed for cholesteatoma growth patterns and contralateral ear (CLE) alterations. The children were divided into two groups: 1) Group 1 comprising 67 patients, under 12 years of age and 2) Group 2 comprising 81 patients, 12 years or older.

Results: We found that 6 out of the 7 patients with anterior epitympanic cholesteatoma (AEC) belonged to group 1. In group 1, 43.3% of the patients were posterior mesotympanic (PMC), 19.4% were posterior epitympanic (PEC), 17.9% had two patterns of cholesteatomas and in 19.7% patients

the growth pattern was undetermined. In group 2, 42% were PMC, 28.4% PEC, 18.5% both, and 11.1% of the patients had an undetermined growth pattern. There was no difference in the diagnosis of the principal ear between the two groups ($p = 0.40$). In the analysis of the CLE, in group 1, 35.7% of ears had *pars tensa* (PT) tympanic membrane (TM) retraction, 28.6% *pars flaccida* (PF) TM retraction, and 35.7% had both abnormalities. PT and PF retractions were present in 50% of children from group 2, and PT retraction only in 9.5% of this group. The differences between the two groups were statistically significant ($p = 0.03$). The CLEs of patients with AEC were normal.

Conclusion: The majority of AEC was found in children younger than 12 years of age and all displayed a normal CLE, suggesting a probable congenital origin. PMC was the most prevalent in both the study groups. The most prevalent CLE abnormalities in children over 12 years of age were PT and PF TM retraction together, suggesting that the PT retractions could evolve and block epitympanum aeration resulting in a PF retraction.

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Acquired middle ear cholesteatoma in children

Presenting Author: **Leticia Rosito**

Leticia Rosito, Inesangela Canali, Sady Selaimen da Costa, Adriane Teixeira, Fabio Selaimen, Gabriel Albuquerque Silva, Livia Morsch, Larissa Petermann Jung
Hospital de Clínicas de Porto Alegre

Learning Objectives: To describe in children: 1. prevalence of cholesteatoma growth patterns; 2. hearing impairment; 3. contralateral ear alterations.

Introduction: Acquired middle ear cholesteatoma in children is a rare event. Over the years, many studies have elaborated the differences between cholesteatoma in children and adults. The clinical findings and the cholesteatoma growth patterns are known to be distinctive in children.

Methods: In a cross-sectional study, videotoscopy data of 155 pediatric patients were analyzed for cholesteatoma growth patterns. They were subjected to an audiological evaluation. We also analyzed the contralateral ear (CLE), classifying it as normal, TM perforation, outside-in TM perforation (in instances with signs of previous TM retraction), moderate and severe TM retraction, and cholesteatoma.

Results: Cholesteatoma growth patterns were posterior epitympanic in 23.2% patients, posterior mesotympanic in 40.6% and both in 17.4% of the patients. Anterior epitympanic growth pattern was observed in 4.5%. In 14.2% the growth pattern was undetermined. The observed pure tone average for bone conduction was 8.8 dB (SD 13.4), for air conduction was 39.7 dB (SD 21.79) and for air-bone gap was 32 dB (SD 15.61). There was no difference between

the cholesteatoma growth patterns and the pure tone average for bone conduction ($p = 0.6$), for air conduction ($p = 0.42$) and for air-bone gap ($p = 0.32$).

A normal CLE was observed in 34.8% of the patients. Moderate or severe TM retractions were observed in 45.2%, TM perforation in 7.1%, and cholesteatoma in 12.9%. Of all the TM perforations, *outside-in* pattern was observed in 63.6%.

Conclusion: Posterior mesotympanic cholesteatoma was the most prevalent in the study population. Most patients had a conductive hearing loss irrespective of the cholesteatoma growth pattern. The most prevalent CLE abnormalities were moderate or severe TM retraction and cholesteatoma.

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The prevalence and implications of marginal tympanic membrane perforations in cholesteatoma pathogenesis

Presenting Author: **Leticia Rosito**

Leticia Rosito, Inesangela Canali, Sady Selaimen da Costa, Fabio Selaimen, Gabriel A. Silva, Livia Morsch, Larissa Petermann Jung
Hospital de Clínicas de Porto Alegre

Learning Objectives: (1) To evaluate the prevalence of marginal perforations in patients with chronic otitis media. (2) To evaluate the marginal perforations searching for signs of previous TM retraction and (3) To study the alterations in the contralateral ear.

Introduction: The pathogenesis of acquired cholesteatoma is still not completely understood. Currently, theories involving previous tympanic membrane (TM) retractions are the most accepted. Migration of the squamous epithelium across a marginal perforation of the TM has also been implicated in the development of cholesteatoma. Marginal perforations are rare events and prospective studies are also very difficult to perform since cholesteatoma is a rare disease and takes many years to develop. The study of marginal perforations and the contralateral ear (CLE) can help us to determine their implications in cholesteatoma pathogenesis.

Methods: Videotoscopy data of 1781 patients diagnosed with chronic otitis media (COM) between August 2000 and December 2015 were analyzed to determine the prevalence of marginal perforations. Signs of previous TM retraction associated to the marginal perforations were evaluated for the following: 1. medialization of the manubrium of the malleus, 2. remnant tympanum adhered to the ossicular chain, 3. remnant tympanum adhered to the promontory, and 4. ossicular chain erosion. Videotoscopy data of the CLE were also analyzed.

Results: Of the 1781 patients evaluated, 45 (2.52%) demonstrated marginal TM perforation. One thousand five hundred eighty-three patients (88.9%) showed two or more signs of