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Factors affecting the outcome of adenoidectomy in children treated for chronic otitis media with effusion

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ABSTRACT

Objective: The aim of this cohort was to determine potential risk factors, concerning the effectiveness of adenoidectomy in the treatment of chronic otitis media with effusion in children.
Methods: Ninety six children with chronic otitis media with effusion treated with adenoidectomy were enrolled in this study. A thorough medical history was taken, including family history of otologic disease, parental smoking habits and breast feeding history. Radiographic palatal airway size was measured preoperatively, whereas the presence of allergy was also investigated. All patients were, postoperatively, followed up for a period of two years, in three month intervals. Disease course was classified as "complete remission", "improvement" or "consistence", in every postoperative evaluation, according to strictly established criteria.
Results: Children's age proved to be a significant factor in the postoperative outcome of adenoidectomy, as a treatment of chronic otitis media with effusion, especially when comparing patients being over and under the fifth year of age. Also, the presence of allergy, family history of otologic disease and palatal airway size, all proved to influence postoperative outcome in a statistical significant way ($p < 0.05$). On the other hand, child's sex, passive smoking, breast feeding and previous acute otitis media infections did not seem to alter the efficacy of adenoidectomy.
Conclusion: Adenoidectomy remains a cornerstone in the treatment of chronic otitis media with effusion in children. Results document that young age, presence of allergy predisposition, otologic family history and small palatal airway can be important drawbacks and should be intensively sought for and taken into account, during treatment planning.

1. Introduction

Otitis media with effusion (OME) is the commonest cause of hearing difficulty and one of the most frequent reasons of elective admission to hospital for surgery, during childhood [1]. OME pathophysiology is thought to be related, among others, to poor Eustachian tube function, which may be combined with a preceding middle ear infection (acute otitis media) [2–4]. The majority of children affected, experience a self-limited process that resolves within a 3 month period, but it may also run a relapsing and remitting course, before ultimately resolving in later childhood (chronic otitis media with effusion, COME). The clinical management of COME involves a variety of combinations of established procedures, and has become more evidence-based, over the past 20 years [2,6–8].

The traditional rationale of adenoidectomy in the treatment of chronic otitis media with effusion (COME) has primarily

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been to free the pharyngeal orifice of the Eustachian tube from mechanical obstruction. Secondarily the procedure aimed to remove a chronically infected nidus [9] on the nasopharynx, which leads to inflammation and subsequent mucous oedema of the Eustachian tube, but also facilitates the intrusion of pathogens in the middle ear cavity. Recent studies have demonstrated that the adenoids in children with OM contain mucosal biofilms [10,11].

The aim of this cohort study was to determine whether known risk factors implicated in COME's pathophysiology can play a substantial role concerning the effectiveness of adenoidectomy as a treatment of COME in children.

2. Materials and method

Ninety six children with COME scheduled for adenoidectomy were enrolled in this study. All children were aged 4–8 years old, with a mean age of 4.9 years (59.6 months) and a standard deviation of 11.4 months. Fifty three out of ninety six children were male (55.2%) and the rest were female (44.8%) (male to female ratio 1.2:1).

Inclusion criteria were established as follows: (i) presence of bilateral middle ear effusion identified through examination by both micro-otoscopy and pneumatic otoscopy and confirmed by tympanometry (type B tympanogram), (ii) middle ear effusion persisting for a period greater than 6 months, despite conservative treatment (mometasone furoate nasal spray 50UG twice a day for a period of one month, amoxicillin 30 mg/kg of body weight three times a day for a period of eight days, oral Dexamethasone sodium phosphate on a tapering dosage for a period of ten days. The child was re-evaluated after one month and if disease persisted, a second course of the same treatment was administered. The child was then re-evaluated on three months and again if disease persisted, a third course of the same treatment was administered. Finally, the child was re-evaluated on 6 months), (iii) mean hearing threshold worse than 25 dB HL bilaterally, in 500–1000–2000–4000 Hz frequencies, established by pure tone audiometry, (iv) age greater than 4 years old.

On the other hand, exclusion criteria included previous surgical intervention to the nose or nasopharynx area, any kind of previous ear surgery, cleft palate or other congenital disorder that may influence middle ear status (eg Kartagener syndrome, Down syndrome etc), congenital or acquired immunodeficiency and hereditary sensorineural hearing loss.

Preoperatively, a thorough medical history was taken, using a study designed questionnaire, combined with a personal interview conducted with the child's parents. Risk factors that were particularly sought and evaluated were of course age and sex and also family history of otologic disease of any kind, breast feeding, passive smoking and previous infections of acute otitis media.

Additionally, the presence of allergy was thoroughly investigated. In terms of medical history, the presence of symptoms compatible with allergic rhinitis, asthma or atopy, in general, was evaluated in detail. Moreover, in vitro and vivo allergic tests were conducted. In particular, both total and allergen specific (RAST) serum IgE levels were measured in all patients, followed by skin prick tests. Eosinophil count in nasal smears was, also, evaluated. Finally, any signs or symptoms of allergy were intensively looked for and closely monitored, during follow up evaluations.

Radiographic palatal airway size was measured preoperatively, during the routine preoperative examination. A radiographic lateral neck film was taken and the proximal distance (in mm) between the anteroinferior surface of the adenoids and the posterosuperior surface of the palate was measured by the same researcher, using a simple ruler. For analysis reasons, palatal airway size was classified as "small" (<3 mm) "medium" sized (3–6 mm) or "large" (>6 mm).

Adenoidectomy was performed by the same surgeon in all cases, using standard surgical procedures. Since the aim of our study was to evaluate the efficacy of adenoidectomy alone, in the treatment of chronic otitis media with effusion, there was no tympanostomy tube insertion performed in any patient.

All patients were, postoperatively, followed up for a period of two years, in three month intervals. First postoperative evaluation, in particular, was conducted immediately after the first postoperative month. Postoperative evaluations included micro-otoscopy, tympanometry and pure-tone threshold audiometry. A Grason-Stadler GSI 33 tympanometer and an, annually calibrated, Interacoustics GSI 26 clinical audiometer, with Telephonics TDH-50P headphones in a soundproof chamber, were used in every case. In total, nine postoperative evaluations were conducted, by the same researchers every time, to avoid bias.

Disease course was classified as "complete remission", "improvement" or "consistence", in every postoperative evaluation, according to strictly established criteria. Criteria for "complete remission" included a Type A or a Type C tympanogram with a mean hearing threshold better than 20 dBHL in 500, 1000, 2000 and 4000 Hz frequencies. On the other hand, "improved" status was defined as a type C tympanogram but with a mean hearing threshold over 20 dBHL in 500, 1000, 2000 and 4000 Hz frequencies, or a Type B tympanogram with a mean hearing threshold better than 25 dBHL in 500, 1000, 2000 and 4000 Hz, and also a mean hearing improvement of at least 10 dBHL compared to preoperative threshold. Finally, as "consistence" was characterized the case of a Type B tympanogram with a mean hearing threshold over 25 dBHL in 500, 1000, 2000 and 4000 Hz frequencies, or a Type B tympanogram with a mean hearing threshold below 25 dBHL in 500, 1000, 2000 and 4000 Hz, but with a mean hearing improvement less than 10 dBHL compared to preoperative threshold. It is obvious, that even though micro-otoscopy was routinely conducted in postoperative evaluations, priority was given to objective methods like tympanometry and pure-tone threshold audiometry, to avoid any subjective estimation differences and thus achieve a uniform analysis. It is, also, obvious that since disease usually runs a relapsing and remitting course, terms like "consistence", "improvement" and "remission" refer to a single postoperative evaluation and do not mirror the disease course as a whole. Thus, a patient may be registered as "improved" in one evaluation and as "consistent" in the next and as a result overall disease course can be better evaluated upon completion of the follow up period.

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