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Research Article

Nasal Irrigation for the Treatment of Acute Sinusitis: Clinical Implications in Otorhinolaryngology

Running Title: *Nasal Irrigation from an ENT's Point of View*

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Abstract

Background: Acute or exacerbated chronic rhinosinusitis are among the most common causes of medical consultation worldwide. Nasal irrigation has emerged as a simple and effective strategy to treat these pathologies.

Objective: To evaluate the role of nasal irrigation in the treatment of acute rhinosinusitis and its clinical applications in otorhinolaryngology.

Methods: I conducted a prospective observational study to assess the course of 63 adult patients with acute or exacerbated chronic rhinosinusitis, with the purpose of validating the use of nasal irrigation for the treatment of rhinosinusitis.

Results: All age groups, even divided by gender, showed a significant improvement in symptoms as nasal congestion, mucus viscosity and nasal irritation.

Conclusions: Nasal irrigation is a safe and effective therapy for the treatment of acute or exacerbated chronic rhinosinusitis. Its regular use should be encouraged, particularly from general practitioners, pediatricians and ENT specialists.

Keywords: Nasal irrigation; upper respiratory tract infections; rhinosinusitis; prevention; otorhinolaryngology; saline solution

Introduction

Upper respiratory tract infections (URTIs) represent a major global health burden, affecting both pediatric and adult populations. The nasal mucosa constitutes the first line of defense against inhaled pathogens through a complex system known as mucociliary clearance.

Impairment of this system, due to infections, especially viral ones, allergens, pollutants, or anatomical abnormalities, facilitates microbial colonization and increases susceptibility to diseases such as rhinosinusitis, otitis media, and pharyngotonsillitis [1,2].

Nasal irrigation has gained increasing attention as a non-pharmacological intervention capable of restoring nasal physiology, preventing infections and treating acute rhinosinusititis.

However, many doctors, including ENT specialists, express doubts about usefulness of nasal irrigation, fearing that it could irritate the nose and increase the risk of nosebleeds and ear infections. Therefore, I decided to conduct a prospective observational study to assess the course of patients with acute or exacerbated chronic rhinosinusitis, in order to quantify the usefulness of topical nasal therapy, based primarily on nasal irrigation.

Materials And Method

I enrolled 63 adult patients with acute rhinosinusitis symptoms, such as nasal congestion, facial pain, hyposmia, or mucoid discharge, present for less than 4 weeks. These were the first patients who presented casually to an ENT doctor during the month-long study and agreed to be followed up for their nasal symptoms. Their problems ranged from initial acute rhinosinusitis to a flare-up of long-standing chronic rhinosinusitis.

These 63 patients consisted of 32 males and 31 females, aged between 19 and 70 years (average age is 44.3). Their distribution is fairly uniform across all age groups. There are three incidence peaks: 29-33 years (12 patients), 44-48 years (15 patients), and 59-63 years (12 patients) (see Figure 1).

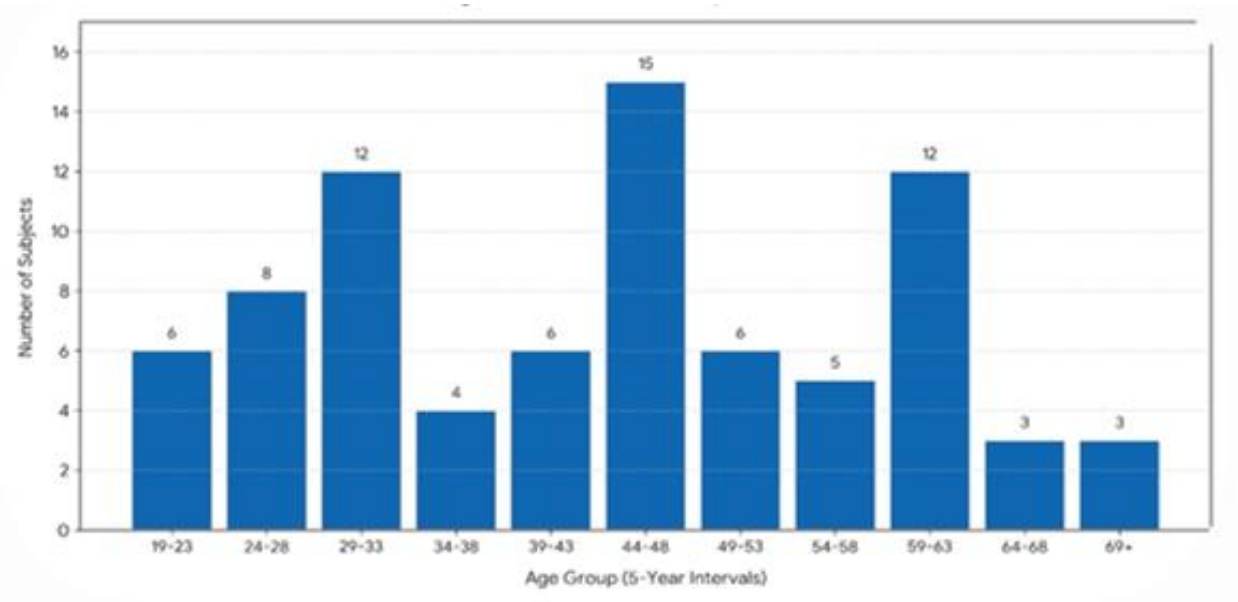

Figure1: Age distribution of 63 enrolled patients.

Three clinical parameters were taken into consideration: nasal congestion, mucus viscosity, and nasal irritation. These were assessed at baseline (T0), and again at 7 (T7) and 20 days (T20). To avoid individual physician bias, the assessment of the quality and severity of symptoms was left to the individual patients, who, once interviewed, rated the severity from 0 (complete well-being) to 5 (maximum possible discomfort) for each parameter. These data were collected as previously mentioned, at baseline, corresponding to the time of the first ENT visit (T0), at day 7 (T7), and again at day 20 (T20), through a telephone interview.

Patients all had in common that they were adults, suffering from symptomatic rhinosinusitis and all agreed to be contacted after 7 and 20 days to assess their symptoms. However, these patients underwent different treatments, specific to each case.

Specifically, two different saline solutions were used: a 3% hypertonic solution, used in cases of acute congestion, three times a day for 7 days, followed by a 0.9% isotonic solution enriched with mucolytics (N-acetylcysteine + methylsulfonylmethane), two puffs per nostril twice a day for 13 days, in order to reach a total of 20 days of therapy. In cases where nasal irritation and mucus viscosity predominated, the decision was made to begin saline irrigation directly with an enriched isotonic solution, twice a day for 20 consecutive days.

Nasal irrigation was sometimes administered as monotherapy (13 Pts). It was often followed, depending on the case, by a nasal cortisone spray containing mometasone, two puffs in the morning (40 Pts). In cases of marked congestion, nasal irrigation was combined with a vasoconstrictor spray, two puffs per nostril three times a day for a week, particularly when irrigation was performed with hypertonic saline solution (10 Pts). Finally, nasal irrigation was often combined with balloon tubal exercises to relieve ear fullness, which often occurs in patients with nasal breathing difficulties (15 Pts). No patient in this study required antibiotic therapy or oral cortisone.

Results

This study evaluated three clinical parameters related to acute sinusitis: specifically nasal congestion, mucus viscosity and nasal irritation. It showed a significant improvement in all parameters considered, as expressed by each individual patient. The improvement was higly statistically significant for all parameters considered ($p<0.001$). There are no statistically significant differences between the results obtained with male and female patients ($p>0.05$).

The greatest improvement was in mucus viscosity, with a change from a mean of 3.71 ± 0.91 to 0.63 at T20, an improvement of 83%. This suggests that treatment is very effective in thinning mucus, making it easier to clear. Regarding mucus viscosity and nasal irritation, over 50% of the overall improvement occurred at T7. Therefore, the improvement was rapid, and then increased over time.

Nasal congestion, on the other hand, improved more slowly, and it is the parameter with the highest values at the end of the study (1.84 at T20). This indicates that therapy is effective (improvement of 56.4%), but not curative, and that more time is needed to make the patient satisfied with the treatment, compared to viscosity and nasal congestion. It is also important to note the high standard deviation about nasal congestion (1.18): this indicates that there is wide variability in therapeutic success and satisfaction between patients. Indeed, some patients are very satisfied with airway patency at T20, while others still experience nasal congestion, albeit milder, but without achieving optimal results.

As expected, some patients reported worsening symptoms at T7(4 Pts), but at T20 all reported satisfactory results for all three study parameters (see Table 1 and Figure 2).

Clinical Parameter	T0 (Baseline)	T7 (7 Days)	T20 (20 Days)	Total Reduction (%)
Nasal Congestion	4.22 ± 0.73	2.75 ± 1.02	1.84 ± 1.18	-56.4%
Mucus Viscosity	3.71 ± 0.91	1.76 ± 1.07	0.63 ± 0.71	-83.0%
Nasal Irritation	3.35 ± 0.87	1.46 ± 1.10	0.70 ± 0.87	-79.1%

Table 1: Symptom evolution report, considering the average value of 3 parameters: nasal congestion, mucus viscosity and nasal irritation ±SD, at baseline T0, at 7 days and at 20 days of follow-up.

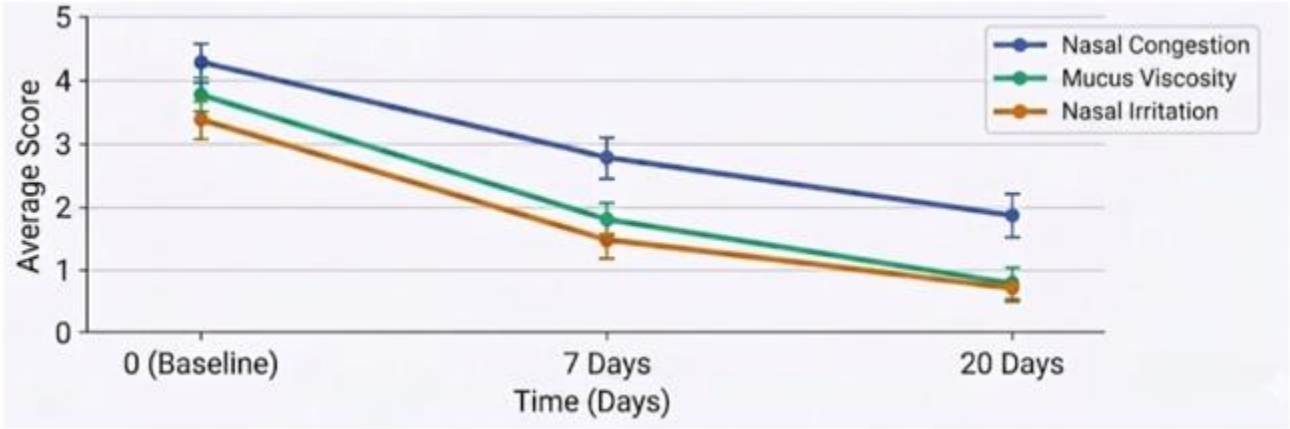

Figure 2: Symptom trends considering the average value of 3 parameters: nasal congestion, mucus viscosity and nasal irritation, at baseline T0, T7 and T20 follow-up.

Discussion

Mucociliary clearance relies on three main components: mucus production by goblet cells, coordinated ciliary beating and directed transport toward the nasopharynx. This system enables the removal of inhaled particles, allergens, and pathogens. Efficient clearance is essential for preventing infection. Alterations in mucus viscosity or ciliary function significantly compromise this defense mechanism (3).

Nasal irrigation exerts its effects through multiple mechanisms: direct removal of mucus, debris, and pathogens, leading to a reduction in microbial load (4), hydration of the mucosa and reduction of mucus viscosity improve ciliary activity and mucus transport (5), dilution and removal of inflammatory mediators contribute to reduced mucosal edema (6), prevention of dysbiosis and reduction of pathogenic colonization support mucosal immunity (7). Available evidence consistently shows that saline irrigation improves mucociliary clearance, reduces pathogen burden, and alleviates inflammation, translating into clinically meaningful outcomes such as symptom reduction and decreased recurrence of infections (1,4,5). These benefits are particularly relevant in patients with chronic rhinosinusitis and recurrent upper respiratory tract infections.

Doctors may prescribe different types of nasal irrigation: isotonic saline (0.9%), that is recommended for daily use and prevention and it is well tolerated; hypertonic saline (3%), that provides osmotic decongestion and it is useful in acute inflammation and congestion; enriched solutions, that can contain hyaluronic acid or N-acetylcysteine + methylsulfonylmethane, that may promote mucosal healing or faster and more effective mucus thinning. Tap water cannot be used for nasal irrigation, not so much because it is not sterile (nasal cavities are not sterile, and are part of the surface with which our body comes into contact with the external environment) but because it is too rich in trace elements and would be irritating to the patient's nose.

Nasal irrigation may be administered with different techniques: by syringes or squeeze bottles, neti pots or nasal sprays. Proper technique and the use of sterile or pre-prepared solutions are essential to ensure safety and efficacy.

Several studies and systematic reviews support the efficacy of nasal irrigation: it reduces frequency of recurrent URTIs (8, 9), it decreases symptom duration in acute rhinitis (10), it improves symptom control in chronic rhinosinusitis (1,11), it reduces use of antibiotics and decongestants (4), it improves quality of life (5). So nasal irrigation has lots of clinical applications in otorhinolaryngology, like preventing respiratory infections (routine use in children, elderly, exposed individuals); treating acute and chronic rhinosinusitis, as adjunct to pharmacological therapy, because it improves symptom resolution; in postoperative care (e.g., functional endoscopic sinus surgery) because in promotes healing, reduces crusting, and prevents infection (10); treating allergic rhinitis, because it removes allergens and reduces symptom burden; preventing otitis media, because it improves eustachian tube function and reduces secretion stasis.

Nasal irrigation is generally safe. Minor adverse effects include: mild burning sensation (more common with hypertonic solutions) and transient discomfort. Relative contraindications could be frequent epistaxis and severe anatomical obstruction.

All 63 patients in this study (100%) demonstrated significant clinical improvement ($p<0.001$) in all three clinical parameters considered, with a mean improvement ranging from 56.4 to 83%. No patient (0%) experienced clinical worsening at T20 or discontinued therapy during the course of treatment. These data refute the suspicion of the harmfulness of nasal irrigation and possible subjective clinical worsening.

When examining patients, I often tend to compare topical nasal therapy to handwashing: good handwashing relies on the use of soap and water. While

it's true that soap cleans hands well, it's also true that soap alone would stick to them and only dislodge dirt, without removing it. Water alone would provide sufficient, though not optimal, cleansing. Good handwashing can only be achieved by combining soap and water. In my opinion, the same applies to topical nasal therapy, where water is equivalent to nasal irrigation, while the cortisone spray is equivalent to soap. It's true that the nasal spray is the real medicine, but I believe the spray alone is of little use, as it would mix with the bacteria, allergens, and mucus already present in the nasal cavity, which were not previously removed by nasal irrigation. It would therefore be rapidly expelled from the nostrils or swallowed along with the emulsified mucus, failing to properly coat the nasal mucosa and therefore being much less effective.

Nasal irrigation is a cost-effective and accessible intervention with a strong safety profile. Despite robust evidence, it remains underutilized in clinical practice, often due to limited patient education or underestimation of its value in the prevention and treatment of acute or chronic sinusitis. Despite its benefits, adherence remains a key challenge. Proper patient education regarding technique, frequency, and expected outcomes is crucial to maximize effectiveness.

Its integration into routine practice of general practitioners, pediatricians and ENT specialists could significantly reduce the burden of upper respiratory infections, particularly in case of acute or exacerbated chronic rhinosinusitis.

Available evidence consistently shows that saline irrigation improves mucociliary clearance, reduces pathogen burden, and alleviates inflammation, translating into clinically meaningful outcomes such as symptom reduction and decreased recurrence of infections (1,4,5). These benefits are particularly relevant in patients with chronic rhinosinusitis and recurrent upper respiratory tract infections.

Regarding patients in this observational study, the first 63 patients who presented to the same ENT specialist during the 30-day study period were enrolled. They agreed to participate in the study and to be contacted over the following 20 days to monitor their clinical progress.

These patients suffered from acute rhinitis associated with acute serous otitis media (20 Pts), or rhinitis exacerbation and chronic otitis media (37 Pts), or facial trauma and resulting acute nasal congestion (2 Pts), or acute rhinitis following chronic exposure to smoke and/or chronic irritants (wood dust, etc.) (2 Pts). Finally, some patients presented with rhinitis exacerbations associated with excessive use of vasoconstrictor nasal sprays (2 Pts).

It is important to note that the study was conducted in spring, a factor that makes rhinitis with an allergic component more common, and rhinosinusitis due to a cold less common. This finding partly explains, in addition to chance, why no patient required topical or systemic antibiotic therapy, nor oral cortisone, which are obviously the reference drugs in acute purulent rhinosinusitis or complicated forms, such as periorbital involvement. Furthermore, patients were not recruited from an emergency department, which also partly explains why no patient presented with acute purulent rhinosinusitis. Certainly, the lack of need for systemic antibiotics and cortisone made this study much more homogeneous and allowed us to more significantly validate the importance of nasal irrigation.

The efficacy of nasal irrigation is strongly supported by its physiological effects on the nasal mucosa. By restoring hydration and optimizing mucus rheology, irrigation enhances ciliary function and promotes effective clearance of inhaled pathogens. This is particularly important in conditions where mucociliary dysfunction is central, such as chronic rhinosinusitis or post-viral inflammation (3). Additionally, the mechanical removal of inflammatory mediators and allergens contributes to the reduction of mucosal edema and local immune activation.

Conclusions

Unlike pharmacological treatments such as topical decongestants, corticosteroids, or antibiotics, nasal irrigation acts through non-specific mechanical and physiological mechanisms. This confers several advantages, like absence of systemic side effects, no risk of pharmacological interactions and no contribution to antibiotic resistance.

While intranasal corticosteroids remain the cornerstone of treatment for inflammatory conditions like allergic rhinitis and chronic rhinosinusitis, nasal irrigation enhances their efficacy by improving drug distribution and mucosal contact (10). Therefore, while in some acute forms of rhinitis, nasal irrigation can be considered as monotherapy, in chronic forms nasal irrigation is considered complementary (rather than alternative) to pharmacological therapy, but certainly always useful.

This study, based on a limited number of cases and a short observation period, represents a randomized observational study. It confirms the importance of nasal irrigation as an effective and often crucial tool for achieving significant clinical improvement in patients with acute rhinosinusitis in a few days, decreasing the need for systemic corticosteroid therapy, and countering antibiotic resistance.

Conflict of Interest: None to declare.

Statement of Ethics: Patients gave their informed consent to write this paper.

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