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Study of the Relationship between Adenoidal Hypertrophy and Secretory Otitis Media*

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ABSTRACT Objective: The purpose of the study was to explore the relationship between adenoid hypertrophy and the occurrence and prognosis of secretory otitis media in children and to guide the clinical doctors on the early diagnosis and treatment of secretory otitis media. **Methods:** To obtain a collection of appropriate medical histories, nasopharyngeal lateral slice endoscopy, acoustic immittance and pure tone hearing threshold tests were performed routinely on 239 hospitalized children whose adenoid bodies were resected prior to surgery. Those who had ear symptoms or presented with a C type curve in acoustic immittance testing were suspected to have a middle ear effusion, and underwent further exmaination through a temporal bone CT or a tympanic cavity puncture examination during the operation. Through the use of statistical software we analyzed the relationship between secretory otitis media, the degree of adenoid hypertrophy and the condition of Eustachian tube **Results:** Among 239 children with adenoid hypertrophy, 34 children (14.2%) were complicated with secretory otitis media confirmed by tympanic cavity puncture in which 33 ears (52.4%) were type B, 10 ears(15.9%) were type C (< - 200 dapa), 20 ears(31.7%) were C (> - 200dapa). The results demonstrated that the occurrence of secretory otitis media was positively associated with the degree of adenoid hypertrophy and compression of the Eustachian tube. **Conclusion:** Acoustic immittance cannot be used as the gold standard of the diagnosis of secretory otitis media. Temporal bone CT is necessary for patients who have ear symptoms or present with a C type curve in acoustic immittance or have a suspected middle ear effusion in order to ensure diagnosis. For children with adenoid hypertrophy, endoscopic adenoidectomy is the main therapy with high rates of resolution given adjunctive tympanic cavity puncture. In cases of recurrent secretory otitis media, tympanic cavity catheterisation can be used to reduce the risk of postoperative complications.

Key words: Adenoidal hypertrophy; Secretory otitis media; Nasal endoscopy

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Introduction

Adenoids, also called pharyngeal tonsils, form, the inner ring of the pharyngeal lymphatic loop and are located on the mid line on the superior aspect of the posterior wall of the nasopharynx. The adenoids are located in close proxinity to the ear nose and throat. Therefore, given its proliferous hypertrophy, various symptoms can result including nasal obstruction, snoring, apnea and hearing loss. Such symptoms, when prolonged can lead to changes in intelligence and behavior[1]. Children are too young to accurately express symptoms and cooperate with physical examination, leading to a higher rate of missing diagnosis than original thought. This paper aims to summarize the clinical information of 239 admitted cases with adenoid hypertrophy from 2012 to 2013 in which an endoscopic examination was employed. The relationship between the degree of adenoid hypertrophy and secretory otitis media was analyzed.

1 Materials and methods

1.1 Clinical materials

From February 2012 to June 2013, the affiliated hospital of medical college Qingdao University received 239 patients of children with adenoid hypertrophy. Including 172 male and 67 female with a mean age of 6.25 years old (3-12 years old) and an average history course of 22 months (2 months to 10 years). The chief complaints included 205 patients (85.8%) presenting with mouth breathing and snoring, 18 patients (7.5%) complaining of nasal congestion, pus exudate, aural fullness and 16 patients (6.7%) presenting with hearing loss. All children were given a period of drug therapy, a detailed history of acquisition and a specialized physical examination. On examination, out of all patients with tonsillar hypertrophy, 27 patients were I degree, 164 patients were II degree

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and 48 patients were III degree. Mucoid discharge and pus exudate in the nasal cavity was present in 124 patients. 1.14 patients had tympanic membrane invagination, the loss of light cones, reflective enhancement, or amber changed or liquid form. Adenoid hypertrophy was confirmed in all patients before surgery through nasopharyngeal lateral slice endoscopy (A/N ratio > 0.6). Surgery was performed under general anesthesia and tonsil stripping was completed in patients with II and III degree tonsillar hypertrophy. We inserted a fine silicone tube through the nose and pulled soft palate superiorly in order to expose the nasopharynx. A 30° nasal endoscopy was then placed through the mouth to enable appropriate observation of the procedure. This allowed for the identification of important anatomical structures including the posterior nares, the nasal septum posteriorly, the inferior turbinate and the Eustachian tube, while also allowing for an appreciation of the anatomical relationship between the adenoid tissue and its associated structures. Next a 40° elbow electric cutting aspirator was inserted through the mouth into the nasopharynx and the hypertrophied adenoids were stripped from lateral to medial under endoscopic guidance. Attention was given to protect the Eustachian tube during operation and deeper tissue in order to prevent bleeding. Dry cotton ball oppression or bipolar electrocautery were used to cease bleeding. Saline flushing was applied given no active bleeding, and the adenoid tissue was removed via the mouth. Tympanic membrane puncture was completed given a type B or C type acoustic immitance curve. Tympanic cavity catheterisation was performed given Eustachian tube obstruction or tympanic cavity effusion. Postoperative antibiotics were routinely provided as prophylaxis against complication infections.

Secondary otitis media was confirmed in 34 patients (63 ears) were confirmed by middle ear piercing. In 26 patients inoperative patients, tympanic cavity puncture was performed. Out of these 26 patients, 47 ears in all (24 left ears, 23 right ears), 30 ears contained a thin pale yellow liquid, while 17 ears contained a yellow viscous liquid. The pressurized rubber ball concha showed 23 patients with unobstructed Eustachian tube, 3 patients with Eustachian tube obstruction. 10 of these inoperative patients underwent tympanostomy, 16 ears in all (6 left ears, 10 right ears), from 15 ears a yellow and viscous liquid was extracted and in 1 a brown sticky substance was removed. Tympanometry also demonstrated 2 patients with unobstructed Eustachian tube and 8 patients with Eustachian tube impassability.

1.2 Research method and content

Imaging measurement of nasopharyngeal lateral slice was provided to all children and the A/N ratio was recorded in detail.

The degree of adenoid hypertrophy was determined according to the ratio of A/N [2]:

Moderate hypertrophy: A/N = 0.60-0.70;

Severe hypertrophy: A/N > 0.7;

Classification was also provided according to the relationship between the adenoids and the Eustachian tubes under nasal endoscope:

Type I: The enlarged adenoid is separate from the Eustachian tube;

Type II: The enlarged adenoid extrudes and covers the Eustachian tube;

Before operation, all children took acoustic immittance conventionally, detection of 226 Hz, with the recording of the tympanic cavity curve type. Temporal bone CT examination was completed in those who complained of ear fullness, hearing loss and were suspected to have tympanic cavity effusion due to positive signs. Case group (with secretory otitis media) was selected according to the presence of fluid in the tympanic cavity. The control group (without secretory otitis media) were selected according to bilateral involvement, with type A acoustic immitance results. A temporal bone CT or tympanic membrane puncture was performed in these patients to prove a lack of effusion and type C or type B curve. Using statistical analysis software SPSS17.0 version, chi-square test, we compared the relationship between secretory otitis media, the degree of adenoid hypertrophy and the condition of Eustachian tube respectively.

2 Results

2.1 Acoustic immittance curve

The structure of acoustic immittance curve were: type A 137 patients (245 ears, 118 left ears, 127 right ears, 51.3%); type C (-100 to -150dapa) 67 patients (97 ears, 49 left ears, 48 right ears; 20.3%), type C (-150 to -200dapa) 22 patients(25 ears, 10 left ears, 15 right ears; 5.2%), type C (> - 200dapa) 43 patients(50 ears, 33 left ears, 17 right ears; 10.5%), Type B 42 patients(61 ears, 29 left ears, 32 right ears; 12.7%).

2.2 The correlation between secretory otitis media and adenoid hypertrophy

Moderate hypertrophy of the adenoid: 65 patients, combined with secretory otitis media 15 patients; Severe hypertrophy of adenoid: 40 patients and 19 patients with secretory otitis media. Inputting this datas into statistical software SPSS17.0, by chi-square test, chi-square = 6.746, P=0.009. The difference was significant, namely there was a statistically significant difference between the occurrences of secretory otitis media in patients with adenoid hypertrophy.

2.3 The relevance between secretory otitis media and the condition of Eustachian tube swallow mouth

Type I 71 patients, 16 patients with secretory otitis media; Type II 34 patients, 18 patients with secretory otitis media. By chi-square test, chi-square = 9.707, P=0.002, significant difference

could be seen, namely with the increase in the degree of Eustachian tube compression, and an increase in the incidence of secretory otitis media.

2.4 Follow-up results

16 patients (32 ears) with secretory otitis media who complained of snoring were followed-up after surgery and among them, 28 ears (87.5%) presented with a type A curve six months prior to surgery. From the control group we followed up 31 patients (55 ears) with type C or B curve without puncture, acoustic immittance of type A 47 ears (85.4%). By the chi-square test, chi-square = 0.071, P = 0.79, the difference was not significant. 137 patients (245 ears) with type A curve preoperative didn't show obvious abnormality in ears and 245 ears (100%) presented type A two weeks later.

3 Discussion

3.1 The relationship between secretory otitis media and adenoid hypertrophy or pharynx mouth situation

Key points of the diagnosis of SOM include: middle ear effusion, no history of acute episodes, without concurrent symptoms and/or signs of acute otitis media [3]. The incidence of pediatric secretory otitis media is high, most of which occur between the ages of 6 months to 4 years. Some OME patients heal naturely in 3 months, but 30%-40% patients had a recurrency of secretory otitis media, 5% ~ l0 % children`s symptoms will last more than one year[4]. Clinically secretory otitis media in children has a close relationship with adenoid hypertrophy, but the specific mechanism remains unclear. Now many scholars think that there are four views on the mechanism of adenoid hypertrophy leading to secretory otitis media: 1. The mechanical obstruction of Eustachian tube or dysfunction; 2. Eustachian tube reflow; 3. Bacterial infection of the adenoids; 4. Abnormalities in adenoid immune function [5]. Previous research on secretory otitis media with hypertrophy of adenoid, took a multiple factors analysis method, but this research takes a single factor analysis method, focusing on the relationship between secretory otitis media with adenoid body size and the extrusion of swallow mouth. Past research [6,7]always takes acoustic immittance (type B or C (＞- 200dapa)) as a standard of diagnosis of secretory otitis media, which cannot accurately reflect the incidence of secretory otitis media. This study selected middle ear piercing as a standard of diagnosis of secretory otitis media. Confirmed by statistical analysis, secretory otitis media has a relationship with adenoid hypertrophy and the degree of swallow mouth squeezed and this may be associated with mechanical obstruction of Eustachian tube. Moreover, Rosonfeld RM [8] and others report that children with secretory otitis media who received adenoidectomy should undergo surgical management.

3.2 Value of acoustic immittance in the diagnosis of secretory otitis media

Tympanic cavity acoustic immittance is the most commonly used method to diagnose pediatric secretory otitis media, which is accurate, convenient, non-invasive and repeatable [9]. Tympanic cavity acoustic immittance can be divided into "A", "B" or "C" types. B type is also called the horizontal type, seen more in middle ear effusion, tympanic membrane adhesion, cerumen embolism or probe contact plane wall and so on. C type, also known as negative pressure type, is more common given Eustachian tube dysfunction [10]. In this study, puncture or temporal bone CT examination confirmed a middle ear cavity without effusion in 7 patients (12 ears), including 4 ears with a B type curve, 8 ears with a C type curve, which is not consistent with domestic and foreign scholars who think that [11.12] all type B and negative pressure C type (＞-200dapa) have concurrent secretory otitis media. Evidence-based medicine [13] in case shows the diagnosis of type B tympanum is 81% sensitive and 74% specific. Among 34 cases (63 ears) in case group, 33 ears (52.4%) is type B, 10 ears (15.9%) is type C (＜- 200 dapa), 20 ears(31.7%) is C (＞ - 200dapa). Therefore, although tympanic cavity acoustic immittance can reflect the function of middle ear, but its accuracy for the diagnosis of SOM has not reached 100%, and is dependent on the tester. Therefore, C type (＞ - 200dapa) results being used for the diagnosis of secretory otitis media is open to questioning and still need to be combined with the clinical picture; most scholars put C type (＜ - 200 dapa) into the column of not with secretory otitis media. There is also no scientific basis, which can cause misdiagnosis and the delayed treatment of pediatric secretory otitis media. It is necessary for the patients who have a suspicious clinical otology examination and whose acoustic immittance test was C type curve to take temporal bone CT examination to define diagnosis.

3.3 The treatment of secretory otitis media

The current opinion regarding the treatment of secretory otitis media is as follows: to observe and to provide appropriate medical management including, hormones, decongestants; surgical treatment. Because of the self-limiting characteristics of secretory otitis media, the guide to the clinical diagnosis of SOM in United States in 2004[14]and evidence-based medicine recommended for children with OME without high risk factors, 3 month observation should be completed [13]. For adenoid hypertrophy with coexisting OME Zhang Yinghua, Zhang peng [15.16] reports that the curative effect of pure adenoidectomy in the treatment of secretory otitis media can reach 98.8% and 100%. Mitchell and Ketly [17] also found that symptoms and quality of life in children improved markedly after adenoidectomy compared with the preoperative state. The patients whose conservative treatment is invalid should be treated with tympanostomy tube. Li JianJiang [18] research found that the effect of tympanostomy tube combined with adenoidectomy under nasal

endoscope in the treatment of pediatric secretory otitis media is obvious and prevents easy recurrence. According to the result of 2.4, there is no statistical difference between pure adenoidectomy and tympanic cavity puncture or tympanic cavity catheter in the treatment of adenoid hypertrophy with OME in those who have no obvious ear symptoms. Therefore, it is suggested that adenoid hypertrophy in patients with OME should be provided with adenoidectomy under nasal endoscopy, with followup monitoring of secretory otitis medias. Jack L. reported [19] that grommet implanted at a later period has no detrimental effect on children at a developmental level, which demonstrates that observational waiting is reliable. With the popularity of evidence-based medicine theory, theoretical or empirical treatments that are thought to be effective may be abandoned due to a lack of supportive evidences [20].

Secretory otitis media is a common cause of hearing loss in children. Its complex etiology and lack of unified standards of diagnosis bring about missed diagnosis, misdiagnosis and delayed treatment. Temporal bone CT cannot be used as a routine diagnostic method because of radiation exposure, but temporal bone CT is still indispensable for the early diagnosis of secretory otitis media. We should pay attention to the individual difference, the forward curative effect, reducing the complications and the provision of appropriate follow-up as much as possible. The prevention strategies aimed at the pathogenic factors causing secretory otitis media should also be explored in the near future.

参 考 文 献(References)

[1] 陈凯良.阻塞性睡眠呼吸暂停低通气综合征手术治疗对儿童记忆的影响[J]. 中国耳鼻咽喉头颈外科,2006, 13:537-539
Chen Kai-liang. The effect of obstructive sleep apnea hypopnea syndrom surgical treatment on children's memory[J]. Chinese archiver of Otolaryngology-Head and Neck surgery, 2006,13:537-539

[2] 邹明舜.儿童增殖腺 - 鼻咽腔比率测定的临床价值[J]. 中华放射学杂志, 1997, 31(3):190-192
Zou Ming-shun. The clinical value of the children's adenoidnaso pharyngeal cavity ratio measurement[J]. Chinese journal of radiology, 1997, 31(3): 190-192

[3] 张亚梅. 分泌性中耳炎临床诊疗进展 [J]. 继续医学教育, 2006, 20 (20):56-59
Zhang Ya-mei. Clinical diagnosis and treatment progress of secretory otitis media[J]. Continuing medical education,2006, 20(20):56-59

[4] Richard M, Rosenfeld, Larry Culpepper, et aL. Otitis media with effusion[J]. Pediatrics, 2004, 1(13):1412-1429

[5] 李永奇, 李源. 腺样体切除术与儿童中耳炎 [J]. 国外医学耳鼻咽喉科学分册, 2001, 25(3): 138-142
Li Yong-ji, Li Yuan. Adenoidectomy and otitis media in children [J]. Foreign medical otolaryngology science volume, 2001, 25 (3): 138-142

[6] 石洪金,李树华,吴大海等.儿童腺样体肥大与分泌性中耳炎的关系研究[J]. 中华耳科学杂志, 2009, 7(2):109-113
Shi Hong-jin, Li Shu-hua, Wu Da-hai, et al. Study of the relationship between the adenoidal hypertrophy and secretory otitis media [J]. Chinese ear science magazine, 2009, 7(2):109-113

[7] 王素芳,韩富根,腺样体肥大对小儿分泌性中耳炎发生及转归的影响[J]. 现代中西医结合杂志, 2011, 20(9):1078-1079
Wang Su-fang, Han Fu-gen. The influence of adenoid hypertrophy in children on secretory otitis media occurence and the outcome [J]. Modern Journal of Integrated Traditional Chinese and Western Medicine, 2011, 20(9):1078-1079

[8] Rosenfeld RM, Culpepper L, Yawn B, et al. Otitis media with effusion clinical practice guideline[J]. Am Faro Physician, 2004, 69(12):2776-2779

[9] 苏仁杰, 史波宁. 1000Hz探测音声导抗及其鼓室图分类方法的研究进展[J]. 医学综述, 2012, 18(19):3269-3273
Su Ren-jie, Shi Bo-ning. Research Progress in 1000Hz Probe Tone Tympanometry and Classification of the Trace Patterns [J]. Medical Recapitulate, 2012, 18(19):3269-3273

[10] 黄兆选,汪吉宝,孔维佳 等.实用耳鼻咽喉头颈外科学[M].北京:人民卫生出版社, 2007: 746-747
Huang Zhao-xuan, Wang Ji-bao, Kong Wei-jia, et al. Practical otolaryngology head and neck surgery [M]. Beijing:People's medical publishing house, 2007:746-747

[11] Rosenfold RM, Culpepper L, Doyle KJ, et al. Clinical practice guideline: otitis media with effusion[J]. Otolaryngol Head Neck Surg, 2004, 130(5): S95-S118

[12] 唐志辉,虞玮翔,顾家铭,等.中国香港与西方儿童分泌性中耳炎发病率的比较[J]. 中华耳鼻喉科杂志, 2004, 39(7):429-432
Tang Zhi-hui, Yu Wei-xiang, Gu Jia-ming, et al. Comparement the incidence of pediatric secretory otitis media in the Hong Kong with that in the west [J]. China. Chinese journal of otolaryngology, 2004, 33(7): 429-432

[13] 龚树生, 谢静. 从循证医学的角度规范儿童分泌性中耳炎的诊疗[J].中国听力语言康复科学杂志, 2008, (5):10-13
Gong Shu-sheng, Xie jing. From the point of view of evidence-based medicine standardize therapy of the pediatric secretory otitis media[J]. Chinese scientific journal of hearing and speech rehabilitation, 2008 (5):10-13

[14] 郑芸,孟照莉,王恺. 分泌性中耳炎的临床诊断与处理指南(摘要)[J]. 临床耳鼻咽喉科杂志, 2005, 19(4):190-192
Zheng Yun, Meng Zhao-li, Wang Kai. The clinical diagnosis and treatment of secretory otitis media guide (abstract) [J]. Journal of clinical otorhinolaryngology, 2005, 19(4): 190-192

[15] 张鹏.儿童分泌性中耳炎的疗效观察与分析[J]. 中华耳科学杂志, 2010, 8(3):319-323
Zhang peng. The curative effect of pediatric secretory otitis media observation and analysis [J]. The ear science magazine, 2010, 8(3): 319-323

[16] 张英华,盛才华.儿童分泌性中耳炎合并腺样体肥大治疗体会 [J]. 听力学及言语疾病杂志, 2004, 12(3):188-189
Zhang Ying-hua, Seng Cai-hua. Secretory otitis media in children with adenoid hypertrophy treatment experience [J]. Journal of

audiology and speech diseases journal, 2004, 12(3):188-189

[17] Mitchell RR. Ketly J. Long—term changes in the behavior of Children after adenotosilectomy for obstructive sleep apnea syndrome [J]. Otolaryngology Head Neck Surgery, 2006,134:374-378

[18] 历建强,吕春雷,罗天飞,等.鼓膜置管联合鼻内镜下腺样体切除治疗儿童分泌性中耳炎临床分析 [J]. 中华耳科学杂志, 2012,10(4):445-447
Li Jian-Jiang, Lv Chun-lei, Luo Tianfei, et al. Clinical analysis of tympanostomy tube combined with adenoidectomy under endoscope in the treatment of pediatric secretory otitis media[J]. The ear science magazine, 2012, 10(4): 445-447

[19] Paradise JL, Feldman HM, Campbell TF, et al. Tympanostomy tubes and developmental outcomes at 9 t0 11 years of age[J]. N Engl J Med. 2007, 356(3):248-261

[20] 李希平,戴海江,牟文清.分泌性中耳炎的治疗现状与思考[J].中国耳鼻咽喉头颈外科, 2007, 1 4(8):467-469
Li Xi-ping, Dai Hai-jiang, Mu Wen-qing. Current treatment and thinking of secretory otitis media [J]. Chinese Archiver of Otolaryngology-Head and Neck surgery, 2007, 1 4(8):467-469

儿童腺样体肥大程度与分泌性中耳炎发生的相关性研究*

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摘要 目的:探讨儿童腺样体肥大程度与分泌性中耳炎发生及预后的相关性,指导临床医师对分泌性中耳炎作出早期诊断和治疗。**方法:**239 例住院手术切除腺样体的儿童,常规行鼻咽侧位片、声导抗检查;部分伴耳部症状、声导抗显示 C 型曲线或查体可疑鼓室积液征者行颞骨 CT 检查或术中行鼓室穿刺。经统计学分析,比较分泌性中耳炎与腺样体肥大程度及咽鼓管咽口情况的相关性。**结果:**在 239 例腺样体肥大儿童中,经鼓室穿刺证实合并分泌性中耳炎者 34 例(63 耳,14.2%),其中鼓室曲线呈 B 型者 33 耳(52.4%),C 型(<-200 dapa)者 10 耳(15.9%),C 型(>-200 dapa)者 20 耳(31.7%)。结果表明分泌性中耳炎的发生与腺样体肥大程度及咽鼓管园枕受压迫的程度呈正相关。**结论:**声导抗检查不能作为分泌性中耳炎诊断的金标准,必要时可行颞骨 CT 明确诊断;对腺样体肥大伴分泌性中耳炎的儿童鼻内镜下腺样体切除为其主要疗法,配合鼓室穿刺多可治愈,对反复发作的分泌性中耳炎行鼓室置管术,避免术后并发症的发生。

关键词:腺样体肥大;分泌性中耳炎;鼻内镜

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