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DIAGNOSTIC AND SURGICAL MANAGEMENT IN CHRONIC HYPERTROPHIC RHINITIS IN CHILDREN

321.16 OTORHINOLARYNGOLOGY

Abstract of the PhD thesis in Medical Sciences

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The thesis was developed within the Department of Otorhinolaryngology of the Public Institution "Nicolae Testemițanu" State University of Medicine and Pharmacy and within the Pediatric Otorhinolaryngology Department of the IMSP Mother and Child Institute, Republican Clinical Hospital for Children "Emilian Coțaga".

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The defense will take place on **20.05.2026**, at **14:00**, at the "Nicolae Testemițanu" State University of Medicine and Pharmacy, 165 Ștefan cel Mare și Sfânt Blvd., office 205, during the meeting of the Public Defense Commission of the PhD thesis, approved by the decision of the Scientific Council of the Consortium nr.4 from 02.03.2026.

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1. CONCEPTUAL FRAMEWORK OF THE RESEARCH

Relevance and importance of the research problem. Nasal obstruction represents one of the most common pathologies encountered in pediatric otorhinolaryngology practice, having a major impact on the quality of life of affected children [2, 8]. Inferior turbinate hypertrophy is the most frequent cause of chronic nasal obstruction in children and is associated with persistent difficulty in nasal breathing, sleep disturbances, decreased concentration capacity, and impaired psychosomatic development. First-line treatment is conservative and includes topical decongestants, antihistamines, and hygienic-dietary measures; however, the therapeutic response is often limited, especially in refractory cases [20, 21]. In such situations, surgical volume reduction of the inferior turbinates becomes a justified therapeutic option.

Although surgical interventions on the nasal turbinates are widely accepted in adults, their indication in children remains controversial [5, 12]. The increased prevalence of chronic hypertrophic rhinitis in children implies a risk of symptom recurrence, and concerns regarding possible late atrophic changes of the nasal mucosa have contributed to the reluctance of some specialists, although the regenerative capacity of the mucosa at younger ages significantly reduces this risk. An additional difficulty in establishing the surgical indication is the overlap between symptoms caused by inferior turbinate hypertrophy and those induced by adenoid hypertrophy, especially in young children, where adenoids play a major role in nasal obstruction.

Consequently, surgical intervention on the inferior turbinates has often been reserved for cases with persistent nasal obstruction after adenoidectomy [1, 4]. However, recent literature data indicate that combining inferior turbinate reduction with adenoidectomy leads to superior improvement of nasal obstructive symptoms compared to adenoidectomy alone, without increasing postoperative complication rates [27]. Moreover, some studies demonstrate the effectiveness of turbinate reduction even as a standalone procedure, which has led to a progressive increase in the number of children undergoing surgical treatment for this pathology [17]. Inferior turbinate hypertrophy may have a mixed etiology, involving both mucosal and bony components. Over recent decades, numerous surgical techniques have been described, including partial turbinectomy, electrocautery, laser photovaporization, submucosal turbinoplasty, microdebrider-assisted techniques, and radiofrequency volumetric reduction [15]. However, there is no consensus regarding the optimal surgical technique, and the choice of method is often influenced by the surgeon's experience and equipment availability [3, 23].

In this context, the present research aimed to consolidate evidence regarding the effectiveness of surgical treatment of inferior turbinates in children with chronic nasal obstruction. The study focused on comparing surgical techniques, with emphasis on restoring nasal patency and evaluating the impact on the quality of life of children with chronic hypertrophic rhinitis, in order to optimize therapeutic management and achieve long-term functional benefits.

Aim of the study. The aim of the study is to evaluate the clinical-functional and morphological characteristics of the nasal cavity in children diagnosed with chronic hypertrophic rhinitis and to assess the effectiveness of surgical methods used in the treatment of this pathology, in order to optimize the diagnostic process and therapeutic management.

Research objectives:

1.To evaluate the physiological functions of the nose (nasal resistance and nasal airway patency) and the morphological characteristics of the inferior turbinates in children with chronic hypertrophic rhinitis in the pre- and postoperative periods;

2. To analyze the utility of modern diagnostic methods (nasal endoscopy and computed tomography) in assessing structural changes of the nasal cavity in the studied patients;

3. To compare the effectiveness of surgical methods used in the treatment of chronic hypertrophic rhinitis in children, by evaluating outcomes after bipolar cauterization and diode laser surgery;

4. To evaluate the impact of surgical treatment on patients' quality of life using standardized symptom and nasal function assessment questionnaires;

5. To develop a diagnostic and treatment algorithm for the management of chronic hypertrophic rhinitis in children based on clinical and functional results obtained in the study.

Research hypothesis. It is hypothesized that diode laser surgery provides superior functional outcomes compared to bipolar cauterization, by reducing nasal obstruction, improving rhinomanometric and rhinometric parameters, and decreasing SNOT-22 and NOSE scores, without inducing adverse morphological changes of the nasal mucosa. Confirmation of this hypothesis would allow optimization of the diagnostic and therapeutic algorithm for chronic hypertrophic rhinitis in children.

Research Methodology. The research was designed as a controlled clinical-analytical study conducted during 2019–2024 at the Department of Otorhinolaryngology of the "Nicolae Testemițanu" State University of Medicine and Pharmacy, with the clinical base in the Pediatric ENT Department of the Mother and Child Institute (IMSP). The study included 128 children aged between 7 and 18 years (mean age 14.2 years) diagnosed with chronic hypertrophic rhinitis, divided into two equal groups: bipolar cauterization (n=64) and diode laser surgery (n=64).

The evaluation protocol was identical for both groups and included ENT clinical examination, nasal endoscopy, paraclinical investigations, histopathological examination, acoustic rhinometry, rhinomanometry, and computed tomography, in order to assess anatomical and functional changes of the nasal cavity. The impact of treatment on symptoms and quality of life was evaluated using the SNOT-22 and NOSE questionnaires, as well as the Visual Analogue Scale (VAS).

Data were statistically processed using SPSS software (IBM Statistics v.26), applying appropriate significance tests. The study was conducted in accordance with ethical principles, based on informed consent and with the approval of the USMF Ethics Committee (14.03.2023).

The scientific novelty of the research lies in its original contribution to the diagnosis, treatment, and quality-of-life assessment of children with chronic hypertrophic rhinitis (CHR) in the Republic of Moldova. The study introduces, for the first time at the national level, an integrated and standardized approach in pediatric otorhinolaryngology, with direct impact on clinical practice.

The innovative aspects include a comparative analysis of the effectiveness of diode laser surgical treatment in inferior turbinate hypertrophy in children, providing objective evidence regarding the advantages of a minimally invasive method over conventional surgical techniques. Furthermore, the research marks the adaptation and application of the SNOT-22 and NOSE questionnaires for quality-of-life assessment in pediatric patients with CHR, these instruments being used for the first time in the Republic of Moldova for this pathology.

An additional original contribution is the development of a standardized diagnostic and treatment algorithm for CHR in children, based on objective clinical and functional data.

The practical value of the study consists in the direct translation of research results into clinical, methodological, and institutional tools with impact on pediatric ENT practice in the Republic of Moldova. The research served as the basis for the development of a National Clinical Protocol for chronic hypertrophic rhinitis in children, a comprehensive document providing updated recommendations for diagnosis, therapeutic options, and disease monitoring, adapted to the national healthcare system.

Additionally, a methodological guide dedicated to chronic hypertrophic rhinitis was developed, addressed to academic staff and medical practitioners, integrating both theoretical and applied aspects, including anamnesis, specific symptomatology, diagnostic methods, therapeutic options, and evaluation of short- and long-term outcomes, along with a standardized assessment questionnaire.

The practical relevance of the research is confirmed by the acquisition of 6 innovation certificates (3 within USMF "Nicolae Testemițanu", MPI Section, and 3 within the Mother and Child Institute), as well as 6 implementation acts, including 3 in the scientific-didactic and practical process at USMF and 3 in clinical practice at the Mother and Child Institute, "Emilian Coțaga" Clinic, Pediatric Otorhinolaryngology Department.

Moreover, the study substantiates the development of a national medical standard for the diagnosis and treatment of chronic hypertrophic rhinitis in children, contributing to the standardization of clinical practices and improvement of healthcare quality.

The applicability and international relevance of the results are supported by the author's participation in two international scientific projects, one of which is currently ongoing, carried out within the Otorhinolaryngology Laboratory, Research Unit 080201 "Personalized Medicine" of USMF "Nicolae Testemițanu".

Keywords: chronic hypertrophic rhinitis, turbinate hypertrophy, inferior nasal turbinates, nasal obstruction, acoustic rhinometry, rhinomanometry, cauterization, diode laser

Ethics Approval. The approval of the Research Ethics Committee for conducting the study, confirmed by minutes no. 2 of 21.03.2023, is positive. The research was carried out within the Pediatric Otorhinolaryngology Department of the Mother and Child Institute, Republican Clinical Hospital for Children "Emilian Coțaga".

2. MATERIALS AND METHODS

2.1. Research Methodology

The study was conducted within the Department of Otorhinolaryngology of the "Nicolae Testemițanu" State University of Medicine and Pharmacy, with the clinical base in the Pediatric Otorhinolaryngology Department of the IMSP Mother and Child Institute, "Emilian Coțaga" Clinic, Chișinău, Republic of Moldova, during the period 2019–2024.

The research was carried out in four distinct phases:

Phase 1: Problem identification involved an exhaustive analysis of the specialized literature to define the relevant theoretical framework and to establish the aim and objectives of the study. The sample size was also determined, and the research plan was developed.

Phase 2: Data collection was performed through the development of questionnaires and appropriate data collection tools. The characteristics of the investigated phenomena and populations were recorded using various methods, including extraction of information from medical records, documentation in individual evaluation forms, and the use of specific investigative methods.

Phase 3: The obtained results were statistically evaluated to determine their relevance and significance.

Phase 4: Data analysis and scientific substantiation of strategies involved the evaluation of key indicators characterizing the study samples, their prospective comparison, and the development of a standardized diagnostic and treatment algorithm for patients with chronic hypertrophic rhinitis (CHR).

In order to achieve the proposed objectives, a controlled clinical analytical study was conducted to compare two types of surgical interventions and to investigate the histomorphological

and functional characteristics of the ciliated epithelium in chronic hypertrophic rhinitis (CHR), aiming to optimize diagnostic strategies and improve surgical interventions. The study included a sample of 128 pediatric patients aged between 7 and 18 years, diagnosed with CHR.

Subsequently, the study group was divided into two subgroups:

- *Study group 1* (64 patients) treated by bipolar cauterization of the inferior nasal turbinates;
- *Study group 2* (64 patients) treated by diode laser surgery.

The representative sample size was calculated using the *F tests – ANOVA: Fixed effects, omnibus, one-way analysis (a priori sample size computation),* based on the following parameters: confidence level of 95%, statistical power of 80%, effect size f = 0.25, number of groups = 2, allocation ratio = 1:1. The total sample size was *128 patients.*

Two groups were formed according to the type of surgical intervention, each including 64 participants, while respecting the inclusion and exclusion criteria. The study group was established as follows:

Inclusion criteria: clinical criteria defining CHR, including nasal obstruction, partial oral breathing, headache/morning headache, snoring, fatigue, somnolence, hyposmia, posterior rhinorrhea, facial pain, and occurrence of inflammatory and infectious complications associated with chronic nasal obstruction (viral/bacterial exacerbations, sinusitis, otitis, recurrent respiratory infections); confirmed diagnosis of CHR; children aged 7–18 years; informed consent obtained.

Exclusion criteria: age below 7 years or above 18 years; presence of osteomeatal complex abnormalities confirmed by imaging or endoscopy; presence of acute infectious pathology; severe psychiatric disorders; oncological diseases; severe chronic hepatic, renal, cardiovascular, or respiratory diseases; type I or II diabetes mellitus; patients likely to leave the country within one year; individuals who did not undergo complete pre- and postoperative investigations according to the study protocol; patients who did not attend scheduled treatment sessions.

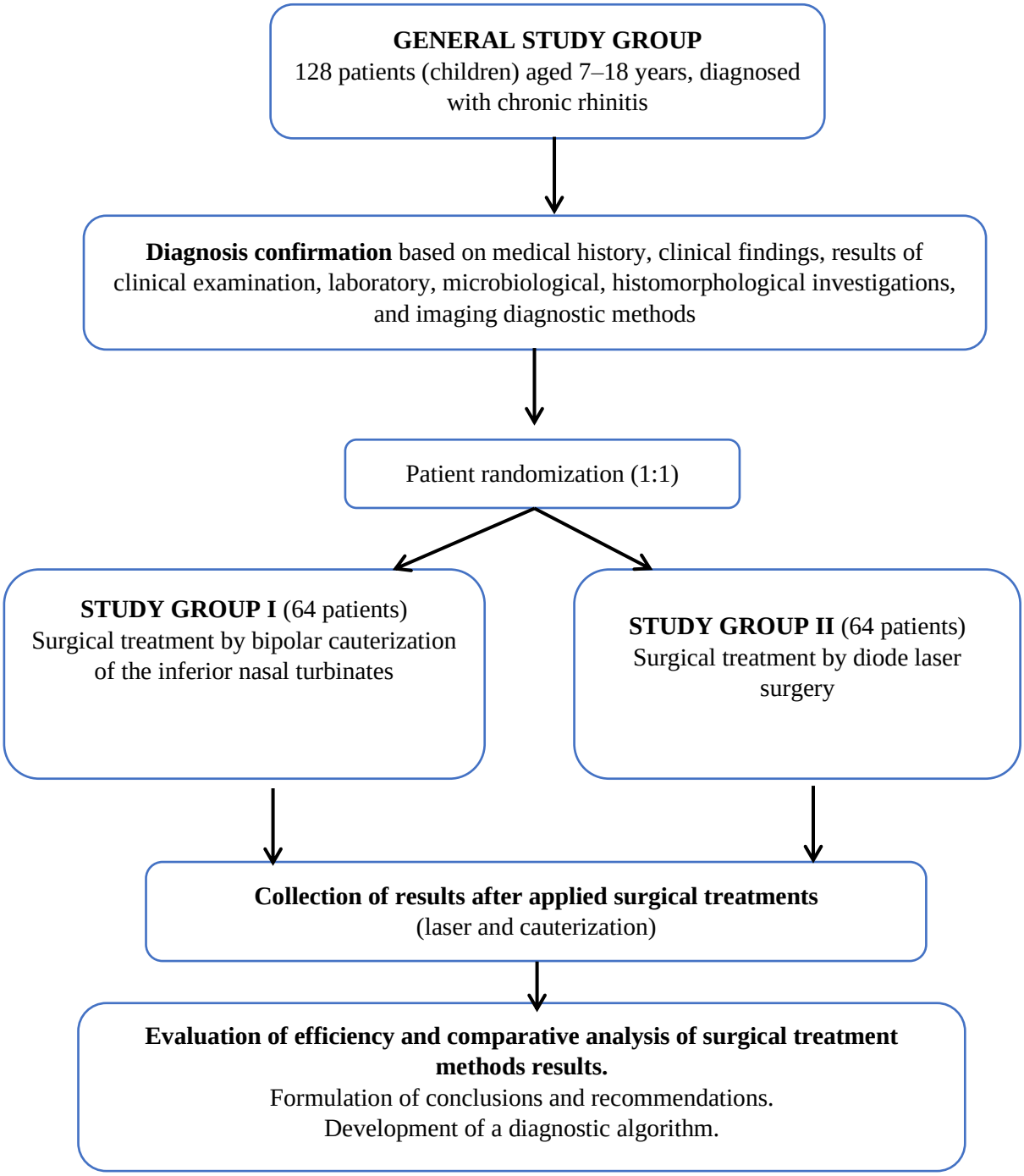

Figure 1. Study Design

Patients included in the study underwent a comprehensive evaluation, both preoperatively and postoperatively, which included the following investigations and medical procedures: ENT clinical examination performed using standard methods; nasal endoscopy for direct visualization of nasal structures and pathological changes; paraclinical blood tests, including complete blood count (hemoglobin, erythrocytes, color index, platelet volume, leukocytes), erythrocyte sedimentation rate (ESR), transaminases (ALT, AST), Quick prothrombin time, fibrinogen, INR, and blood group determination; histomorphological analysis of tissue samples obtained by biopsy during surgery, to highlight structural changes of the nasal mucosa; objective methods such as acoustic rhinometry and rhinomanometry to assess nasal patency and airflow resistance; instrumental investigations, including computed tomography (CT) with staging of rhinosinus changes according to the Lund–Mackay scoring system; assessment of patients' quality of life

using the SNOT-22 questionnaire (revised and adapted by the author for chronic hypertrophic rhinitis, originally designed for chronic rhinosinusitis patients); application of the NOSE questionnaire for subjective evaluation of nasal obstruction severity; and the use of the Visual Analogue Scale (VAS) to assess symptom severity as perceived by the patient.

Informed consent was obtained from each patient prior to inclusion in the study. All patients were informed about the benefits and risks of surgical intervention for chronic hypertrophic rhinitis (CHR). The research protocol was approved by the Ethics Committee of USMF on 14.03.2023. All participants were informed through an information form prepared in two copies, one for the parents and one for children aged over 10 years, in accordance with Law no. 338 of 15.12.1994 on the Rights of the Child (Art. 8), which states that the opinion of a child aged 10 years or older must be taken into account, provided it does not contradict their best interests.

2.2. General characteristics of the study groups

The comparative study was conducted on a group of 128 pediatric patients (57 girls and 71 boys), aged between 7 and 18 years (mean age 14.2 years), diagnosed with chronic hypertrophic rhinitis. The general study group was divided into two randomized subgroups (1:1):

Study Group I (64 patients) treated by bipolar cauterization of the inferior nasal turbinates;

Study Group II (64 patients) treated by diode laser surgery.

Table 1. General characteristics of the study groups

Patient Characteristics	Group 1	Group 2	P-value
Age (years), median	14	14	>0,05
Gender (n)			
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

2.3. Methods of investigation and treatment

The investigation and treatment methods used in this study included clinical, paraclinical, instrumental, imaging, and histopathological evaluation, as well as assessment of quality of life. All patients included in the two study groups underwent clinical evaluation through detailed medical history and a complete ENT examination, which allowed the identification of subjective symptoms, disease duration, previous treatments, and possible comorbidities. Clinical data were systematized using a standardized questionnaire developed within the study, which facilitated both the initial assessment and postoperative follow-up at predefined intervals.

The diagnosis was further complemented by laboratory investigations and histopathological examination of inferior nasal turbinate specimens, performed at the Department of Histology, Cytology and Embryology of the "Nicolae Testemițanu" State University of Medicine and Pharmacy. Instrumental methods included nasal endoscopy, used for direct evaluation of the mucosa and intranasal structures, while imaging methods consisted of computed tomography of the nasal turbinates, necessary for detailed assessment of mucosal and bony components.

The impact of the disease on quality of life and symptom severity was evaluated using standardized questionnaires: SNOT-22 (adapted for the pediatric population), NOSE, and the Visual Analogue Scale (VAS), administered preoperatively and one month postoperatively, allowing an objective assessment of treatment effectiveness.

Diagnosis of CHR

In addition to the previously described methods for assessing disease severity, patients were also evaluated using rhinomanometry and acoustic rhinometry.

Rhinomanometry is an instrumental method used in the diagnosis of chronic hypertrophic rhinitis in children. This technique is employed to assess nasal function and airway obstruction. The procedure involves the use of a device called a rhinomanometer [26], which measures pressure and airflow through the nasal passages.

Acoustic rhinometry is a non-invasive method used in the diagnosis of CHR in children, allowing objective evaluation of nasal function and airway obstruction. This technique is based on the principle that the way sound travels through the nasal passages provides information about possible obstructions.

Treatment methods

Medical treatment in children diagnosed with chronic hypertrophic rhinitis primarily aims to alleviate symptoms and reduce nasal inflammation. In general, this treatment included the following types of medications: nasal decongestants, antihistamines, intranasal corticosteroids, and saline nasal solutions.

The indicated medical treatment was prescribed after surgery, with the aim of improving symptoms and enhancing the quality of life of patients who underwent surgical intervention.

Surgical Treatment

The surgical interventions performed in this study were of two types, corresponding to the study groups.

Bipolar cauterization of the inferior nasal turbinates is a surgical procedure used in the treatment of chronic hypertrophic rhinitis in children. This procedure aims to reduce the size of the inferior turbinates, which are often inflamed and hypertrophied in this condition, leading to nasal obstruction and other associated symptoms.

Diode laser surgery in children diagnosed with chronic hypertrophic rhinitis is a minimally invasive procedure used to treat inferior turbinate hypertrophy. This type of surgery is designed to reduce the size of inflamed and hypertrophied tissues within the nasal passages, thereby improving airflow and alleviating symptoms associated with nasal obstruction.

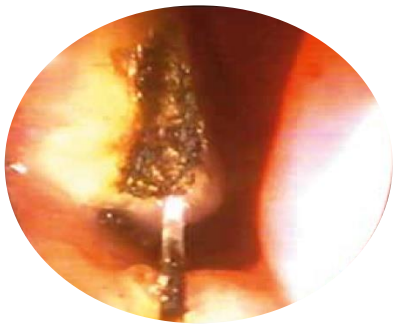

Figure 2. Diode laser surgical intervention

The aim of the research is to demonstrate the superiority of one of the two treatment methods over the other, particularly considering that both approaches pursue the same outcome: volumetric reduction of the inferior nasal turbinates, decrease of nasal obstruction, and improvement of breathing and overall quality of life in patients.

2.4. Methods of statistical processing of results

Statistical processing. In order to obtain accurate results, all data were recorded in written form and stored in a database using SPSS (Statistical Package for the Social Sciences, IBM Statistics for Windows, version 26.0). SPSS represents an integrated and modular system used for

data collection, management, and statistical analysis, with the purpose of generating reports and presenting study results.

For statistical processing, a clinical-anamnestic questionnaire, along with SNOT-22 and NOSE questionnaires, was completed for each patient. The collected data were entered into Google Forms, after which the results were exported and synthesized in Excel spreadsheets and presented graphically using charts and tables.

3. DIAGNOSIS AND TREATMENT OF CHRONIC HYPERTROPHIC RHINITIS IN CHILDREN

3.1. Characteristics of patients with chronic hypertrophic rhinitis treated by bipolar cauterization of the inferior nasal turbinates

Socio-demographic data. Group I included 64 pediatric patients treated surgically by bipolar cauterization of the inferior nasal turbinates, aged between 7 and 18 years, with the majority being adolescents in the 13–18 years age group. Gender distribution showed a slight predominance of males (36 patients; 56.3%) compared to females (28 patients; 43.8%).

Regarding medical history, the most frequent ENT interventions were adenoidectomy (25 cases) and adenotonsillectomy (17 cases), while septoplasty was reported in only one case. No prior polypectomies or turbinate surgeries were recorded, and 21 patients had no previous ENT surgical history.

*Symptomatology analysis***.** The analysis of clinical symptoms revealed that nasal obstruction was present in all patients (100%), confirming its central role in chronic hypertrophic rhinitis. A very high prevalence (>90%) was also observed for rhinolalia (98.43%), headache (95.31%), sleep disturbances (100%), morning fatigue (100%), general fatigue (100%), and nocturnal snoring (100%), indicating a major functional impact of the disease.

Symptoms reported in more than 70% of patients included anterior rhinorrhea (73.43%), facial/nasal fullness (75%), dizziness (73.43%), and sensation of a nasal foreign body (65.62%). Other manifestations, such as viscous nasal discharge (64.06%), pain in the external nasal region (85.93%), and ear fullness (62.50%), were also frequently observed, while cough and sneezing were less commonly reported (20.31%).

Symptom severity was assessed using the Visual Analogue Scale (VAS), which allowed subjective quantification of symptom intensity on a scale from 0 to 10, providing an overall evaluation of the clinical impact of the disease.

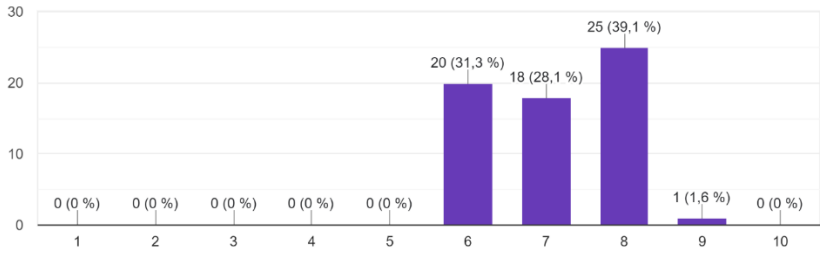

Figure 3. Severity of symptoms assessed by the VAS scale in Group I

Therefore, the data suggest that the majority of patients in this study experienced a significant severity of symptoms associated with chronic hypertrophic rhinitis, based on subjective evaluation using the VAS scale. This highlights the substantial impact of the disease and the need for effective management strategies to improve patients' quality of life.

Objective ENT examination

Inspection. During the objective ENT examination, all 64 patients (100%) presented oral breathing without free nasal breathing, confirming the presence of significant nasal obstruction. No congenital or post-traumatic nasal deformities were identified, nor were episodes of epistaxis recorded, indicating that oral breathing was not caused by obvious structural abnormalities or recent lesions, but rather by functional obstruction associated with chronic hypertrophic rhinitis.

Anterior rhinoscopy. On anterior rhinoscopy, the nasal mucosa was hyperemic in 62 cases (96.87%) and congested in 2 cases (3.12%), indicating an active inflammatory process. Inferior turbinate hypertrophy was present in 100% of cases (64 patients), with total hypertrophy being the most frequent form—37 cases (58.7%), followed by hypertrophy of the turbinate head—14 cases (22.2%) and turbinate tail—12 cases (19%). Nasal septum deviation was identified in 37 cases (57.8%), without association with other pathological changes such as septal spurs, synechiae, concha bullosa, or hypertrophy of the uncinate process, indicating a frequent association between CHR and septal deviation in the absence of other structural anomalies.

*Nasal endoscopy***.** As part of the objective ENT examination, the next stage consisted of nasal endoscopy, which revealed the following findings. Adenoid vegetations were present in 26.6% of cases, indicating a considerable proportion of patients affected by this condition within the study sample. Tonsillar changes were observed in 39.1% of cases, suggesting a significant frequency of tonsillar pathology among patients with chronic hypertrophic rhinitis. Deformities of the posterior ends (tails) of the inferior turbinates were identified in a very high percentage—98.4% of cases—indicating a widespread presence of this anatomical alteration in the study group.

3.2. Characteristics of patients with chronic hypertrophic rhinitis treated surgically by laser surgery

Socio-demographic data. Group II included 64 patients treated with diode laser surgery, the majority being adolescents. Age distribution showed a predominance of the 15–18 years group (35 patients; 54.7%), followed by 13–14 years (17 patients; 26.6%), 10–12 years (7 patients; 10.9%), and 7–9 years (5 patients; 7.8%). The median age was 14.33 ± 2 years, confirming the homogeneity of the sample.

Gender distribution was similar to Group I, with a slight predominance of males (35 patients; 54.7%) compared to females (29 patients; 45.3%). Clinically, the symptomatology of patients in Group II was comparable to that of Group I, confirming the homogeneity of the groups prior to surgical intervention.

In Group II, the duration of the disease exceeded 3 consecutive months in all patients, confirming the chronic nature of chronic hypertrophic rhinitis. Disease duration ranged between 10 and 24 months, with a predominance of long-standing forms: 43.8% of patients (28 cases) had a duration of 24 months, 31.3% (20 cases) 12 months, 17.2% (11 cases) 18 months, while shorter durations were less frequent (10 months – 3.1%, 20 months – 4.7%).

Assessment of symptom severity using the VAS scale revealed marked symptomatology: 98.4% of patients rated symptom severity with high scores (7–8 points), of which 53.1% indicated a score of 7, 45.3% a score of 8, and only 1.6% a score of 6, reflecting a significant clinical impact of the disease prior to surgical intervention.

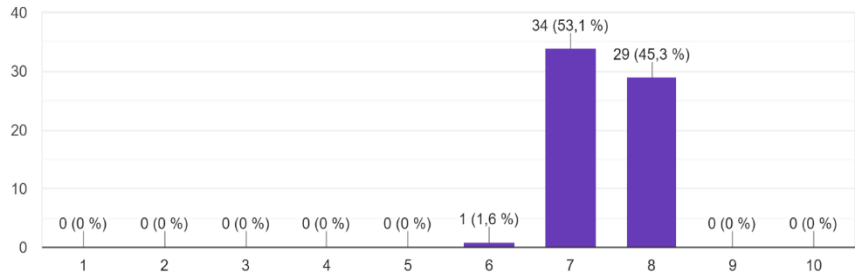

Figure 4. Severity of symptoms assessed by the VAS scale in Group II

Out of a total of 64 evaluations of general condition, the majority of patients (41 cases; 64.1%) presented a relatively satisfactory condition, while 21 patients were assessed as having moderate severity. Only 2 patients reported a satisfactory condition, with no cases of severe condition or altered levels of consciousness (such as somnolence, stupor, precoma, or coma) being recorded.

The analysis of comorbidities revealed the absence of bronchopulmonary, cardiovascular, gastrointestinal, and urogenital pathologies, while 60 patients presented associated ENT conditions, confirming the localized nature of the studied pathology.

Inspection

During the ENT examination, all 64 patients were found to have predominantly oral breathing, indicating the presence of significant nasal obstruction. The need for oral breathing reflects impaired nasal airflow and a functional adaptation to maintain adequate oxygenation. At the same time, clinical examination did not reveal congenital or post-traumatic structural abnormalities, nor epistaxis, suggesting that oral breathing was not caused by obvious anatomical lesions but by the underlying obstructive nasal pathology.

Anterior Rhinoscopy

Anterior rhinoscopy revealed that the nasal mucosa was hyperemic in 92% of cases, while a normal pale pink appearance was observed in 3.2% of cases, and mucosal congestion in only 1.6%, supporting the association of hyperemia with chronic inflammation specific to chronic hypertrophic rhinitis. Inferior turbinate hypertrophy was present in 100% of cases, and nasal septum deviation was identified in 50% of patients, with a single case of concha bullosa and no other associated nasal abnormalities.

Nasal endoscopy revealed adenoid vegetations in approximately 36% of cases and tubal tonsil changes in about 30%, while deformities of the posterior ends (tails) of the inferior turbinates were present in all patients. Overall, the clinical and paraclinical data confirm the severe inflammatory-obstructive nature of chronic hypertrophic rhinitis and highlight the need for appropriate and individualized therapeutic management.

3.3. Modern practices in diagnostic methods applied in the confirmation of chronic hypertrophic rhinitis

In recent decades, technological development has led to the advancement and implementation of modern diagnostic practices, providing clinicians with new tools and techniques for the confirmation and evaluation of this condition [6]. The following section presents some of the most relevant contemporary diagnostic methods used in the confirmation of chronic hypertrophic rhinitis (CHR), highlighting their advantages, limitations, and impact on patient management.

Currently, in the Republic of Moldova, there is no standardized diagnostic and therapeutic algorithm for patients with this pathology. The algorithm proposed by the author has been included

in the medical standards for diagnosis and treatment developed by the Ministry of Health for national public medical institutions and clinical practitioners [9].

For the accurate diagnosis of CHR and comprehensive collection of anamnestic data, the author proposed a structured patient evaluation approach based on well-defined criteria, which facilitates proper analysis and enables the development of statistical data regarding the disease. The proposed questionnaire consists of 228 items, covering detailed information on medical history, symptomatology, ENT objective examination, paraclinical investigations, and both medical and surgical treatment, with the possibility of repeated patient evaluation immediately after surgery, at 7 days, and at one month post-intervention. This methodological recommendation is intended for ENT specialists, particularly doctoral candidates, practicing physicians, and residents [24].

Acoustic rhinometry and rhinomanometry represent two essential modern instrumental methods in the diagnosis of children with chronic hypertrophic rhinitis [7, 14]. By using these precise and non-invasive techniques, specialists can accurately assess nasal airway function, providing a rapid and detailed diagnosis. The advantages for pediatric patients are evident, including the elimination of discomfort associated with invasive procedures and the possibility of monitoring disease progression over time, thus enabling effective and personalized treatment management.

For these reasons, both study groups underwent acoustic rhinometry and rhinomanometry at multiple time points: preoperatively, immediately postoperatively, at 7 days, at one month, and at 6 months, allowing for a comprehensive comparative analysis and demonstrating the effectiveness of one surgical method over the other.

Acoustic Rhinometry

Before surgical intervention, patients underwent evaluation using acoustic rhinometry, and the results indicated a reduction in the studied parameters compared to normal reference values, as presented in the following table.

Table 2. Acoustic rhinometry data in study groups (preoperative)

Patiens groups	**Examination values**				
	V (cm3)	**A1 (cm2)**	**D1 (cm)**	**A2 (cm2)**	**D2 (cm)**
Group I	2,867±0,88*	0,390±0,01*	1,244±0,04*	0,512±0,02*	2,769±0,05 *
Group II	2,755±0,02*	0,381±0,01*	1,286±0,02*	0,533±0,02*	2,902±0,01 *
Normal values	5,7±0,18	0,790±0,21	0,94±0,15	0,78±0,038	2,68±0,15

Note: * statistically significant differences between groups I and II

According to the presented table, preoperative acoustic rhinometry data were analyzed to better understand the condition of the nasal airways in patients from both groups. It can be observed that both groups showed a reduction in nasal cavity volume, indicating a significant deviation from normal values. This reduction, together with the values recorded for cross-sectional areas and airway diameters in both regions, highlights the characteristic parameters associated with chronic hypertrophic rhinitis prior to treatment.

Following the application of surgical treatments, changes were observed in acoustic rhinometry parameters, demonstrating the effectiveness of the performed surgical interventions.

Table 3. Acoustic rhinometry data in study groups at postoperative follow-up

Rhinometric values		7 days		1 month		6 months	
		M	**m**	**M**	**m**	**M**	**m**
V	group I	3,507***	0,1	3,427***	0,06	3,647***	0,14
	group II	3,325***	0,04	3,453***	0,08	3,943***	0,1
AST 1	group I	0,454***	0,01	0,456***	0,01	0,509***	0,02
	group II	0,410	0,01	0,473***	0,01	0,533***	0,02
D1	group I	1,110**	0,05	1,145**	0,03	1,100**	0,06
	group II	1,224**	0,03	1,352	0,08	1,228*	0,05
AST2	group I	0,561***	0,01	0,553**	0,01	0,574*	0,02
	group II	0,491*	0,01	0,554	0,02	0,615*	0,03
D2	group I	2,625***	0,03	2,573***	0,03	2,454**	0,09
	group II	2,710***	0,03	2,638***	0,02	2,619***	0,04

Note: * $p<0.05$; ** $p<0.01$; *** $p<0.001$ compared to the corresponding stage values

After surgical intervention, acoustic rhinometry data in children from both groups demonstrated significant changes in the measured parameters.

Rhinomanometry

Clinical examination confirmed the presence of nasal obstruction in children affected by chronic hypertrophic rhinitis.

Table 4. Rhinomanometry data in study groups (preoperative)

	Groups		
Rhinomanometric values	Normal values	Groupl I	Group II
Total airflow (150 Pa) cm^3/s	564±125	518,375±0,84*	515,5938±0,74*
Total resistance (150 Pa) cm^3/s	0,37±0,17	0,483281±0,014*	0,469844±0,009*

Note: * statistically significant differences between Group I and Group II

Reference rhinomanometric values in children indicate a total airflow of approximately 564 cm^3/s at 150 Pa and a total nasal resistance of 0.37 cm^3/s, considered normal physiological parameters of nasal respiratory function. Compared to these values, preoperative examination of patients in both study groups revealed significant alterations in rhinomanometric parameters, consistent with the diagnosis of chronic hypertrophic rhinitis.

In Group I, the mean total airflow was 515.6 cm^3/s (95% CI: 515.1–516.1 cm^3/s), while total nasal resistance reached a mean value of 0.483 cm^3/s, significantly higher than the reference value. The distribution of values was homogeneous, with low variability.

In Group II, the mean total airflow was slightly higher, at 518.4 cm^3/s (95% CI: 517.7–519.0 cm^3/s), and the mean total resistance was 0.470 cm^3/s. Variability was moderately higher compared to Group I, but the distribution remained approximately symmetrical.

Comparative analysis showed that both groups presented similar preoperative values, characterized by decreased airflow and increased nasal resistance compared to normal values, without major clinical differences between groups prior to surgical intervention [13, 19]. These findings confirm significant nasal obstruction as an objective functional feature of chronic hypertrophic rhinitis and justify the need for surgical treatment.

Table 5. Rhinomanometry data in study groups (postoperative)

Rhinomanometric values		At 7 days		At 1 month		At 6 months	
		M	m	M	m	M	m
Total airflow (150 Pa) cm3/ sec	group I	528,5938***	0,87	536,3906***	0,07	539,0469***	0,05
	group II	534,6094***	0,92	542,5938***	1,24	545,0625***	1,82
Total resistance (150 Pa) Pa/ cm3/ sec	group I	0,452969	0,011	0,432656	0,07	0,43125	0,05
	group II	0,440781**	0,004	0,400469**	0,002	0,390313**	0,02

At 7 days postoperatively, an increase in total airflow was observed in both groups, more pronounced in Group II (534.61 cm^3/s) compared to Group I (528.59 cm^3/s). Simultaneously, total nasal resistance decreased in both groups, with a greater reduction in Group II (0.4408 $Pa/cm^3/s$) compared to Group I (0.4530 $Pa/cm^3/s$), indicating a faster functional recovery following diode laser surgery.

At one month postoperatively, the increasing trend in airflow continued in both groups, while total resistance further decreased, suggesting progressive improvement of nasal respiratory function.

At 6 months postoperatively, total airflow values remained elevated, being higher in Group II (545.06 cm^3/s) compared to Group I (539.05 cm^3/s). Regarding total resistance, Group II showed a more pronounced decrease, reflecting a more efficient and stable functional recovery compared to bipolar cauterization.

Statistical analysis indicated that Group II demonstrated greater homogeneity of postoperative outcomes, with lower variability and a narrower interquartile range, confirming more consistent functional recovery compared to Group I.

Computed tomography

Computed tomography (CT) represents a fundamental imaging method in confirming the diagnosis of chronic hypertrophic rhinitis, providing a detailed three-dimensional evaluation of nasal structures, particularly the inferior nasal turbinates. It allows precise identification of anatomical changes such as turbinate hypertrophy, septal deviation, and associated lesions, complementing clinical and endoscopic findings and contributing to accurate differential diagnosis and individualized therapeutic planning.

The study included 128 patients (256 inferior turbinates) without paranasal sinus pathology, selected based on thorough anamnesis and complete clinical and endoscopic evaluation. CT examinations were performed without the use of nasal decongestants to ensure objective assessment of mucosal thickness.

Imaging investigations were conducted using a 64-slice CT scanner (LightSpeed Volume VCT, GE Medical System), following a standardized protocol: detector thickness 0.625 mm, slice thickness 1.5 mm, and reconstruction interval 0.5 mm.

Measurements included medial mucosal thickness, bony component thickness, and lateral mucosal thickness of the inferior turbinates, both anteriorly and posteriorly. Measurements were performed perpendicular to the mucosal surface using an electronic CT indicator, ensuring accuracy and reproducibility.

This protocol allowed a detailed morphological analysis of inferior turbinate structure, relevant for understanding hypertrophy mechanisms and selecting the optimal surgical technique.

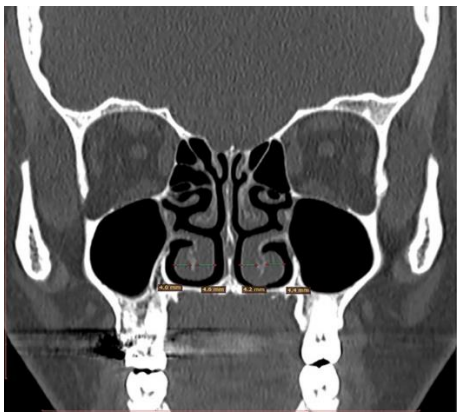

Figure 5. Coronal computed tomography of the inferior turbinate

Coronal computed tomography demonstrated the measurement of the medial and lateral non-bony (mucosal) components of the inferior turbinate in the anterior region, on both the right and left sides.

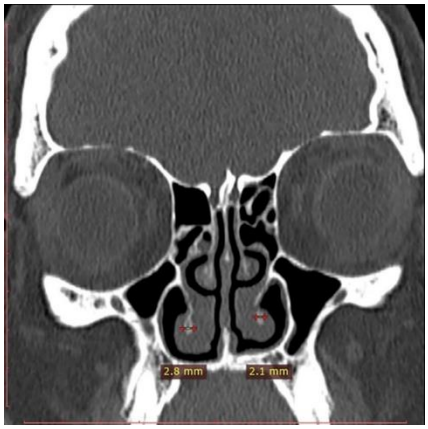

Figure 6. Coronal CT section – bony component of the inferior turbinate

Coronal computed tomography demonstrated the measurement of the bony component of the inferior turbinate in the anterior region, on both the right and left sides.

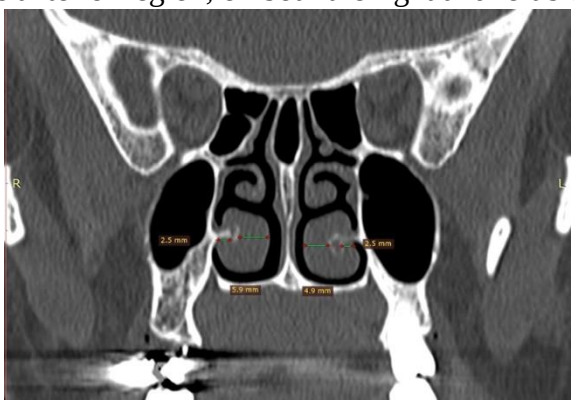

Figure 7. Coronal section – mucosal component of the inferior turbinate

Coronal computed tomography demonstrated the measurement of the medial and lateral non-bony (mucosal) components of the inferior turbinate in the posterior region, on both the right and left sides.

The nasal cavity airspace was evaluated by measurements performed between the anterior end of the inferior turbinate and the nasal septum, anterior to the appearance of the middle turbinate, and between the septum and the posterior end of the inferior turbinate at the level of the choana. Measurements were taken at the most medial point of the inferior turbinate, corresponding to the narrowest portion of the nasal airway (Figure 23). In addition, the anteroposterior length of the inferior turbinate was determined bilaterally using axial CT sections (Figure 24).

Coronal CT demonstrated the measurement of the airspace between the inferior turbinate and the septum at the anterior end (A) and posterior end (B) of the inferior turbinate. Axial CT demonstrated the measurement of the bilateral length of the inferior turbinate. All CT images were analyzed in separate sessions across all available planes, and mean values were calculated for each patient.

On the right side, the mean airspace between the posterior end of the inferior turbinate and the nasal septum was 3.43 ± 1.6 mm (range: 1.2–7.8 mm), with 40 inferior turbinates showing an airspace ≥ 4 mm. At the anterior end, the mean airspace was 2.1 ± 0.8 mm (range: 1.0–4.4 mm), with only 4 inferior turbinates presenting an airspace ≥ 4 mm. Statistical analysis revealed a significant difference between anterior and posterior airspace dimensions ($p < 0.0001$; $t = 7.4488$) (Table 23).

Correlation analysis showed a moderate positive correlation between medial mucosal thickness and bony width at the posterior end of the inferior turbinate ($R = 0.433$ left; $R = 0.573$ right), whereas at the anterior end the correlation was weak or absent. The length of the inferior turbinate ranged between 47.3–57.3 mm on the right (52.2 ± 3.4 mm) and 44.3–59.9 mm on the left (51.6 ± 4.1 mm), with no significant differences between sides ($p = 0.5781$).

Overall, CT evaluation demonstrates that inferior turbinate hypertrophy is predominantly determined by the medial mucosal component, with a marked reduction of the airspace, especially anteriorly, confirming the value of computed tomography in the objective diagnosis of RCH and in guiding the appropriate surgical strategy.

3.4. Histopathology of the hypertrophic inferior nasal turbinate

The histopathological analysis of the inferior nasal turbinate aimed to identify quantitative and qualitative differences between hypertrophic and normal inferior turbinates, being conducted as a prospective, morphometric, controlled study on a sample of 20 patients with chronic hypertrophic rhinitis and 14 control subjects. The results demonstrated that hypertrophic inferior turbinates were significantly larger in volume, with the main contribution attributed to the medial mucosal layer, which increased in thickness from 1.39 ± 0.28 mm to 2.53 ± 0.56 mm ($P \leq 0.001$), accounting for 64.4% of the total increase in width.

The thickening of the lateral mucosa had a smaller contribution (0.91 ± 0.26 mm vs 1.26 ± 0.31 mm), while the bony component did not show relevant changes. The lamina propria revealed a significant increase in inflammatory infiltrate and venous sinusoids across all layers of the hypertrophic mucosa, whereas the proportion of connective tissue, submucosal glands, and arteries remained relatively constant. Fibrosis of the lamina propria was identified in most hypertrophic samples, without evidence of tissue destruction.

These findings confirm the predominantly mucosal and inflammatory-vascular nature of inferior turbinate hypertrophy and highlight the importance of correlating histopathological data with surgical decision-making in order to achieve optimal functional outcomes [16, 18].

Table 6. Dimensions of hypertrophic and normal inferior turbinates

Patient group	Height		Width			
	Total	Inferior mucosal layer	Medial mucosal layer	Bone	Lateral mucosal layer	Total
Hypertrophic inferior turbinate (n=20)	7,82±1,53	1,98±0,72	2,53±0,56	1,40±0,44	1,26±0,31	5,19±0,60
Normal turbinate (n=14)	6,95±1,64	1,53±0,57	1,39±0,28	1,16±0,22	0,91±0,26	3,42±0,57
P value	.12	.06	≤.001┼	.05	.002	≤.001┼

Note: Except for P values, all data are presented as mean ± standard deviation (in millimeters). Measurements may not sum to totals due to rounding or incomplete data. † Statistical significance

Although their height was similar, the hypertrophic inferior turbinate was significantly wider than the normal inferior turbinate (Figure 8).

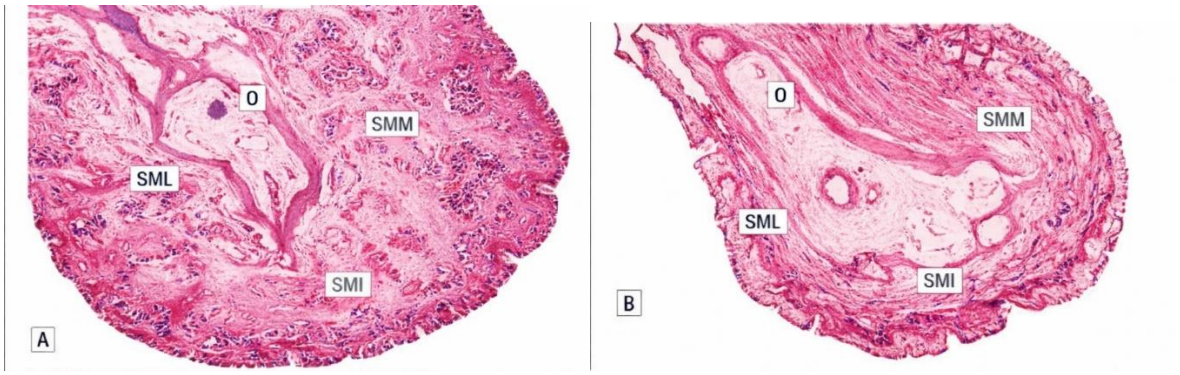

Figure 8. Histology of hypertrophic and normal inferior turbinates

Histological sections reveal clear dimensional differences between hypertrophic (A) and normal (B) inferior nasal turbinates (hematoxylin–eosin, original magnification ×20). In the image, B indicates the bony component, IML – inferior mucosal layer, LML – lateral mucosal layer, and MML – medial mucosal layer. Morphometric analysis demonstrated that the medial mucosal layer showed the greatest increase in thickness, from 1.39 ± 0.28 mm to 2.53 ± 0.56 mm ($P \leq 0.001$), contributing 64.4% to the total width of the hypertrophic inferior turbinate. The thickening of the lateral mucosa, from 0.91 ± 0.26 mm to 1.26 ± 0.31 mm, showed marginal statistical significance ($P = 0.002$) and accounted for 19.8% of the total increase, while the contribution of the bony component was minimal and not significant.

In the absence of relevant changes in the epithelium and basement membrane, the increase in turbinate width was predominantly determined by hypertrophic changes in the lamina propria. Further analysis revealed a significant enlargement of lamina propria regions containing subepithelial inflammatory infiltrate within the medial, lateral, and inferior mucosal layers in patients with inferior turbinate hypertrophy compared to controls ($P \leq 0.001$ for all comparisons). Similar changes were observed in the venous sinusoids of the medial and lateral mucosa, as well as in the submucosal glands of the medial mucosal layer.

Morphometric analysis of the relative proportion of soft tissue components showed that connective tissue represented the major component, followed by venous sinusoids, submucosal glands, epithelium, and arteries. While connective tissue, submucosal glands, and arteries did not show significant changes in patients with inferior turbinate hypertrophy, venous sinusoids were significantly enlarged across all aspects of the hypertrophic mucosa. The epithelial surface fraction of the normal inferior mucosa was also significantly greater than that of the hypertrophic mucosa.

Qualitative assessment. All hypertrophic inferior turbinates preserved the basic mucosal architecture, without evidence of tissue destruction. However, variable pathological changes were identified, ranging from isolated focal lesions to extensive areas, with uneven distribution among specimens. Similar to normal inferior turbinates, the epithelial layer consisted predominantly of pseudostratified columnar epithelium, composed of basally located cells, superficial ciliated and non-ciliated cells, and a significant number of goblet cells. Limited areas of squamous metaplastic epithelium were identified in only 2 specimens. At high magnification (×400), a thin layer of eosinophilic material of plasma origin was observed on the exposed basement membrane in some

hypertrophic samples. Lamina propria fibrosis was the most frequent histopathological finding, identified in 18 out of 20 samples (90%), affecting all aspects of the inferior turbinate, with predominance in the inferior mucosal layer (Figure 9).

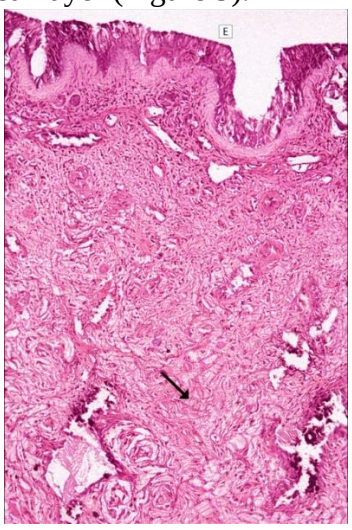

Figure 9. Fibrosis in the lamina propria of the hypertrophic inferior turbinate

The image shows a section of a hypertrophic inferior turbinate demonstrating fibrosis (arrow) of the lamina propria (hematoxylin–eosin, original magnification ×100). E indicates the epithelium. In some specimens, fibrosis was distributed throughout the entire lamina propria, while in others it was limited to the superficial zone near the epithelium [25].

A marked subepithelial inflammatory cell infiltrate, consisting of a mixture of lymphocytes, macrophages, plasma cells, and eosinophils, was present in approximately two-thirds of the samples (13/20; 65%), while dilated and congested thin-walled venous sinusoids were observed in 3 cases (15%). Neither edema nor dilated excretory glandular ducts were identified in any of the specimens [10].

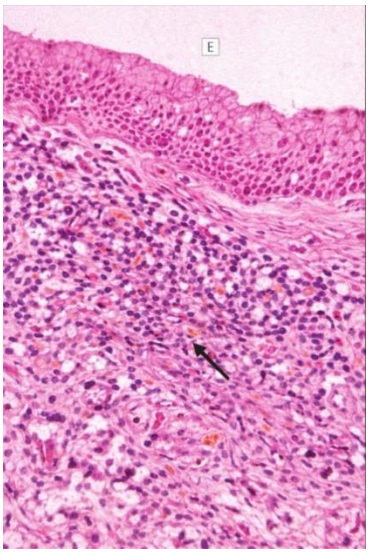

Figure 10. Subepithelial inflammatory infiltrate in the hypertrophic inferior turbinate

Figure 10 shows a section from a patient with a hypertrophic inferior turbinate, demonstrating a marked subepithelial inflammatory cell infiltrate beneath the basement membrane (arrow), composed of a mixture of lymphocytes, macrophages, plasma cells, and eosinophils (hematoxylin–eosin, original magnification ×200). E indicates the epithelium.

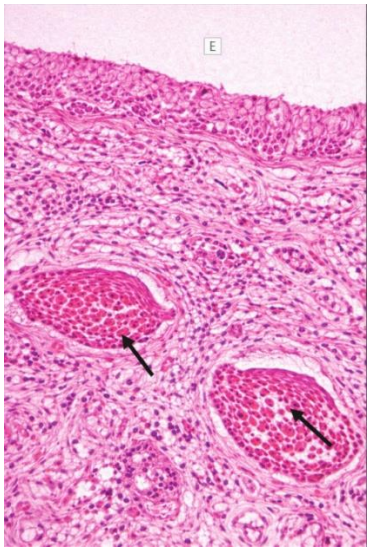

Figure 11. Dilatation of venous sinusoids in the hypertrophic inferior turbinate

Figure 11 shows a section from a patient with a hypertrophic inferior turbinate, demonstrating dilated and congested thin-walled venous sinusoids (arrows) (hematoxylin–eosin, original magnification ×100). E indicates the epithelium. A qualitative assessment of the 14 normal inferior turbinates revealed dilated venous sinusoids in one specimen. No other pathological changes were identified.

4. EFFICIENCY OF SURGICAL TREATMENT IN PATIENTS WITH CHRONIC HYPERTROPHIC RHINITIS

4.1. Assessment of quality of life in patients with CHR using the SNOT-22 and NOSE questionnaires

Chronic hypertrophic rhinitis significantly impairs the quality of life in children, as reflected by high preoperative scores on the SNOT-22 and NOSE questionnaires. Preoperative evaluation revealed SNOT-22 scores predominantly ranging between 76–83 points, with maximum values up to 86 points, indicating moderate to severe symptoms. NOSE scores ranged between 60–90 points, confirming severe nasal obstruction. The most frequently reported symptoms included nasal obstruction, hyposmia, facial pain/pressure, and sleep disturbances. The use of standardized SNOT-22 and NOSE questionnaires allowed for an objective and reproducible assessment of the impact of CHR on quality of life and served as a useful tool for quantifying disease severity and monitoring treatment effectiveness.

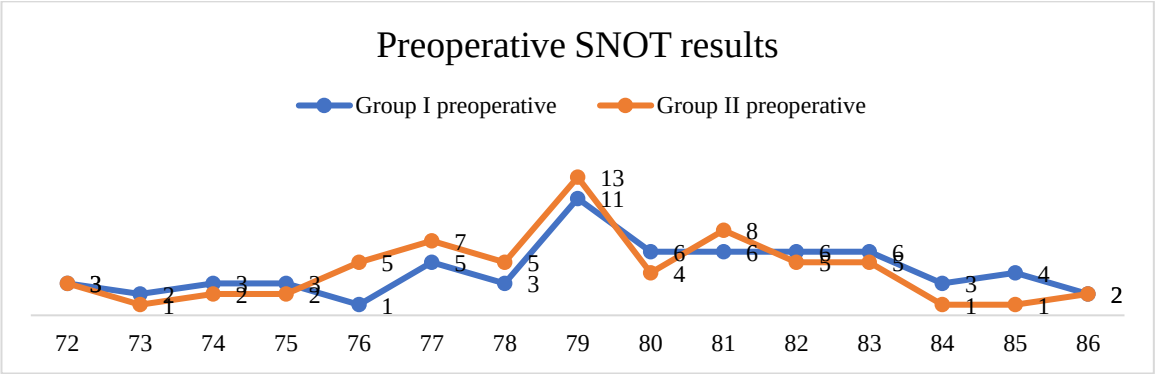

Figure 12. Comparative preoperative SNOT results between groups

The analysis of total scores and symptom severity revealed a significant concordance between Group I and Group II in the preoperative period. Both groups showed a similar distribution of SNOT scores, predominantly concentrated in the range of 76–83 points, corresponding to moderate to severe symptom severity. The most frequent clinical manifestations identified in both groups were nasal obstruction, facial pain or pressure, and decreased sense of smell and taste, reflecting the characteristic clinical picture of chronic hypertrophic rhinitis in children and its significant impact on quality of life [11].

In the postoperative period, SNOT scores decreased considerably in both groups, indicating a significant improvement in quality of life as a result of volumetric reduction of the inferior nasal turbinates and restoration of nasal patency. Symptoms shifted predominantly from moderate and severe categories toward absence of symptoms or mild manifestations, confirming the effectiveness of the surgical treatment applied in both study groups.

Analysis of the data shows that postoperative scores in Group II are generally lower than those in Group I, indicating a more pronounced improvement of symptoms following diode laser surgery.

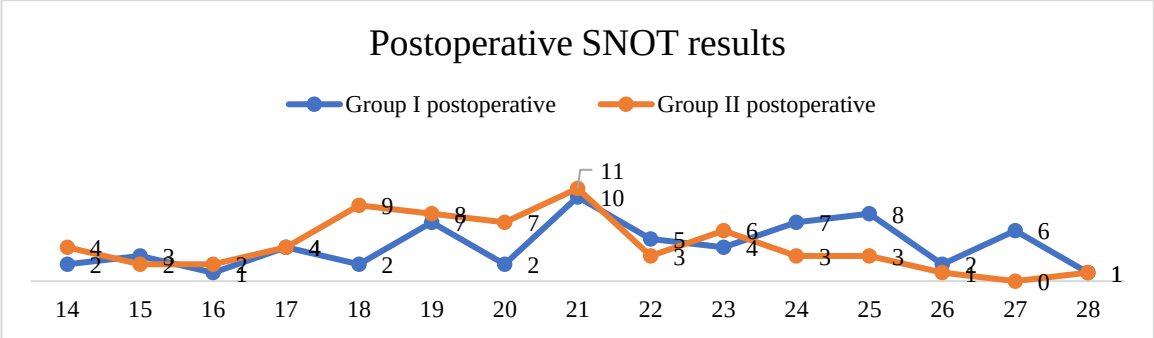

Figure 13. Comparative postoperative SNOT results between groups

The comparison of preoperative and postoperative scores revealed a more pronounced reduction in symptom severity in Group II, treated with diode laser, compared to Group I, treated with bipolar cauterization, confirming the superior effectiveness of this technique. In Group I, postoperative evolution was favorable in 100% of patients (64/64); however, 62 patients (96.9%) required nasal packing, and complications were recorded in 27 cases (42.2%), consisting of bleeding, local pain, and nasal crust formation.

In Group II, postoperative evolution was favorable in 100% of cases, without the need for nasal packing, and complications were minimal, identified in only 3 cases (4.7%), including 1 case of delayed postoperative bleeding and 2 cases of nasal crust formation, with rapid resolution. In both groups, all patients reported improvement in nasal breathing and restoration of olfaction; however, recovery was faster and more uniform in Group II.

The evaluation of nasal obstruction using the NOSE questionnaire showed high preoperative scores in both groups, ranging between 60–90 points, with most cases concentrated in the 75–85 range, indicating moderate to severe symptoms. The distribution of scores was similar between the two groups, confirming the significant impact of nasal obstruction on the quality of life of children with chronic hypertrophic rhinitis prior to surgical intervention.

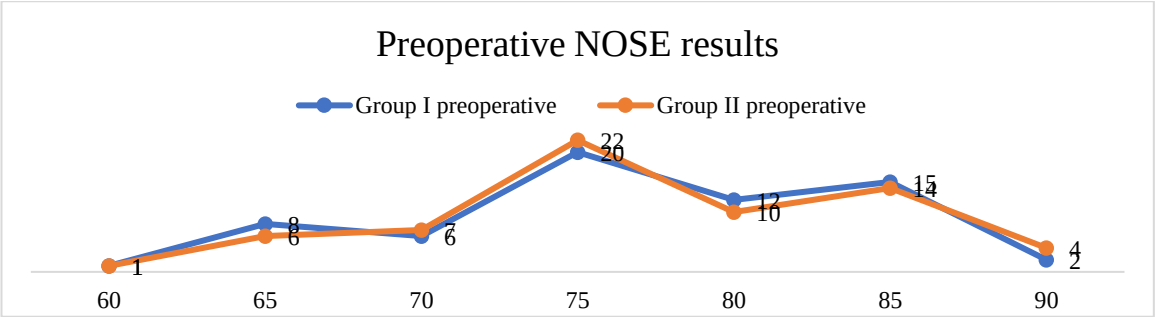

Figure 14. Comparative preoperative NOSE results between groups

Thus, both groups presented high total preoperative scores, highlighting the significant impact of nasal obstruction on patients, with no significant differences between the two groups regarding symptom severity before surgical treatment. Postoperatively, in Group I, treated by bipolar cauterization of the inferior nasal turbinates, a clear improvement in symptoms was observed, reflected by a reduction in nasal congestion and obstruction, as well as improved nasal breathing and sleep quality.

In Group II, treated with diode laser, postoperative symptom improvement was more pronounced and more uniform, with most patients reporting a significant reduction in nasal congestion and obstruction, and only minimal residual symptoms. Comparatively, the more favorable clinical evolution in Group II suggests the superior effectiveness of diode laser surgery in alleviating nasal obstruction symptoms in children with chronic hypertrophic rhinitis.

In light of the presented data and arguments, the conclusion regarding the superior efficacy of diode laser treatment compared to bipolar cauterization in children with chronic hypertrophic rhinitis is evident.

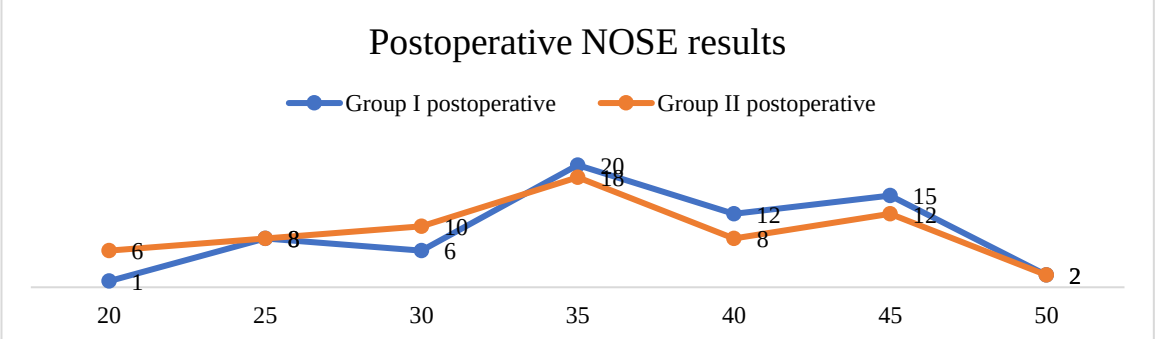

Figure 15. Comparative postoperative NOSE results between groups

Several factors support the superiority of diode laser treatment in this condition. Firstly, the diode laser provides greater precision in tissue treatment, reducing the risk of damage to adjacent healthy tissues and contributing to faster and less painful recovery in children. Secondly, it allows better intraoperative bleeding control, thereby decreasing the risk of postoperative hemorrhagic complications.

Furthermore, the diode laser enables a more selective therapeutic approach, leading to more precise and consistent outcomes compared to bipolar cauterization, which may be more difficult to control and associated with variable results. Additionally, the diode laser promotes tissue healing and regeneration, contributing to faster recovery and a lower risk of postoperative complications.

Overall, postoperative results indicate significant improvement in nasal breathing and reduction of symptoms in both surgical approaches; however, recovery and the absence of complications were more rapid and more evident in the diode laser group.

Based on these findings, diode laser surgery can be considered a more effective and safer option for the treatment of chronic hypertrophic rhinitis in children compared to bipolar cauterization of the inferior nasal turbinates.

4.2. Current advances in the therapeutic management of CHR in children

One of the most relevant outcomes of the present research is the development and approval of the National Clinical Protocol PCN-431 "Chronic Hypertrophic Rhinitis in Children", approved by Order of the Ministry of Health No. 429 of 15.05.2024, which provides a standardized framework for the diagnosis, treatment, and monitoring of this condition [22]. The protocol was developed by the Ministry of Health working group, with the participation of specialists from the Department of Otorhinolaryngology of "Nicolae Testemițanu" State University of Medicine and Pharmacy, in accordance with current international guidelines, and serves as a basis for the development of institutional protocols at the national level.

PCN-431 is intended for family physicians, otorhinolaryngologists, pediatricians, and surgeons from district, municipal, and republican medical institutions, with the main objective of improving the quality of diagnosis and treatment of chronic hypertrophic rhinitis in children, reducing the risk of complications, and enhancing patients' quality of life. The protocol clearly defines the clinico-morphological forms of chronic hypertrophic rhinitis, etiological and risk factors, criteria for differential diagnosis, and the mandatory stages of medical management, from prevention and screening to conservative or surgical treatment and post-therapeutic follow-up.

Particular emphasis is placed on early diagnosis, achieved through medical history assessment, clinical ENT examination, and paraclinical and imaging investigations, as well as on the rational selection of therapeutic strategy depending on the stage of hypertrophy and response to treatment. The protocol recommends conservative treatment as the first-line option in early stages and establishes clear indications for surgical intervention in refractory cases. It also describes preoperative and postoperative management, criteria for hospitalization and discharge, long-term monitoring, and the coordinated role of the family physician and the ENT specialist.

Through its comprehensive structure, PCN-431 provides a practical and applicable tool, contributing to the standardization of medical practice, optimization of clinical decision-making, and improvement of the management of chronic hypertrophic rhinitis in children within the healthcare system of the Republic of Moldova.

GENERAL CONCLUSIONS AND PRACTICAL RECOMMENDATIONS

1. The study of the clinical-functional characteristics of the nasal cavity in children with chronic hypertrophic rhinitis revealed significant alterations in nasal airflow and resistance, caused by hypertrophy of the inferior nasal turbinates, as confirmed by objective functional evaluation methods applied pre- and postoperatively.

2. Modern diagnostic methods, particularly nasal endoscopy and computed tomography, have demonstrated their utility in assessing anatomical and structural changes of the nasal cavity in children with chronic hypertrophic rhinitis, contributing to accurate diagnosis and appropriate therapeutic decision-making.

3. Surgical treatment of chronic hypertrophic rhinitis in children, through volumetric reduction of the inferior nasal turbinates, leads to significant improvement in nasal patency and functional respiratory parameters in the postoperative period.

4. Minimally invasive surgical intervention using diode laser has been associated with favorable functional outcomes and a significant reduction in nasal obstruction symptoms, representing an effective method in the management of chronic hypertrophic rhinitis in children.

5. Based on the clinical, functional, and imaging results obtained, a diagnostic and treatment algorithm for chronic hypertrophic rhinitis in children was developed, contributing to optimization of the diagnostic process and standardization of therapeutic management in pediatric otorhinolaryngology practice.

The research hypothesis was confirmed, demonstrating that the integration of modern functional and imaging diagnostic methods with minimally invasive surgical techniques leads to significant and sustained improvement in nasal patency and quality of life in children with chronic hypertrophic rhinitis. Diode laser surgery proved superior to bipolar coagulation due to its precision, reduced tissue trauma, and favorable functional recovery.

The scientific problem was solved by developing and validating a standardized model for objective diagnosis and optimized therapeutic management, based on functional and imaging investigations and the implementation of diode laser surgery, materialized into a therapeutic algorithm applicable in pediatric ENT practice.

The most important results and innovations with practical value include:

1. Translation and adaptation of the SNOT-22 and NOSE questionnaires for pediatric chronic hypertrophic rhinitis, providing specific tools for symptom evaluation and assessment of disease impact in this age group.

2. Development and approval of the National Clinical Protocol (PCN) for chronic hypertrophic rhinitis in children, establishing clear standards for diagnosis and treatment and improving the quality of medical care.

3. Creation of a standardized diagnostic and therapeutic algorithm for pediatric CHR, contributing to uniform medical practice and precise clinical decision-making.

4. Development of a methodological guide for practical implementation in medical and educational activities within the Department of Otorhinolaryngology of "Nicolae Testemițanu" State University of Medicine and Pharmacy, ensuring an updated and coherent framework for continuous professional development.

5. Establishment of a medical standard for pediatric CHR, providing structured criteria for diagnosis, treatment, and monitoring in accordance with recent scientific evidence and international guidelines.

Based on the above, the author proposes the following practical recommendations:

1. Implementation of SNOT-22 and NOSE questionnaires, translated and adapted for pediatric CHR, for evaluating symptoms and disease impact.
2. Use of the National Clinical Protocol (PCN) for CHR in children by specialists, ensuring standardized and updated diagnostic and therapeutic approaches.
3. Application of the standardized diagnostic and therapeutic algorithm to ensure uniform and efficient disease management across all medical centers.
4. Implementation of the developed methodological guide to support clinical practice and academic activity.
5. Adoption of the medical standard for pediatric CHR to ensure consistent diagnosis, treatment, and monitoring.
6. Development of continuous training programs for family physicians, pediatricians, and ENT specialists to improve competencies in CHR management.
7. Creation of an informational guide approved by the Ministry of Health for parents and children regarding disease management.
8. Promotion of prevention and screening programs in primary healthcare for early detection of CHR.
9. Development of an Institutional Clinical Protocol for surgical management within the Pediatric Otorhinolaryngology Department of the “Emilian Coțaga” Clinic.
10. Publication of a comprehensive scientific-methodological work on this pathology.
11. The implementation of these recommendations will contribute to more efficient management of chronic hypertrophic rhinitis in children in the Republic of Moldova, improving both health outcomes and quality of life.

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LIST OF PUBLICATIONS AND SCIENTIFIC EVENTS

where the research results related to the doctoral thesis were presented

Doctoral thesis in medical sciences

entitled: ***"Diagnostic and surgical management in chronic hypertrophic rhinitis in children"***

conducted within the Department of Otorhinolaryngology, "Emilian Coțaga" Clinic,
Doctoral Program 321.16 Otorhinolaryngology,
Nicolae Testemițanu State University of Medicine and Pharmacy,
by **Daniel Furculița**

Scientific-didactic works:

1. *Chronic hypertrophic rhinitis: Methodological guide.* Authors: Maniuc M., Danilov L., Ababii P., Diacova S., Furculița D. Ministry of Health of the Republic of Moldova, USMF Nicolae Testemițanu, Department of Otorhinolaryngology – Chișinău: CEP Medicina, 2024, 46 p. Available at: https://ibn.idsi.md/ro/book_view/1393 [accessed 17.07.2025]

Article published in an international collective scientific monograph:

2. Furculița D. et al. *Scientific space: integration of traditional and innovative processes.* Scientific monograph. Riga, Latvia: Baltija Publishing; 2023, 600 p. ISBN 978-9934-26-310-1 http://baltijapublishing.lv/omp/index.php/bp/catalog/view/332/9282/19370-1

Articles in scientific journals abroad:

✓ **Articles in ISI, SCOPUS and other international databases**

3. Furculița D., Maniuc M., Danilov L., Ababii P. Clinical and symptomatological particularities in pediatric patients diagnosed with chronic hypertrophic rhinitis. *Ukrainian Scientific Medical Youth Journal.* 2025, 157 (3), pp. 111-119. ISSN 2786-6661 (print), ISSN 2786-667X (online). DOI: https://doi.org/10.32345/USMYJ.3(157).2025.111-119

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Articles in scientific conference proceedings:

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10. Furculița D. Modern surgical techniques for hypertrophy of the inferior nasal turbinates. International Scientific Conference: *Modern Science: globalization and transformation process.* Riga, Latvia, Baltija Publishing, 21–22.04.2023, pp. 5-8. ISBN 978-9934-26-309-5. DOI: https://doi.org/10.30525/978-9934-26-309-5-2

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Patents and innovation certificates:

28. Furculița D., Maniuc M. *Standardized algorithm for the diagnostic and therapeutic management of chronic hypertrophic rhinitis in children.* Innovator Certificate no. 6035 and 518 dated 28.04.2023, within the "Nicolae Testemițanu" State University of Medicine and Pharmacy and the Mother and Child Institute (IMSP IMC).

29. Furculița D., Maniuc M. *Application of the diagnostic evaluation questionnaire for chronic hypertrophic rhinitis in children.* Innovator Certificate no. 6039 and 519 dated 28.04.2023, within the "Nicolae Testemițanu" State University of Medicine and Pharmacy and the Mother and Child Institute (IMSP IMC).

30. Furculița D., Maniuc M. *Efficiency of using the Sinonasal Outcome Test (SNOT-22) in assessing the quality of life in patients with chronic hypertrophic rhinitis.* Innovator Certificate no. 6040 and 520 dated 28.04.2023, within the "Nicolae Testemițanu" State University of Medicine and Pharmacy and the Mother and Child Institute (IMSP IMC).

Presentations at scientific forums:

✓ **International:**

31. Furculița D. *Modern surgical techniques for hypertrophy of the inferior nasal turbinates.* International Scientific Conference: *Modern Science: globalization and transformation process.* Riga, Latvia, 21–22.04.2023

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33. Furculița D. *Analysis of the effectiveness of surgical intervention methods in patients with chronic hypertrophic rhinitis.* National Congress of Otorhinolaryngology and Cervico-Facial Surgery with international participation. Bucharest, Romania, 11–13.11.2020

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✓ **National:**

35. Furculița D. *Impact of chronic hypertrophic rhinitis on the quality of life of children.* International Congress of Pediatrics, 8th edition, 6–8 June 2024, Chișinău, Republic of Moldova

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39. Furculița D. *Laser surgery in chronic hypertrophic rhinitis in children.* Congress dedicated to the 75th anniversary of USMF "Nicolae Testemițanu". Chișinău, Republic of Moldova, 21–23.10.2020

Participation in scientific projects:

1. National state scientific project *"Nanoarchitectures based on GaN and three-dimensional matrices from biological materials for applications in microfluidics and tissue engineering"*, project code 20.80009.5007.20, during 2020–2023, as scientific researcher;

2. National state scientific project *"ForceMed – Strengthening education through research in medicine within USMF Nicolae Testemițanu"*, research subprogram: *Application of cellular therapy in postoperative rehabilitation of children with chronic hypertrophic rhinitis*, during 2024–2027, as scientific researcher.

National clinical protocols:

1. PCN – 431 *Chronic hypertrophic rhinitis in children.* Approved at the meeting of the Council of Experts of the Ministry of Health of the Republic of Moldova on 24.04.2024, minutes no. 1. Approved by Order of the Ministry of Health of the Republic of Moldova no. 429 of 15.05.2024 regarding the approval of the National Clinical Protocol *"Chronic hypertrophic rhinitis in children."* Authors: Maniuc M., Furculița D., Danilov L., Ababii P. https://ms.gov.md/wp-content/uploads/2024/05/Protocolul-clinic-na%C8%9Bional-%E2%80%9ERinita-cronic%C4%83-hipertrofic%C4%83-la-copil%E2%80%9D-aprobat-prin-Ordinul-MS-nr.-429-din-15.05.2024.pdf

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ANNOTATION

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„Diagnostic and surgical management of chronic hypertrophic rhinitis in children”

Doctoral thesis in medical sciences, Chisinau 2026

Structure of the thesis. The research is presented over 115 pages of main content and includes an introduction, four chapters, general conclusions, practical recommendations, and a bibliography comprising 183 references. The thesis contains 34 figures, 29 tables, and 10 appendices. The obtained results were disseminated and published in 35 scientific works, including one chapter in an international collective scientific volume, one article in an international journal indexed in SCOPUS, and four articles in international journals indexed in other international databases, ten single-author publications, one publication in nationally peer-reviewed editions, and nine participations with oral communications or posters at national and international scientific conferences. Additionally, the work resulted in six innovator certificates and six implementation acts, two participations in international research projects, and the development of a National Clinical Protocol (NCP).

Keywords: chronic hypertrophic rhinitis, nasal turbinate hypertrophy, inferior nasal turbinates, nasal obstruction, acoustic rhinometry, rhinomanometry, cauterization, diode laser.

The aim of the study is to evaluate the clinical-functional and morphological characteristics of the nasal cavity in children diagnosed with chronic hypertrophic rhinitis and to assess the effectiveness of the surgical methods used in the treatment of this pathology, in order to optimize the diagnostic process and therapeutic management.

To achieve this aim, the following **general objectives** of the thesis were established: evaluation of the physiological nasal functions (nasal resistance and nasal cavity permeability) and the morphological features of the inferior nasal turbinates in children with chronic hypertrophic rhinitis in the pre- and postoperative periods; analysis of the usefulness of modern diagnostic methods (nasal endoscopy and computed tomography) in assessing structural changes of the nasal cavity in the patients included in the study; comparison of the effectiveness of surgical methods used in the treatment of chronic hypertrophic rhinitis in children by evaluating the outcomes after bipolar cauterization and diode laser surgery; assessment of the impact of surgical treatment on patients’ quality of life through standardized questionnaires for symptom and nasal function evaluation; and development of a diagnostic and treatment algorithm for the management of chronic hypertrophic rhinitis in children, based on the clinical and functional results obtained in the study.

The scientific novelty and originality of the research lie in the introduction, for the first time in the Republic of Moldova, of a comparative evaluation of the effectiveness of diode laser surgery in the treatment of chronic hypertrophic rhinitis in children, the adaptation and application of quality-of-life assessment tools (SNOT-22/NOSE) for the pediatric population with this pathology, and the development of a standardized diagnostic and treatment algorithm, with a direct impact on the standardization of clinical practice and improvement of patient care in chronic hypertrophic rhinitis.

The practical value of the study is demonstrated by the development of a National Clinical Protocol for chronic hypertrophic rhinitis in children and a methodological guide (including an evaluation questionnaire annex), the practical validation of results through six innovator certificates (three from USMF and three from IMSP IM and C) and six implementation acts (three in the scientific-didactic/practical process at USMF and three in clinical practice at IMSP IM and C), as well as by substantiating a medical standard for the diagnosis and treatment of pediatric chronic hypertrophic rhinitis.

The applicability and international relevance of the results are also supported by the author’s participation in two international research projects during the course of the study, one of which is currently ongoing, developed through scientific and academic collaboration within the Otorhinolaryngology Laboratory, Research Unit 080201 Personalized Medicine at Nicolae Testemițanu State University of Medicine and Pharmacy.