

Atomized Nasal Douche vs Nasal Lavage in Acute Viral Rhinitis

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Objective: To evaluate the efficacy of the atomized nasal douche in the restoration of physiological nasal functions in patients affected by acute viral rhinosinusitis, when compared with nasal lavages with isotonic sodium chloride solution.

Design: Randomized clinical trial.

Setting: The ENT Department at the University of Siena Medical School.

Patients: Two hundred patients affected by acute viral rhinosinusitis were included in the study.

Interventions: Patients were randomly divided into 2 groups: group 1 patients received an atomized nasal douche, and group 2 patients received nasal lavages with isotonic sodium chloride solution. Patients underwent treatments 4 times per day for 15 days in our institution under our direct control.

Results: Atomized nasal douches significantly improved inspiratory and expiratory rhinomanometric resistance ($P < .01$) and nasal volumes measured by acoustic rhinometry ($P < .001$). Nasal lavages were unable to modify these variables significantly ($P < .3$). Only atomized nasal douches were able to normalize mucociliary transport time to a physiological level ($P < .001$).

Conclusions: The atomized nasal douche demonstrated a better efficacy than traditional nasal lavages with isotonic sodium chloride solution in restoring all the physiological nasal functions. For this reason, and considering ease of use, painlessness, cheapness, and manageability of the instrument, we suggest the use of the compressor-micronizer chamber system (Rinoflow Nasal Wash & Sinus System) as a routine adjuvant to every treatment of acute rhinopathies.

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INFLAMMATORY PATHOLOGICAL features of the upper airways are often characterized by the presence of serous, mucous, or mucopurulent secretions.¹

In patients with these pathological features, the removal of nasal secretions allows the attainment of various important results. Secretions represent the ideal growth medium for major pathogens, such as *Staphylococcus aureus*, *Staphylococcus epidermidis*, and *Streptococcus pneumoniae*, so the elimination of secretions has obvious consequence on the natural history of the pathological features.

Nasal irrigation (or douche) with isotonic sodium chloride solution seems to be able to reduce nasal and rhinosinusal dryness, facilitating the clearing of thick mucus and crusts in patients affected by rhinosinusitis.²

Moreover, nasal irrigations, because of their effects of moisturization, humidification, and reduction of swelling,

have obtained in past years even more consensus when administered after surgery in patients operated on for chronic rhinosinusitis.³

However, clinicians have to select the right inhalation therapy according to the anatomical region of the respiratory tract involved in the different pathological features.⁴

Specifically, aerosol therapy is not really efficacious when only the upper airways are involved in the inflammatory process. In fact, the small diameter of the particles produced by aerosol apparatuses commonly used does not allow their deposition in this region: the smaller the particles, the greater is the likelihood of their diffusion to the lower airways.^{5,6}

A recently proposed compressor-micronizer chamber system (Rinoflow Nasal Wash & Sinus System), able to create a jet of atomized physiological solution with particles of 20 μm in diameter, could represent the solution to the previously

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Table. Results of Active Anterior Rhinomanometry Before and After Treatment*

Variable	Group 1	Group 2
Before treatment		
Inspiratory resistance	0.55 ± 0.07	0.56 ± 0.05
Expiratory resistance	0.48 ± 0.05	0.49 ± 0.05
After treatment		
Inspiratory resistance	0.30 ± 0.05	0.46 ± 0.07
Expiratory resistance	0.27 ± 0.04	0.45 ± 0.05

*Data are given as mean ± SD values, in pascals per second per cubic centimeter. Group 1 indicates patients who received an atomized nasal douche; and group 2, patients who received nasal lavages with isotonic sodium chloride solution.

mentioned problems. The present study evaluates the efficacy of the atomized nasal douche in the restoration of physiological nasal functions in patients affected by vasomotor or epidemic rhinitis, when compared with nasal lavages with isotonic sodium chloride solution.

METHODS

Two hundred patients (106 women and 94 men) affected by epidemic rhinitis (the common cold) were included in the study. Each patient, before undergoing any treatments, underwent the following tests: an otorhinolaryngological objective examination, anterior active rhinomanometry, acoustic rhinometry, and analysis of mucociliary transport time (MCTt).

Moreover, we asked patients to grade their symptoms (nasal obstruction, nasal discharge, and sneezing) according to a 0 to 3 scale, with 0 indicating the absence of the symptom and 3, the presence of the symptom in a severe form; by adding all the symptom-related scores, we obtained, for each patient, a global symptom score, varying from 0 to 9.

Patients were randomly divided into 2 groups: group 1 patients received an atomized nasal douche, and group 2 patients received nasal lavages with isotonic sodium chloride solution. Patients underwent treatments 4 times per day for 15 days at our institution under our direct control.

We performed atomized nasal douches by using a compressor-micronizer chamber system; for nasal lavages, we used a 20-mL syringe. The technical details of the atomized nasal douche-administering modality have already been described elsewhere.⁷

After treatments, patients underwent the same set of examinations performed in the pretreatment phase (an otorhinolaryngological objective examination, anterior active rhinomanometry, acoustic rhinometry, bacterial cultures, MCTt analysis, and symptom score evaluation). All the measured data underwent a statistical analysis by using the *t* test.

RESULTS

Focusing on nasal patency, atomized nasal douches significantly improved inspiratory and expiratory rhinomanometric resistance ($P < .01$). On the contrary, nasal lavages were unable to modify these variables significantly ($P < .3$) (Table).

Moreover, nasal volumes, measured by acoustic rhinometry, in patients treated with atomized nasal douches significantly improved, varying from a pretreatment

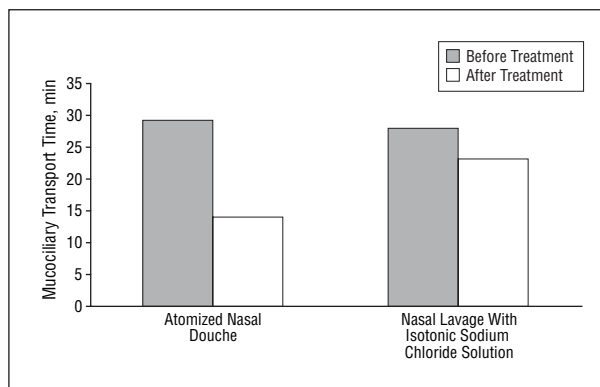


Figure 1. Mucociliary transport time in the 2 groups before and after treatment.

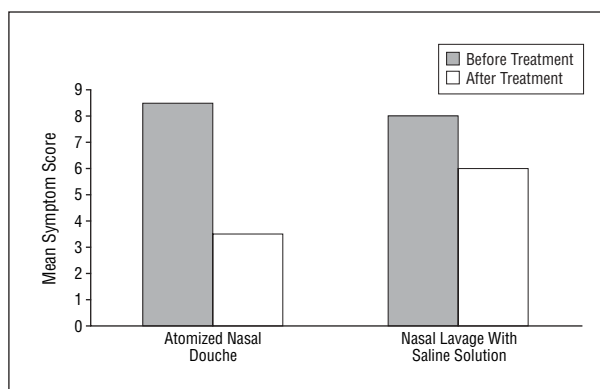


Figure 2. Mean symptom score in the 2 groups before and after treatment.

mean ± SD of $4.65 \pm 0.15 \text{ cm}^3$ in each nasal fossa to a post-treatment mean ± SD of $6.40 \pm 0.15 \text{ cm}^3$ ($P < .001$). Nasal lavages did not affect nasal volumes significantly ($P < .3$) (mean ± SD value in each nasal fossa pretreatment vs post-treatment, 4.50 ± 0.15 vs $4.75 \pm 0.15 \text{ cm}^3$).

All patients showed, before treatment, a prolonged MCTt, with mean values for groups 1 and 2 of 29 and 28 minutes, respectively.

Only the atomized nasal douche was able to normalize this variable to a physiological level, leading to a mean MCTt for group 1 after treatment of 14 minutes ($P < .001$) (Figure 1).

In the pretreatment phase, the mean global symptom scores in patients of groups 1 and 2 were 8.5 and 8.0, respectively (Figure 2).

After therapy, group 1 patients had a mean global symptom score of 3.5 ($P < .001$); nasal lavages determined few improvements in symptoms (mean score after treatment, 6.0).

COMMENT

To keep clean the nasal cavities is one of the major targets in the treatment of all the inflammatory pathological features of the rhinosinusal district.

Nasal lavages with isotonic sodium chloride solution, because of their actions of fluidization and removal of secretions, have always been considered the mainstay of every treatment of inflammatory affections

of the nasal cavity, catarrhal and mucopurulent. This simple procedure allows the restoration of normal mucociliary function and eliminates a possible pabulum for inhaled microorganisms.⁸

In our sample, the atomized nasal douche, when compared with nasal lavages with isotonic sodium chloride solution, showed a stronger efficacy in the normalization of nasal resistance that, in turn, will allow the restoration of physiological nasal functions. In the atomized nasal douche group, we observed, after the treatment, a statistically significant positive modification of nasal patency ($P < .01$) and nasal volumes ($P < .001$). In the nasal lavage group, a little improvement occurred, but it was not statistically evident.

The cleaning of the nasal cavity with the atomized nasal douche also produces hydration of the nasal mucosa. This action determines the restoration of eutrophia, which represents the key element for the proper functioning of the mucosa.⁹

In this sense, we documented in our sample a normalization of MCTt in patients treated with the atomized nasal douche ($P < .001$); on the contrary, in the group treated with nasal lavages, we observed only a slight reduction of this variable, which remained in the pathological range.

Moreover, it has been previously demonstrated that the correct assembly of a secretory IgA molecule requires the good functioning of all the local immunological network,^{10,11} which, in turn, requires the eutrophia of nasal mucosa. In other words, by improving the trophism of the nasal mucosa, we can, in some ways, strengthen the specific immunological local defenses.

Finally, in our samples, the quality of life of patients treated with atomized nasal douches or nasal lavages dramatically differs, as stated by the different posttreatment symptom scores expressed by the 2 groups.

In conclusion, the use of a compressor-micronizer chamber system is more effective than common nasal lavages because of the greater diffusion of the solution onto the nasal mucosa.

In particular, it reaches and remains in the areas of the superior and middle meatus, which are not reached by physiological solutions administered in a different manner.^{12,13}

According to our data, we can affirm that the atomized nasal douche demonstrated a better efficacy than traditional nasal lavages with isotonic sodium chloride solution in restoring all the physiological nasal functions.

For this reason, and considering ease of use, painlessness, cheapness, and manageability of the instrument, we suggest the use of the compressor-micronizer chamber system as a routine adjuvant to every treatment of acute or chronic rhinopathy.

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