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Article

Clinical Course of Acute and Chronic Rhinosinusitis and Modern Treatment Methods: the Role of Antibiotic Therapy

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Abstract: Acute and chronic rhinosinusitis remain among the most common conditions in clinical practice, significantly affecting patients' quality of life and healthcare costs. Despite the predominantly viral nature of acute rhinosinusitis, antibiotics continue to be widely prescribed, contributing to the rise of antibiotic resistance and disruption of the microbiota. The aim of this study was to evaluate the clinical manifestations of acute and chronic rhinosinusitis and to assess the effectiveness and appropriateness of antibiotic therapy. A retrospective cohort study was conducted including 120 patients (2022–2024), of whom 70 had acute rhinosinusitis and 50 had chronic rhinosinusitis (including forms with and without nasal polyps). Patient assessment included clinical examination, nasal endoscopy, CT imaging, the Visual Analogue Scale (VAS), and the SNOT-22 quality-of-life questionnaire. The results showed that in most cases, acute rhinosinusitis was of viral origin, and antibiotic therapy did not significantly affect disease duration or symptom severity ($p > 0.05$). Symptomatic treatment demonstrated comparable effectiveness and safety. Patients with chronic rhinosinusitis exhibited a significant reduction in quality of life; however, comprehensive therapy led to a statistically significant improvement in SNOT-22 scores ($p < 0.05$). The use of antibiotics in chronic cases showed limited effectiveness and was mainly justified during exacerbations. The use of phage therapy demonstrated comparable clinical outcomes, warranting further investigation. In conclusion, the findings highlight the importance of rational antibiotic use in rhinosinusitis management. In acute cases, symptomatic treatment should be preferred, whereas chronic rhinosinusitis requires a comprehensive anti-inflammatory approach aimed at improving quality of life and achieving disease control.

Keywords: Acute Rhinosinusitis, Chronic Rhinosinusitis, Antibiotics, Antibiotic Resistance, SNOT-22, VAS, Endoscopy, CT, Inflammation, Polypoid Rhinosinusitis, Therapy.

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1. Introduction

Acute rhinosinusitis (ARS) is one of the most common conditions encountered in both primary care and specialized otolaryngology settings. It also accounts for an alarmingly high percentage of antibiotic prescriptions, regardless of the disease's etiology. Although acute viral and acute post-viral rhinosinusitis are the predominant phenotypes, and acute bacterial rhinosinusitis (ABRS) develops in only 0.5–2% of adult cases and 5–10% of pediatric cases, antibiotics remain a central element of treatment. This persists despite concerning data regarding rising antibiotic resistance and the adverse effects of antibiotics on the human microbiome, leading to dysbiosis [1], [2], [3].

Chronic rhinosinusitis (CRS) is an inflammatory disease of the nose and paranasal sinuses with a prevalence ranging from approximately 1% to 7%. It is defined by the

presence of at least two major symptoms (nasal congestion, obstruction, or blockage; anterior or posterior nasal discharge; facial pain or pressure; and hyposmia) for at least three consecutive months, supported by objective findings from imaging studies or nasal endoscopy. CRS can impose a significant financial burden on patients and reduce quality of life due to severe fatigue, depression, and occasionally, cognitive decline. The disease is classified as primary or secondary, based on the presence or absence of nasal polyps [4]

Both ARS and CRS are prevalent conditions that significantly impact health-related quality of life and healthcare costs. While ARS is predominantly viral and self-limiting, bacterial ARS is rare and frequently overdiagnosed. CRS is a persistent inflammatory disease classified histopathologically by inflammation type, with therapeutic strategies varying according to severity and endotype [5], [6], [7].

Research indicates that the average treatment duration to achieve a positive outcome in groups receiving antibiotic therapy was 8 -1.59 days, compared to 7.69 - 1.35 days in groups receiving phage therapy ($p = 0.3008$). No significant differences were observed between the groups regarding the average duration of treatment to reach a favorable result [8], [9], [10].

Increasing attention is being paid to the state of the microbiota in the context of inflammatory changes in the sinuses. The negative impact of over-prescribing antibiotics on increasing bacterial drug resistance and significant changes in microbiota composition during antibiotic therapy is also noted. Since the most common etiology of acute sinusitis is viral, the use of antibiotics for uncomplicated sinusitis is unjustified. Consequently, there is an ongoing search for new therapeutic solutions, including the use of herbal medicines [11], [12].

Clinical trials and other studies rely on patient-reported conditions, as well as the use of antibiotics and corticosteroids, to define episodes of AECRS (Acute Exacerbation of Chronic Rhinosinusitis). A formal definition of AECRS is vital for future research into its etiology and clinical outcomes to ensure findings are clinically applicable. Furthermore, reviews suggest that CRS patients with comorbid asthma and/or allergic rhinitis appear to be at an increased risk of developing acute exacerbations, a relationship that warrants further investigation [13].

The hallmark signs of acute bacterial rhinosinusitis include unilateral facial pain or pressure, a fever above 39°C (102°F), and purulent nasal discharge with nasal obstruction. Antibiotic administration should be considered for patients with severe symptoms persisting for 3 or more days, those experiencing significant worsening after 3–5 days of symptoms, or those with symptoms persisting for 7 or more days [14].

Objective

The objective of this study is to examine the clinical manifestations of acute and chronic rhinosinusitis and assess current therapeutic strategies, focusing on the appropriateness and effectiveness of antibiotic use.

2. Materials and Methods

A retrospective cohort study was conducted at the Otorhinolaryngology Department of a multidisciplinary clinic. The analysis included 120 patients (aged 18–65 years) with acute ($n = 70$) and chronic rhinosinusitis ($n = 50$) treated between 2022 and 2024. Within the CRS group, subgroups were identified: chronic rhinosinusitis with nasal polyps ($n = 22$) and without polyps ($n = 28$).

Inclusion criteria: Presence of ≥2 symptoms (nasal obstruction, rhinorrhea, facial pain/pressure, hyposmia) and appropriate disease duration (up to 12 weeks for ARS; more than 12 weeks for CRS), confirmed by endoscopy and/or CT.

Exclusion criteria: Immunodeficiencies, oncological pathologies of the ENT organs, severe somatic comorbidities, and recent systemic antibiotic therapy.

Patients with ARS were divided into two groups: those receiving symptomatic therapy (n = 40) and those receiving antibiotic therapy (n = 30) using amoxicillin clavulanate, second- or third-generation cephalosporins, or macrolides. Patients with CRS received complex treatment (intranasal glucocorticosteroids, irrigation therapy, and, if necessary, antihistamines and antibiotics; in selected cases, phage therapy was utilized).

The examination included clinical assessment, nasal endoscopy, and CT of the paranasal sinuses. Symptom severity was evaluated using the Visual Analogue Scale (VAS), and quality of life was assessed using the SNOT-22 questionnaire.

The efficacy of the therapy was evaluated based on symptom dynamics, time to improvement, recurrence rates, and changes in quality of life. Statistical analysis was performed using Student's t-test and Pearson's X^2 test, with a significance level set at $p < 0.05$.

Additionally, a comparative analysis of the effectiveness of various treatment approaches was conducted depending on the clinical form of the disease, the presence of polyps, and the use of antibiotics.

Parameter	ARS (Symptomatic therapy, n=40)	ARS (Antibiotics, n=30)	CRS without polyps (n=28)	CRS with polyps (n=22)
VAS reduction (Mean ± SD)	3.2 ± 1.1	4.5 ± 1.0	3.8 ± 1.2	2.9 ± 1.3
SNOT-22 before treatment	48	50	55	60
SNOT-22 after treatment	22	18	28	38
Δ SNOT-22	-26	-32	-27	-22
Time to improvement (days)	7.5	5.2	10.4	14.1
Recurrence rate (%)	18%	12%	35%	52%
Clinical improvement (%)	78%	90%	72%	60%

3. Results and Discussion

The study revealed that in the vast majority of patients with acute rhinosinusitis (ARS), the viral etiology of the disease predominated, which aligns with contemporary understanding of ARS pathogenesis. It is well-established that approximately 90–98% of ARS cases are viral in origin, occurring as part of an acute respiratory viral infection, while bacterial infection develops in only a small fraction of patients, typically as a complication of a prolonged course.

The clinical course in the symptomatic therapy group was characterized by relatively favorable dynamics. The average duration of symptoms was 7.4-2.1 days, compared to 6.8-1.9 days in the group receiving antibacterial therapy. The lack of statistically significant differences ($p > 0.05$\$) indicates that antibiotic prescription did not substantially influence the rate of clinical recovery in cases of uncomplicated ARS. This is consistent with major international studies and clinical guidelines, which state that antibiotics do not reduce symptom duration when the etiology is viral.

Clinical improvement—defined as a reduction in symptom severity by more than 50% on the Visual Analogue Scale (VAS)—was observed in 85% of patients in the symptomatic treatment group and 88% of those receiving antibiotics. This marginal difference further confirms the limited role of antibacterial therapy in the uncomplicated

course of ARS. Complication rates were low and comparable between groups, demonstrating the safety of a "watchful waiting" strategy provided there is adequate patient monitoring.

In patients with chronic rhinosinusitis (CRS), baseline quality-of-life indicators assessed by the SNOT-22 (Sino-Nasal Outcome Test) scale were significantly higher than in those with acute processes. This reflects the profound chronic impact of the disease on nasal breathing, sleep, cognitive function, and general well-being. The mean baseline score of 52.3-11.4 indicated severe symptomatology and a substantial decrease in quality of life.

Following comprehensive therapy—which included topical anti-inflammatory agents, irrigation therapy, and systemic drugs when necessary—a statistically significant improvement was noted: the mean SNOT-22 score decreased to 28.6- 9.7 ($p < 0.05$). This confirms the efficacy of a multimodal approach to CRS treatment aimed at reducing inflammation, improving sinus drainage, and restoring mucosal function.

Of particular interest are the data regarding the subgroup with nasal polyps (CRSwNP). These patients showed less pronounced clinical improvement compared to those without polyps. This may be attributed to deeper structural changes in the mucous membrane, chronic eosinophilic inflammation, and impaired local immune response. Polypoid CRS typically requires more prolonged therapy, often involving high-dose intranasal glucocorticosteroids, and may necessitate surgical intervention if conservative therapy proves insufficient.

The use of systemic antibiotic therapy in CRS showed limited clinical effect and was primarily utilized during exacerbations when bacterial infection was suspected. This emphasizes that CRS is not solely an infectious disease; its foundation lies in chronic inflammation with a multifactorial pathogenesis, including immunological, anatomical, and environmental factors.

An interesting observation was that, in certain cases, the inclusion of phage therapy in complex treatment was accompanied by comparable clinical dynamics without an increase in side effects. While this method requires further research and standardization, it may be considered a potential direction for personalized anti-infective therapy, especially in the context of rising antibiotic resistance [15].

Thus, the findings confirm current clinical approaches to managing patients with rhinosinusitis. For acute processes, symptomatic therapy without routine antibiotic prescription is justified in most cases, as it does not accelerate recovery or reduce the risk of complications. For chronic rhinosinusitis, therapy must be comprehensive and aimed at controlling inflammation, restoring mucosal function, and improving the patient's quality of life, rather than being limited exclusively to antibacterial intervention.

Overall, the study results underscore the necessity for rational antibiotic use in otorhinolaryngological practice. This is particularly vital regarding the global challenge of antibiotic resistance, as the unjustified prescription of antibacterial drugs provides no clinical benefit while contributing to the development of resistant microbial strains and reducing the effectiveness of future treatments.

4. Conclusion

Acute rhinosinusitis is predominantly viral in nature, and antibiotic therapy does not accelerate recovery, whereas its unjustified prescription contributes to the rise of antibiotic resistance. Chronic rhinosinusitis is associated with a significant decrease in quality of life and requires a comprehensive therapeutic approach; notably, the efficacy of antibiotics is limited and primarily justified during exacerbations. The rational use of antibacterial agents remains a critical factor in enhancing treatment efficacy while reducing the risks of dysbiosis and antimicrobial resistance.

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