The use of SNOT-22 questionnaire in monitoring the quality of life of pediatric patients with chronic hypertrophic rhinitis

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Abstract

This study was conducted within the Department of Otorhinolaryngology of the "Nicolae Testemițanu" State University of Medicine and Pharmacy, Chișinău, Republic of Moldova, in partnership with the "Emilian Coțaga" Clinic in Chișinău, during the period 2019-2024. The aim of the research was to optimize diagnostic and treatment methods for chronic hypertrophic rhinitis (CHR) in children, by comparing the effectiveness of two surgical interventions: bipolar forceps cauterization and diode laser surgery. A controlled clinical study was applied to a sample of 128 patients, aged between 7 and 18 years old, randomly divided into two equal groups. The analysis included the evaluation of quality of life using the SNOT-22 questionnaire. The results highlighted the effectiveness of both methods, with a significant impact on symptom relief and quality of life. The study makes an important contribution by adapting the SNOT-22 questionnaire for children in the Republic of Moldova, representing an innovative step in the assessment of CHR.

Keywords: *chronic hypertrophic rhinitis, children, laser surgery, bipolar cauterization, SNOT-22, quality of life*

Rezumat

Acest studiu a fost realizat în cadrul Catedrei de otorinolaringologie a Universității de Stat de Medicină și Farmacie „Nicolae Testemițanu", Chișinău, Republica Moldova, în parteneriat cu Clinica „Emilian Coțaga" din Chișinău, în perioada 2019-2024. Scopul cercetării a fost de a optimiza metodele de diagnostic și tratament în rinita cronică hipertrofică (RCH) la copii, prin compararea eficienței a două intervenții chirurgicale: cauterizarea cu pensa bipolară și chirurgia laser cu diodă. A fost aplicat un studiu clinic, controlat, pe un eșantion de 128 de pacienți, cu vârste între 7 și 18 ani, repartizați aleatoriu în două loturi egale. Analiza a inclus evaluarea calității vieții prin chestionarul SNOT-22. Rezultatele au evidențiat eficiența ambelor metode, cu un impact semnificativ asupra ameliorării simptomelor și calității vieții. Studiul reprezintă o contribuție importantă, prin adaptarea chestionarului SNOT-22 pentru copii în Republica Moldova, constituind un pas inovator în evaluarea RCH.

Cuvinte-cheie: *rinită cronică hipertrofică, copii, chirurgie laser, cauterizare bipolară, SNOT-22, calitatea vieții*

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Utilizarea chestionarului SNOT-22 în monitorizarea calității vieții la pacienții pediatrici cu rinită cronică hipertrofică

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Introduction

Hypertrophic chronic rhinitis (HCR) is a common condition afflicting the nasal mucosa, with a high incidence among the pediatric population. It significantly impacts the children's quality of life through persistent symptoms such as nasal obstruction, mouth breathing, excessive nasal discharge, headaches and drowsiness[(1)]. Despite its non-lethal nature, HCR leads to respiratory complications and negatively affects school and social performance in children, making early diagnosis and appropriate treatment essential.

The clinical context in the Republic of Moldova has highlighted the need for a rigorous study aimed at optimizing diagnostic and treatment methods for this pathology. The present study was conducted within the Department of Otorhinolaryngology of the "Nicolae Testemițanu" State University of Medicine and Pharmacy, Chișinău, Republic of Moldova, with the primary objective of comparing the effectiveness of two surgical methods – bipolar cautery of the inferior nasal turbinates and diode laser surgery[(2)] – in relation to symptom progression and quality of life in pediatric patients diagnosed with HCR.

By designing a clinical, analytical and controlled study, 128 pediatric cases were carefully selected and evenly distributed between the two therapeutic interventions. In addition to clinical and functional evaluation, the study introduced for the first time in the Republic of Moldova the use of the SNOT-22 questionnaire,

validated and adapted for children, to assess the disease's impact on quality of life.

This research aims not only to conduct a comparative analysis of treatment effectiveness, but also to propose a standardized algorithm to serve as a clinical guide for the diagnosis and management of hypertrophic chronic rhinitis in pediatric practice across the country.

Materials and method

The research was conducted within the Department of Otorhinolaryngology of the "Nicolae Testemițanu" State University of Medicine and Pharmacy, with the clinical base at the Pediatric Otorhinolaryngology Department of the "Emilian Coțaga" Clinic, within the Mother and Child Institute (IMSP), in Chișinău, Republic of Moldova, during the period 2019-2024. The study was carried out in four successive stages.

The first stage involved defining the research problem, which required an in-depth analysis of the specialized literature, establishing the study objectives, determining sample sizes, and developing the research plan. In the second stage, data collection was carried out using specially designed questionnaires and tools. Various investigative methods were used, including medical records analysis, completion of evaluation forms, electron-optical, microbiological, histological, and imaging methods, such as conventional radiography, computed tomography and magnetic resonance imaging.

The third stage focused on statistical analysis of the results to determine their significance and relevance. In the final phase, the data obtained were comparatively analyzed and, based on these findings, a standardized algorithm was developed for the diagnosis and treatment of patients with hypertrophic chronic rhinitis.

To meet the research objectives, an analytical, clinical, controlled study was designed, comparing two types of surgical interventions while simultaneously analyzing the microbiological, histomorphological and functional characteristics of the ciliated epithelium, with the aim of optimizing diagnostic and treatment methods in HCR cases. The sample included 128 children, aged between 7 and 18 years old, all diagnosed with hypertrophic chronic rhinitis. They were divided into two equal subgroups: the first group included 64 patients treated with bipolar cautery of the inferior nasal turbinates, and the second group also consisted of 64 patients treated with diode laser surgery.

Sample size calculation was performed using the software *F tests – ANOVA: Fixed effects, omnibus, one-way Analysis: A priori: Compute required sample size*, considering a 95% significance level, 80% statistical power, an estimated effect size of f=0.25 between the two analyzed methods, two groups, and a 1:1 allocation ratio. The result confirmed the need for a sample of 128 patients, evenly distributed between the two groups, respecting the inclusion and exclusion criteria.

Clear inclusion criteria were established, such as confirmed diagnosis of HCR, age between 7 and 18 years old, presence of characteristic symptoms (nasal obstruction, mouth breathing, headache, drowsiness, or inflammatory complications), and signed informed consent. The exclusion criteria included children under 7 or over 18 years of age, those with osteomeatal complex anomalies, acute infections, psychiatric, oncological or severe chronic conditions, diabetes mellitus, or patients who did not follow the investigation and treatment protocol or declined participation.

The study also evaluated the patients' quality of life using the SNOT-22 questionnaire, adapted for cases of hypertrophic chronic rhinitis. The comparative study was conducted on a sample of 128 children (57 girls and 71 boys), with a mean age of 14 years old (±2). The subgroups were created randomly and equally, with 64 patients in each. One group underwent diode laser surgery, while the other received bipolar cautery of the turbinates. The two groups were comparable in terms of sex distribution, age, school attendance and living

Table 1 General characteristics of the study groups

Patient characteristics	Group 1	Group 2	P value
Age (years)	14±2	14±2	>0.05
Gender			
Male	35	36	>0.05
Female	29	28	>0.05
Enrolled in educational institutions (%)	100	98.4	>0.05
Living environment (%)			
Rural	56.3	56.3	>0.05
Urban	43.8	43.8	>0.05

environment. The proportion of patients from rural and urban areas was balanced, with approximately 56.3% from the rural environment and 43.8% from urban areas in both subgroups, without significant differences between them.

Discussion

Chronic hypertrophic rhinitis has a significant impact on patients' quality of life, particularly in children, as persistent symptoms such as nasal congestion, excessive nasal discharge and breathing difficulties negatively affect daily activities and overall well-being. In assessing patients' quality of life, standardized measurement tools become essential to obtain an objective perspective on symptom severity and their impact.

In this context, the *Sino-Nasal Outcome Test-22 (SNOT-22)* has become a widely recognized and utilized instrument for evaluating the symptoms and the quality of life in patients with various rhinologic conditions. This tool enables a comprehensive and standardized assessment of symptoms and their effects on the lives of children with chronic hypertrophic rhinitis, thereby providing essential information for the development and monitoring of personalized treatment plans.

SNOT-22 is a validated questionnaire consisting of 22 questions, used to assess treatment outcomes in chronic rhinosinusitis conditions, especially sinus pathology. Higher scores obtained on this questionnaire indicate more severe disease activity or more intense symptoms, with a total score range between 0 and 110[3]. To complete the questionnaire, the participants respond to questions using a Likert scale, where 0 indicates the absence of problems and 5 indicates a problem as severe as possible[4]. The SNOT-22 test is derived from the RSOM-31 (Rhinosinusitis Outcome Measure protocol), initially developed by Piccirillo[5] and colleagues, with the purpose of providing a holistic assessment of health status and quality of life[6].

Although SNOT-22 is recommended for use according to the EPOS 2012[7] and EPOS 2020 (European Position Paper on Chronic Rhinosinusitis and Nasal Polyps)[8] guidelines, being freely available to all specialists in the field, it remains accessible and easy to complete for patients. For researchers, it is a rational, easy-to-apply tool with a wide range of applications. SNOT-22 can be used to measure health status and quality of life, for diagnosis, assessment of disease severity and treatment effect, as well as to anticipate the need for surgical intervention or to evaluate its outcomes.

The use of SNOT-22 in evaluating the quality of life of patients with chronic hypertrophic rhinitis (CHR) represents a novelty in the Republic of Moldova, given that it was translated and adapted by the author for use among children, and with symptom adaptation specific to CHR[9]. This questionnaire includes a variety of symptoms, including those related to nasal changes, hearing impairment, and the patient's general condition. For the first time, this instrument is applied to assess the impact of CHR on patients' quality of life from the specific perspective of children, considering that their activities and needs differ from those of adults.

Recognizing the SNOT-22 test as a valid and reliable tool for evaluating CHR pathology in children from the Republic of Moldova constitutes a progress in the diagnosis and comprehensive analysis of the pathology. The test also includes questions regarding how the patients relate to these symptoms and how their life is affected by the condition. The SNOT-22 quality-of-life improvement assessment test will also be used to monitor the reduction of symptom scores, which will demonstrate a favorable response to the applied treatment. The questionnaire was translated and adapted by the author for this particular pathology.

Measuring the quality of life of patients diagnosed with chronic hypertrophic rhinitis represents a useful indicator of the disease, helping to classify its severity, achieve the best and most effective treatment, and evaluate post-treatment outcomes dynamically. SNOT-22 can be widely implemented as a diagnostic method for patients suffering from chronic hypertrophic rhinitis. In the respective study, the SNOT instrument was applied to all patients included in the study at both the preoperative and postoperative stages, one month after the intervention.

The results of the SNOT questionnaire (Sino-Nasal Outcome Test) applied preoperatively provide a detailed picture of the symptoms experienced by patients before surgery. For analysis, each symptom was evaluated according to its severity and classified into categories to highlight the degree of patient impairment.

Nasal blockage or obstruction, with a score of 57, is a predominant and characteristic symptom of chronic hypertrophic rhinitis in children, considered by patients to be the most important symptom. This persistent nasal obstruction is associated with inflammation of the nasal mucosa and hypertrophy of nasal tissue, which are hallmarks of this condition. Decreased sense of smell and taste scored 42 in symptom severity, due to inflammation affecting the olfactory and gustatory receptors. Facial pain/pressure, evaluated with a score of 40, is also an important symptom, regarded as a result of nasal congestion and inflammation of the paranasal sinuses.

The next significant symptoms reported by patients relate to those affecting the quality of sleep in children. High scores assigned to difficulty falling asleep (33), nocturnal awakenings (25), poor sleep quality (31), and morning fatigue (21) reflect a significant impairment of sleep in children with chronic hypertrophic rhinitis.

Chronic hypertrophic rhinitis is characterized by inflammation and swelling of the nasal mucosa[2], which obstructs the upper airways and affects airflow during sleep. These breathing disturbances cause difficulty falling asleep, frequent nighttime awakenings, and lack of continuous and restorative sleep. Nasal obstruction also leads to noisy breathing (snoring), and children may also suffer from sleep apnea, interruptions in breathing that affect sleep quality.

Moreover, nasal obstruction and noisy breathing disrupt children's sleep cycles, causing frequent awakenings and sleep fragmentation. These factors lead to a lack of deep and restful sleep, even though children appear to sleep for a considerable amount of time. Poor sleep quality consequently contributes to morning fatigue and decreased concentration and attention during the day.

Thus, the effects and impact of impaired sleep in children with chronic hypertrophic rhinitis are significant. Poor-quality sleep affects children's cognitive and behavioral development, as well as their school performance. Additionally, lack of restorative sleep influences children's mood, leading to irritability and emotional problems. Furthermore, fatigue and lack of energy caused by disturbed sleep affect children's ability to participate in social and recreational activities and reduce their overall quality of life. Therefore, proper management of chronic hypertrophic rhinitis and its associated symptoms is essential to ensure restful sleep and promote good health and well-being in affected children.

The total preoperative SNOT questionnaire scores for Group I reflect the severity level of symptoms experienced by patients before surgery. The analysis of these scores provides an overall picture of the condition's impact on quality of life and treatment needs. The most frequent total scores range between 79 and 83, with a higher concentration in the 79 to 83 range, and fewer cases at the lower and upper extremes of the scoring scale. This suggests that the majority of patients in Group I experienced moderate to severe symptoms before surgery.

In detail, the most frequent scores are 79 (11 cases) and 81 (six cases), followed by scores of 80 and 82, each recorded in six cases. These scores reflect a moderate severity of symptoms, indicating that many patients in this group experienced significant discomfort prior to the operation. There is relatively little dispersion of cases at the extremes of the scoring scale, with only one case recorded for scores of 76 and 86, and no cases for scores below 72 or above 86. This indicates that most patients in Group I had moderate to severe symptoms, without cases of extremely mild or extremely severe symptoms.

This interpretation suggests that, overall, patients in Group I presented significant symptoms before surgery, emphasizing the importance of appropriate treatment and proper management of chronic hypertrophic rhinitis (CHR) to improve patients' quality of life and health.

For Group II, the total preoperative SNOT questionnaire scores similarly reflect the severity of symptoms experienced by patients before surgery. The analysis of these scores provides a general overview of the condition's impact on quality of life and treatment needs.

Nasal blockage or obstruction (55 points), decreased sense of smell and taste (43 points), facial pain/pressure (39 points), difficulty falling asleep (33 points), and poor sleep quality (32 points) represent the most severe characteristic symptoms in Group II.

The total preoperative SNOT scores for Group II offer insight into the severity of symptoms experienced by patients prior to surgery. A varied distribution of total scores is observed, with a higher concentration between 76 and 83. The most frequent scores range from 79 to 83, accounting for approximately 55% of all cases. The most common scores are 79 (13 cases), 81 (eight cases), and 77 (seven cases), followed by scores of 80, 82 and 78, each recorded in five cases.

There is a relatively small dispersion of cases at the extremes of the scoring scale, with only one case recorded for scores of 72, 73, 84 and 85, and no cases for scores above 86. This indicates that most patients in Group II had moderate to severe symptoms, without any cases of extremely mild or extremely severe symptoms.

The analysis of total scores and the severity of the most important symptoms in both study groups reveals several similarities between Group I and Group II. First, both groups exhibit a similar distribution of total scores, concentrated in the range of 76 to 83, indicative

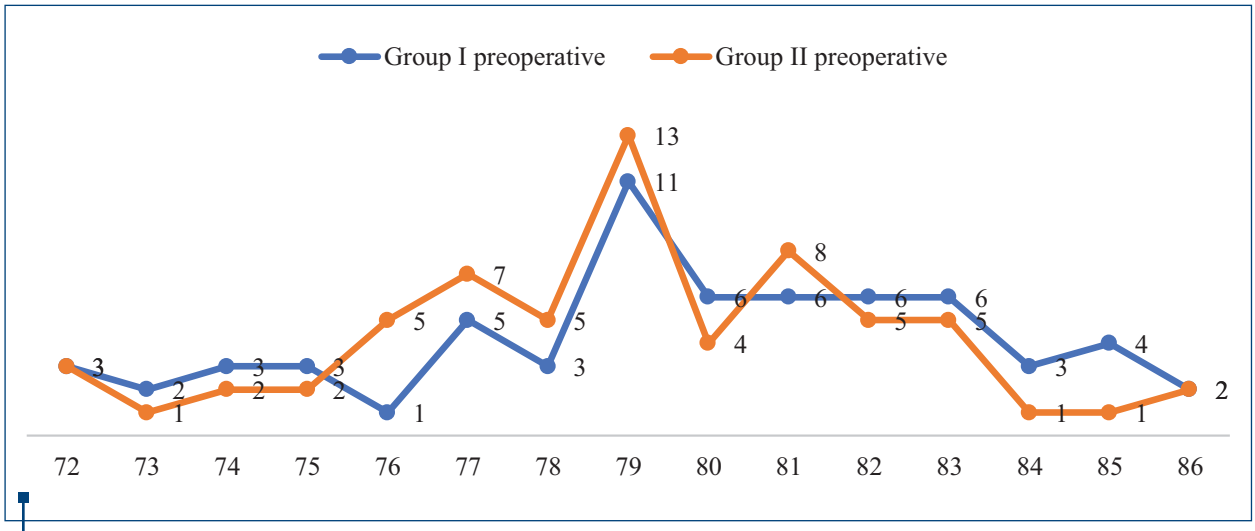

Figure 1. *Comparative preoperative SNOT results between groups*

Table 2 SNOT scores in the study groups

Group I				Group II			
Preoperative score		Postoperative score		Preoperative score		Postoperative score	
72	3	14	2	72	3	14	4
73	2	15	3	73	1	15	2
74	3	16	1	74	2	16	2
75	3	17	4	75	2	17	4
76	1	18	2	76	5	18	9
77	5	19	7	77	7	19	8
78	3	20	2	78	5	20	7
79	11	21	10	79	13	21	11
80	6	22	5	80	4	22	3
81	6	23	4	81	8	23	6
82	6	24	7	82	5	24	3
83	6	25	8	83	5	25	3
84	3	26	2	84	1	26	1
85	4	27	6	85	1	27	0
86	2	28	1	86	2	28	1
Total	**64**	**Total**	**64**	**Total**	**64**	**Total**	**64**

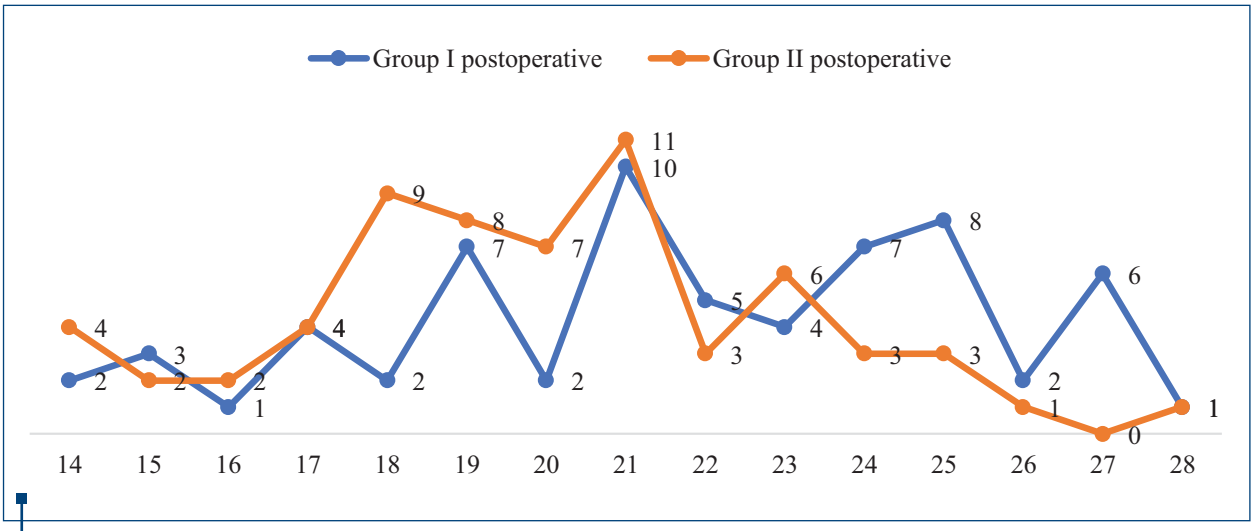

Figure 2. *Comparative postoperative SNOT results between groups*

of moderate to severe symptom severity reported by patients before surgery.

Additionally, the most frequent symptoms in both groups are similar and include nasal blockage or obstruction, facial pain/pressure, and decreased sense of smell/taste. These symptoms reflect common characteristics of chronic hypertrophic rhinitis in children and highlight the significant impact of the condition on patients' quality of life.

Although slight differences may exist in the exact distribution of scores and symptom prevalence between the two groups, the significant similarities suggest that chronic hypertrophic rhinitis in children causes a similar spectrum of symptoms and impairments among patients, regardless of the studied group.

This consistency between the results of Groups I and II underscores the reliability and relevance of the findings and emphasizes the importance of proper diagnosis and treatment to improve the quality of life and health of children affected by this condition. Following surgical interventions, SNOT scores changed considerably, representing an improvement in quality of life through volumetric reduction of the inferior nasal turbinates and elimination of nasal obstruction in both study groups. In both groups, all symptoms shifted from moderate, severe, or very severe problems to no problem, very mild problem, or mild problem, indicating the effectiveness of the surgical treatment.

Analyzing the data from Table 2, we can observe that the postoperative scores in Group II are generally lower than those in Group I, indicating a more significant improvement in symptoms following diode laser surgery.

By comparing preoperative and postoperative scores, we can observe that, in most cases, the postoperative scores in Group II are lower than their preoperative scores, whereas in Group I this trend is less pronounced. This suggests that the diode laser surgery had a more effective impact in reducing symptom severity in Group II compared to nasal turbinate cauterization used in Group I.

Thus, the data suggest that Group II, which underwent diode laser surgery, experienced a more significant improvement in postoperative symptoms compared to Group I, treated with nasal turbinate cauterization.

In Group I, all 64 patients showed a favorable postoperative course. Sixty-two patients required nasal packing due to immediate postoperative bleeding. Additionally, all patients were satisfied with the surgical outcome as their symptoms were alleviated. Among the most important improvements were enhanced breathing and restoration of olfactory function. Postoperative complications were identified in 27 cases overall. These included excessive bleeding, discomfort and pain in the nasal area lasting several days, and the formation of nasal crusts.

Postoperative progress was also assessed using the evaluation questionnaire developed by the author. In Group II, a favorable postoperative course was reported in 100% of cases. No patients required nasal packing. All patients (100%) were satisfied with the surgical treatment results, with improvement in nasal breathing and restoration of olfaction. Postoperative complications were found in three cases. Among these, there was one case of excessive bleeding on the second day after surgery. The other two complications involved nasal crust formation in the treated area, which caused discomfort and required removal to prevent nasal obstruction and alleviate discomfort.

Limitations of the study

The study presents certain limitations that should be considered when interpreting the results. First, the sample was selected exclusively from a single clinical institution, which may affect the representativeness and generalizability of the conclusions to the entire pediatric population of the country. Additionally, the research included only children aged between 7 and 18 years old, thereby excluding other pediatric age groups that might have different characteristics in the progression and treatment of chronic hypertrophic rhinitis. Furthermore, the study did not monitor the long-term recurrence of symptoms after surgical interventions, limiting the ability to assess the durability of the therapeutic effects achieved. Also, the impact of socio-familial and educational factors on the quality of life of children with chronic hypertrophic rhinitis was not analyzed separately, although these may significantly influence symptom perception and treatment response. These limitations highlight the need for future research to include a larger and more diverse sample, extended follow-up periods, and a multidimensional approach to the factors influencing disease progression.

Conclusions

The study demonstrated that chronic hypertrophic rhinitis profoundly impacts the quality of life of children, affecting respiratory functions, overall health status, and the ability to integrate socially and academically. The comparison of surgical interventions revealed that both methods analyzed – bipolar forceps cauterization and diode laser surgery – are effective in alleviating symptoms of chronic hypertrophic rhinitis; however, the use of laser was associated with greater postoperative comfort and faster symptom reduction[10]. The application of the SNOT-22 questionnaire[11], adapted for pediatric patients, provided a quantitative and standardized perspective on patients' health status, confirming its usefulness as an evaluation tool in pediatric otolaryngology practice. Thus, this study makes a significant contribution to the standardization of diagnosis and optimization of therapeutic management in cases of chronic hypertrophic rhinitis[12,13]. Based on the results, a diagnostic and treatment algorithm was developed for medical practice, which can contribute to improving therapeutic interventions and enhancing the quality of life of affected children. ■

Informed consent statement. The informed consent was obtained from all subjects involved in the study.

References

1. Lipan MJ, Most SP. Development of a severity classification system for subjective nasal obstruction. *JAMA Facial Plast Surg*. 2013;15(5):358-61.
2. Hol MK, Huizing EH. Treatment of inferior turbinate pathology: a review and critical evaluation of the different techniques. *Rhinology*. 2000;38(4):157-166.
3. Gillett S, Hopkins C, Slack R, Browne JP. A pilot study of the SNOT 22 score in adults with no sinonasal disease. *Clin Otolaryngol*. 2009;34(5):467-469.
4. Kosugi EM, Chen VG, da Fonseca VMG, Cursino MMP, Neto JAM, Gregório LC. Translation, cross-cultural adaptation and validation of SinoNasal Outcome Test (SNOT)-22 to Brazilian Portuguese. *Braz J Otorhinolaryngol*. 2010;77(5):663-9.
5. Piccirillo JF, Merritt MG Jr, Richards ML. Psychometric and clinimetric validity of the 20-Item Sino-Nasal Outcome Test (SNOT-20). *Otolaryngol Head Neck Surg*. 2002;126(1):41-47.
6. Lange B, Thilsing T, Al-kalemji A, Bælum J, Martinussen T, Kjeldsen A. The Sino- Nasal Outcome Test 22 validated for Danish patients. *Dan Med Bul*. 2011;58(2):A4235.
7. Mozzanica F, Preti A, Gera R, Gallo S, Bulgheroni C, Bandi F, Ottaviani F, Castelnuovo P. Cross-cultural adaptation and validation of the SNOT-22 into Italian. *Eur Arch Otorhinolaryngol*. 2017; 274(2):887-895.
8. Hopkins C, Gillett S, Slack R, Lund VJ, Browne JP. Psychometric validity of the 22-item Sinonasal Outcome Test. *Clin Otolaryngol*. 2009;34(5):447-454.
9. Jalessi M, Farhadi M, Kamrava SK, et al. The Reliability and Validity of the Persian Version of Sinonasal Outcome Test 22 (Snot 22) Questionnaires. *Iran Red Cres Med J*. 2013;15(5):404-8.
10. Passali D, Loglisci M, Politi L, Passali GC, Kern E. Managing turbinate hypertrophy: coblation vs. radiofrequency treatment. *Eur Arch Otorhinolaryngol*. 2016;273(6):1449-1453.
11. Codruț S. Rhinology. Medical Publishing House, Bucharest, 2003.
12. Sroka R, Janda P, Killian T, Vaz F, Betz CS, Leunig A. Comparison of long term results after Ho:YAG and diode laser treatment of hyperplastic inferior nasal turbinates. *Lasers Surg Med*. 2007;39(4):324-331.
13. Ungureaunu R, Sarafoleanu D. Chronic Hypertrophic Rhinitis. *Romanian Medical Journal*. 2012;LIX(3):185-190.

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