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Investigation of the effects of chronic hypertrophic adenotonsillitis on olfaction and quality of life

Kronik hipertrofik adenotonsillitin koklama duyusu ve yaşam kalitesi üzerine etkilerinin araştırılması

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Abstract

Objective: To investigate the effects of the chronic hypertrophic adenotonsillitis on olfaction and quality of life.

Methods: Pediatric patients, aged 7-8 years, were prospectively included in three groups; Group I- Adenotonsillar diseases (n=15), Group II- Control (n=15) and Group III- Postoperative group (n=15). Patients were evaluated with the Sniffin' Sticks 12 item smell identification test and obstructive sleep disorder-6 (OSD-6) quality of life survey.

Results: Total smell identification (SI) scores were 6.93±1.75 in the adenotonsillar disease, 8.73±1.10 in the control and 7.67±1.59 in the postoperative groups, respectively. Total SI score in the adenotonsillar disease group was significantly lower than the control group ($p<0.05$). The postoperative group SI scores were higher, but not at the level of the control group. Total OSD-6 scores were 18.80±4.75 for the adenotonsillar disease, 5.20±2.40 for the control and 5.07±2.02 for the postoperative groups, respectively. The adenotonsillar disease group score was significantly higher than the scores of the other two groups ($p<0.05$).

Conclusion: Adenotonsillar diseases affect both quality of life and smell function. Six months after surgery quality of life reaches normal standards. Smell function is observed to have partially recovered by the sixth month. This situation may be due to obstructive symptoms resolving in the early postoperative period, while symptoms related to mucosal or inflammatory pathologies recover more slowly.

Key words: Adenoid, tonsillitis, smell, olfaction, quality of life, OSD-6, smell identification.

Özet

Amaç: Kronik hipertrofik adenotonsillitin koku alma fonksiyonu ve yaşam kalitesine etkisinin incelenmesi amaçlanmıştır.

Yöntem: Yedi ila 8 yaşlarında çocuk hastalar, prospektif olarak üç grup halinde çalışmaya dahil edilmiştir: Grup I- Adenotonsiller hastalıklar (n=15); Grup II- Kontrol grubu (n=15) ve Grup III- Postoperatif grup (n=15). Hastalar 12 maddelik Sniffin'Sticksa koku tanımlama testi ve obstrüktif uyku bozukluğu-6 (OSD-6) yaşam kalitesi tarama testiyle değerlendirilmiştir.

Bulgular: Adenotonsiller hastalık (6.93±1.75), kontrol (8.73±1.10) ve postoperatif grubun (7.67±1.59) total koku tanımlama (SI) skorları ölçülmüştür. Adenotonsiller grupta total SI skoru kontrol grubununkinden anlamlı derecede daha düşüktü ($p<0.05$). Postoperatif grubun SI skorları daha yüksek olmasına rağmen kontrol grubu seviyesinde değildi. Total OSD-6 skorları ise adenotonsiller hastalık grubunda 18.80±4.75, kontrol grubunda 5.20±2.40 ve postoperatif grupta 5.07±2.02 idi. Adenotonsiller hastalık grubunun skoru diğer 2 grubun skorlarından anlamlı derecede daha yüksekti.

Sonuç: Adenotonsiller hastalıklar hem yaşam kalitesi hem de koku alma fonksiyonunu etkilemektedir. Cerrahiden 6 ay sonra yaşam kalitesi normal standartlarına kavuşmaktadır. Altıncı ayda koku alma fonksiyonunun kısmen geri döndüğü gözlenmiştir. Bu durum erken dönemde geçen obstrüktif semptomlara bağlı olabilir. Mukoza veya inflamatuar patolojilere bağlı semptomlar ise daha yavaş geri dönmektedir.

Anahtar sözcükler: Adenoid, tonsillit, koku, koku alma duyusu, yaşam kalitesi, OSD-6, koku tanımlama.

The most common factors leading to olfactory system dysfunction are nasal obstruction, upper respiratory tract infections and inflammatory diseases.[1] In pediatric age groups, adenotonsillar diseases are frequently seen. Adenotonsillar pathologies are generally characterized by recurrent attacks of infection and nasal obstruction due to tissue hypertrophy. Both infections and nasal obstruction may lead to reduction of olfaction in these cases.

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Nasal obstruction leads to lesser air flow and naturally fewer stimulating molecules reaching the olfactory region. Infection via direct damage to the olfactory epithelium cells, may lead to mucosal inflammation, structural breakdown of mucosa, and congestion which induces olfactory dysfunction.[2-4]

Several methods including threshold, discrimination, identification and electrophysiological tests are available to investigate smell function. Using standard stimuli is important for standardization of results. Also these tests are evaluated according to the patients' subjective responses. In addition to these limitations, in pediatric patients, smell function test reference values change significantly with age.[5,6]

In pediatric cases chronic hypertrophic adenotonsillar diseases have an important place in obstructive airway pathologies. At the same time adenotonsillar diseases are defined as the most frequent cause within the etiology of obstructive sleep pathologies. Obstructive sleep disorder survey (OSD- 6) is a screening test evaluating the effects of this disease on quality of life of pediatric patients.7 OSD-6 is composed of 6 domains that reflect functioning of the child to determine the patient's sleep disorder and associated symptoms; (1) physical suffering, (2) sleep disturbance, (3) speech and swallowing difficulties, (4) emotional distress, (5) activity limitations and (6) level of concern of caregiver.[7]

In this study smell identification (SI) scores and OSD-6 symptom scores were examined in cases with and without adenotonsillar pathologies. The evaluation was performed on patients in the same age group.

Materials and Methods

This study was carried out by Otolaryngology Department of Çanakkale Onsekiz Mart University Medical Faculty. Permission was granted by the local ethics committee. We created three groups including adenotonsillar disease (Group I), control (Group II) and postoperative (Group III) groups. Children aged 7 and 8 years were included in our study. Exclusion criteria were accepted as upper respiratory infection history in the previous month, significant nasal structural pathology (i.e., choanal atresia, advanced septal deviation) or systemic disease with nasal involvement (i.e., cystic fibrosis). The adenotonsillar group included patients with grade 3-4 tonsillar hypertrophy on oral physical examination and 75-100% choanal obstruction caused by adenoid hypertrophy seen during diagnostic nasal endoscopy (DNE). The control group included grade 1 tonsils and less than 25% adenoid tissue visible on DNE without a history of frequent infection. The postoperative group included patients examined 6 months after surgery.

The SI test was administered with the Sniffin' Sticks screening 12 item test (Burghart Messtechnik GmBH, Wedel, Germany). This test kit includes 12 different smell pens. For every smell the child was presented with four choices to distinguish the smell. The smell pen was brought near the nose, taking care not to contact the skin and the smell was identified. The smell pen was held near the nose for 5 seconds. The correct answers were determined and the total score was calculated.

OSD-6 survey was carried out in interviews with the parents. For every parameter 6 choices were presented and answers were marked. A point scale is used ranging from 1 (=none of the time) to 7 (=all of the time) to grade the relative severity of the problem addressed in each item. Total scores were recorded.

Statistical Analysis

The Statistical Package for Social Sciences 15.0 for Windows (SPSS Inc., Chicago, IL, USA) was used for statistical analysis of data. The mean and standard deviation of the groups was calculated. To determine differences between the three groups Kruskal-Wallis and for pairwise comparisons Mann-Whitney U tests were used. The results were evaluated at a significance level of $p<0.05$.

Results

Seven-eight year old patients were voluntarily included in this study. Three groups were defined; namely adenotonsillar disease (Group I, n=15), control (Group II, n=15) and postoperative (Group III, n=15). There was no difference between the groups in terms of gender and age distribution.

Total mean SI scores were 6.93±1.75 in the adenotonsillar disease, 8.73±1.10 in the control and 7.67±1.59 in the postoperative groups, respectively. There was a statistically significant difference between the groups (p=0.006, Table 1). On pairwise comparisons there was a statistically significant difference between the adenotonsillar disease and control groups (p=0.001). There was no significant difference between the adenotonsillar disease and postoperative groups

Table 1. Smell identification and OSD-6 scores for the three groups*.

	Adenotonsiller disease group	Postoperative group	Control group	p values
Smell identification score	6.93±1.75	7.67±1.59	8.73±1.10	0.006
OSD- 6 Score	18.80±4.75	5.07±2.02	5.20±2.40	<0.001

*Statistical comparison of the three groups/Kruskal-Wallis test

(p=0.412). There was a statistically significant difference between the control and postoperative groups (p=0.037). While the SI scores were lower in the adenotonsillar disease group compared to the control group, six months after adenotonsillectomy the scores had risen, but they were still lower than those of the control group (Fig. 1).

Total mean OSD-6 scores were 18.80±4.75 in the adenotonsillar disease, 5.20±2.40 in the control and 5.07±2.02 in the postoperative groups, respectively (Table 1 and Fig. 2). There was a statistically significant difference among three groups (p<0.001). Pairwise comparisons identified a statistically significant difference between the adenotonsillar disease group and both the control (p<0.001) and the postoperative groups (p<0.001). There was no statistically significant difference between the control and postoperative groups. The adenotonsillar disease patients had high OSD-6 scores and six months after the operation scores had reduced to control group levels.

Discussion

Adenotonsillar diseases are frequently seen in the pediatric age group and can lead to additional pathologies such as ear and sinus diseases and OSAS. In patients with chronic hypertrophic adenotonsillitis, quality of life and olfaction can be affected due to disease.[8] In this study, the effect of adenotonsillar diseases on olfaction and sleep disorders-related quality of life was investigated.

There are a variety of difficulties associated with researching olfaction in pediatric cases. Among them cooperation problems, subjective tests and normal values changing with age can be enumerated.[6,9] The size of the adenoid tissue has also been shown to affect SI scores.[8,10] To prevent bias due to these characteristics, patients in the same age group and with adenoid hypertrophy more than 75% of the normal were included in the study. Adenoid tissue hypertrophy was identified and evaluated more accurately during endoscopic examination.

For the SI test, our study used Sniffin' Sticks identification test kit (12 odors). SI scores from patients with adenotonsillar diseases were significantly lower than the control group. Test results retrieved six months after surgery showed postoperative period scores had risen but they were still observed to be significantly lower than those of the control group. In their study on cases of adenoid hypertrophy causing nasal obstruction Ghorbanian et al. found that there was an improvement in smell function after adenoidectomy.[10] In another study on children after adenoidectomy smell function improved by the third month postoperatively. However in this study increase in the size of adenoid hypertrophy levels were classified as 0-100% on a lateral soft tissue graph.[8] Our patients included those with 75-100% choanal obstruction as detected during endoscopy. Accordingly, recovery of olfaction was slower in our patients which may be due to a more advanced pathology detected in our patients In addition more advanced pathology may lead to mucosal or inflammatory changes in nasal airway with coincidence of upper airway infections.[11] We know that adenoid hypertrophy is also related with mucociliary clearance.[3]

Our results from the OSD-6 survey of quality of life showed adenotonsillar disease group had lower scores while

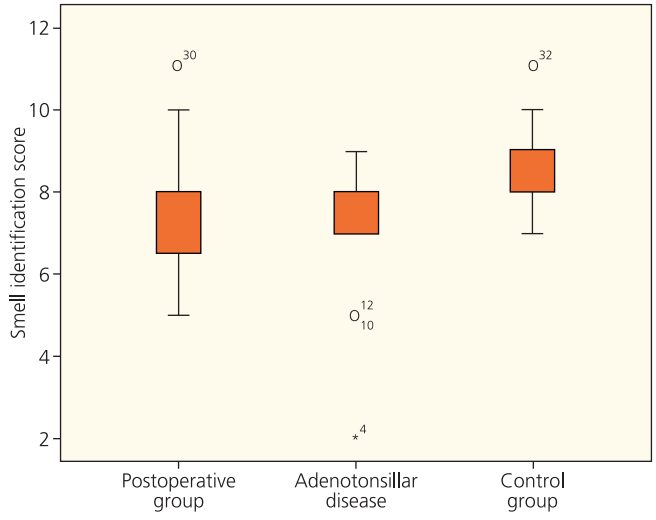

Fig. 1. Smell identification scores of the groups.

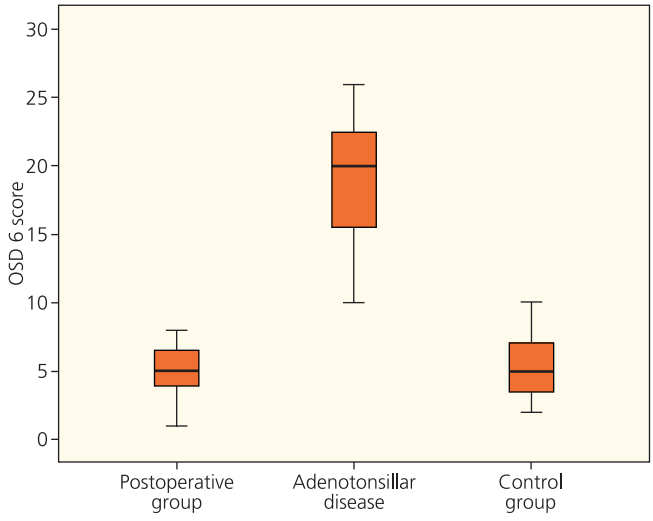

Fig. 2. OSD-6 survey results of the groups.

those of the postoperative and control groups were statistically significantly higher. There was no statistically significant difference between scores of postoperative and control groups. It appears that quality of life of the patients reach normal levels by six months after the operation. Prospective study of De Serres et al. showed a definite improvement in quality of life after adenotonsillectomy.[7] Diez-Montinel et al. carried out a preoperative OSD-6 survey, on the postoperative 8th day and in the postoperative 3rd month on adenotonsillectomized children. Preoperative values were higher than both the second and third evaluations. Additionally the results from the postoperative 8th day were higher than the results from the 3rd month. According to these results, adenotonsillectomy has a positive effect on quality of life in the long-term.[12] In our cases adenotonsillectomy had a positive effect on quality of life. It can be considered that in the postoperative period olfaction recovered more slowly than quality of life. Postoperative SI scores were lower than the control group; however the quality of life scores in the two groups showed no statistical difference. This situation indicates that while obstructive symptoms resolve in the early period as the quality of life scores increase. Slower recovery of the olfaction may be associated with late recovery of the mucosal changes.

Smell is identified in the olfactory region by way of the orthonasal and retronasal passages.[5,8] Our study evaluated only orthonasal olfaction. Konstadinidis et al. evaluated the retronasal passages in cases with adenoid hypertrophy. Both orthonasal and retronasal SI scores showed statistically significant improvement after adenoidectomy.[8] The fact that retronasal evaluation was not done is a limitation of our study. Especially in advanced stage cases, in patients where the nasopharynx is closed, retronasal smell evaluation can provide valuable information.

Conclusion

Our study investigated the relationship between adenotonsillar diseases, olfaction and quality of life. Age-matched pediatric patients with advanced stage disease were included in the present study. In our cases, adenotonsillar disease affected smell identification scores and quality of life. After surgery, quality of life improved significantly, however recovery of olfaction had not reached the level of normal individuals by the sixth month.

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References

1. Dalton P, Mennella JA, Cowart BJ, Maute C, Pribitkin EA, Reilly JS. Evaluating the prevalence of olfactory dysfunction in a pediatric population. Ann N Y Acad Sci 2009;1170:537-42.
2. Konstantinidis I, Haehner A, Frasnelli J, et al. Post-infectious olfactory dysfunction exhibits a seasonal pattern. Rhinology 2006; 44:135-9.
3. Ranga RK, Singh J, Gera A, Yadav J. Nasal mucociliary clearance in adenotonsillar hypertrophy. Indian J Pediatr 2000;67:651-2.
4. Kern RC, Conley DB, Haines GK 3rd, Robinson AM. Pathology of the olfactory mucosa: implications for the treatment of olfactory dysfunction. Laryngoscope 2004;114:279-85.
5. Doty RL. Office procedures for quantitative assessment of olfactory function. Am J Rhinol 2007;21:460-73.
6. Dalton P, Mennella JA, Maute C, et al. Development of a test to evaluate olfactory function in a pediatric population. Laryngoscope 2011;121:1843-50.
7. De Serres LM, Derkay C, Sie K, et al. Impact of adenotonsillectomy on quality of life in children with obstructive sleep disorders. Arch Otolaryngol Head Neck Surg 2002;128:489-96.
8. Konstantinidis I, Triaridis S, Triaridis A, Petropoulos I, Karagiannidis K, Kontzoglou G. How do children with adenoid hypertrophy smell and taste? Clinical assessment of olfactory function pre- and post-adenoidectomy. Int J Pediatr Otorhinolaryngol 2005;69:1343-9.
9. Doty RL, Mishra A. Olfaction and its alteration by nasal obstruction, rhinitis and rhinosinusitis. Laryngoscope 2001;111:409-23.
10. Ghorbanian SN, Paradise JL, Doty RL. Odor perception in children in relation to nasal obstruction. Pediatrics 1983;72:510-6.
11. Sobol SE, Fukakusa M, Christodoulopoulos P, et al. Inflammation and remodeling of the sinus mucosa in children and adults with chronic sinusitis. Laryngoscope 2003;113:410-4.
12. Díez-Montiel A, de Diego JI, Prim MP, Martín-Martínez MA, Pérez-Fernández E, Rabanal I. Quality of life after surgical treatment of children with obstructive sleep apnea: long-term results. Int J Pediatr Otorhinolaryngol 2006;70:1575-9.

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