

Effect of Local Application of N. Acetylcysteine Post-Functional Endoscopic Sinus Surgery

Samer Badie Kamel¹

¹Otorhinolaryngology Department, Faculty of Medicine, Benha University, Egypt.

Corresponding author: Samer Badie Kamel

ABSTRACT

Background:

Objective: This study aimed to assess the role of local application of NAC post FESS in versus saline irrigation only. **Patients and Methods:** This study was a prospective, randomized controlled study that included 150 patients suffering from chronic allergic rhinosinusitis with nasal polyposis not responding to medical treatment. They underwent Functional Endoscopic Sinus Surgery, then they were enrolled in the study. They were divided into 2 groups, 75 patients per each group: The first group received N. acetylcysteine (NAC) nasal douches with saline irrigation for 3 weeks in the post-operative follow up period in contrast to the second group that received saline nasal irrigation only for a similar period.

Results: After 6 weeks of follow up period the formation of nasal crusts, nasal adhesions and blood clots were observed in 5, 3 and 4 patients of the first group in contrast to 13, 10 and 12 patients from the second group consequently.

Conclusion: Both NAC and saline irrigation promoted post-operative healing and prevented crusts formation, but combination between both of them resulting in better healing of nasal mucosa and prevented crusts formation and nasal adhesions.

Keywords: Sino nasal, polyposis, FESS & NAC.

INTRODUCTION

Chronic allergic rhinosinusitis with nasal polyposis represents one of the most common worldwide problems nowadays due to many factors especially environmental irritants and allergens⁽¹⁾.

The most common symptoms of nasal polyposis are nasal obstruction, facial pain, sneezing, runny nose, post-nasal discharge and altered smell function⁽²⁾.

Medical treatment represents the first line of treatment in the form of antibiotics⁽³⁾, local and systemic steroids⁽⁴⁾, antihistamines⁽⁵⁾, antileukotriens⁽⁶⁾ and mucolytics⁽⁷⁾.

With failure of medical treatment, FESS represents the second line of treatment as safe and effective treatment⁽⁸⁾ for excision of polyps and restoration of the physiological function of the affected sinuses⁽⁹⁾ Post FESS follow up period is so important to maintain the nasal cavity clean from crusts and so prevent formation of adhesions⁽¹⁰⁾.

The aim of the present study was to assess the local effect of NAC post-FESS in prevention of crustations and nasal adhesions.

PATIENTS AND METHODS

This study was conducted in the otorhinolaryngology department of Benha University Hospitals through the period from June 2019 to May 2020.

Ethical approval:

The Ethical Committee of Benha Faculty of Medicine approved this study. Informed written consent was obtained from each patient after explanation of the plan of treatment and the follow-up regimen.

150 patients were enrolled in the study suffering from allergic rhinosinustis with nasal polyposis not

improved with medical treatment. They were prepared for surgical treatment (FESS).

Inclusion criteria:

Age ranged between 18-45 years. Patients suffering from chronic allergic rhinosinusitis with nasal polyposis.

Exclusion criteria:

Patients suffering from chronic debilitated diseases as liver diseases, pulmonary diseases, renal failure, cardiac diseases and malignancies, patients suffering from allergic fungal sinusitis and patients with previous nasal surgery.

The patients were blindly divided into two groups, 75 patients per each one.

Functional Endoscopic Sinus Surgery was performed to all patients with the standard. Messerklinger's technique⁽¹¹⁾ and nasal packings were removed after 24 hours post operatively⁽¹²⁾. The follow up regimen was designed as follows: Two visits per week for the first 2 weeks, then one visit per week for the next month. Every patient received medical treatment in the form of antibiotic (Amoxicillin/Clavulanic acid) twice daily, analgesic (paracetamol) three times daily for 10 days, first group received N-acetyl cysteine 300 mg/3 ml in the form of nasal spray twice daily for three weeks post operatively followed by saline irrigation, and the second group irrigated the nose with saline only for a similar period.

During the follow up visits, each patient underwent endoscopic examination with rigid Hopkin's endoscope 0 degree blindly by the same investigator. During examination, each patient was asked about anosmia, nasal pain, nasal obstruction, postnasal

discharge, nasal crustations and epistaxis and the examination focused on nasal crustations, blood clots, healing of nasal mucosa and presence of adhesions.

Statistical analysis

Data management and statistical analysis were done using SPSS version 25. (IBM, Armonk, New York, USA). Numerical data were summarized as means and SDs and categorical data were summarized as numbers and percentages. Comparisons were done between both

groups using Mann Whitney U test for numerical data and categorical data were compared using X² test or Fisher's exact test. All P values were two sided. P values ≤ 0.05 were considered significant.

RESULTS

At the end of the follow up period (after 6 weeks from the operation), there was a difference between the two groups and the difference was significant.

Table (1): Comparison between the two groups regarding nasal crustation, nasal adhesions and blood clots

	1 st group (NAC then saline irrigation)		2 nd group (saline irrigation only)		Statistical test (X ²)	P value
	N (75)	%	N (75)	%		
Endoscopic findings						
Nasal crustation	5	6.67	13	17.33	4.04	0.044
Nasal adhesion	3	4	10	13.33	4.12	0.042
Blood clots	4	5.33	12	16	4.48	0.034

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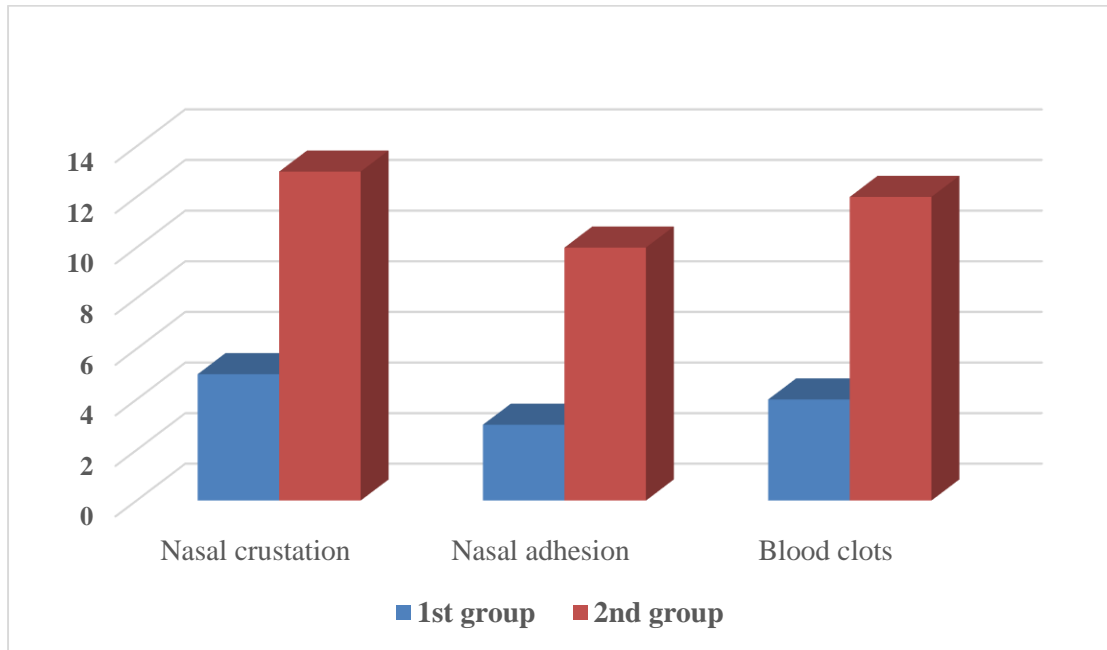


Figure (1): Shows the Endoscopic findings difference between the two groups at the end of the follow up period (6 weeks).

Table (2): Improvement in both groups

	1 st group (NAC then saline irrigation)		2 nd group (saline irrigation only)		Statistical test (X ²)	P value
	N (75)	%	N (75)	%		
Subjective improvement						
Nasal obstruction	13	17.33	22	29.33	5.72	0.016
Pain	6	8	11	14.67	4.49	0.034
Anosmia	7	9.33	16	21.33	4.16	0.041
Nasal discharge	8	13.33	17	20	3.89	0.049
Epistaxis	5	6.67	13	13.33	4.04	0.044

In consideration to subjective improvement, there was difference for the benefit of the first group and the difference was significant.

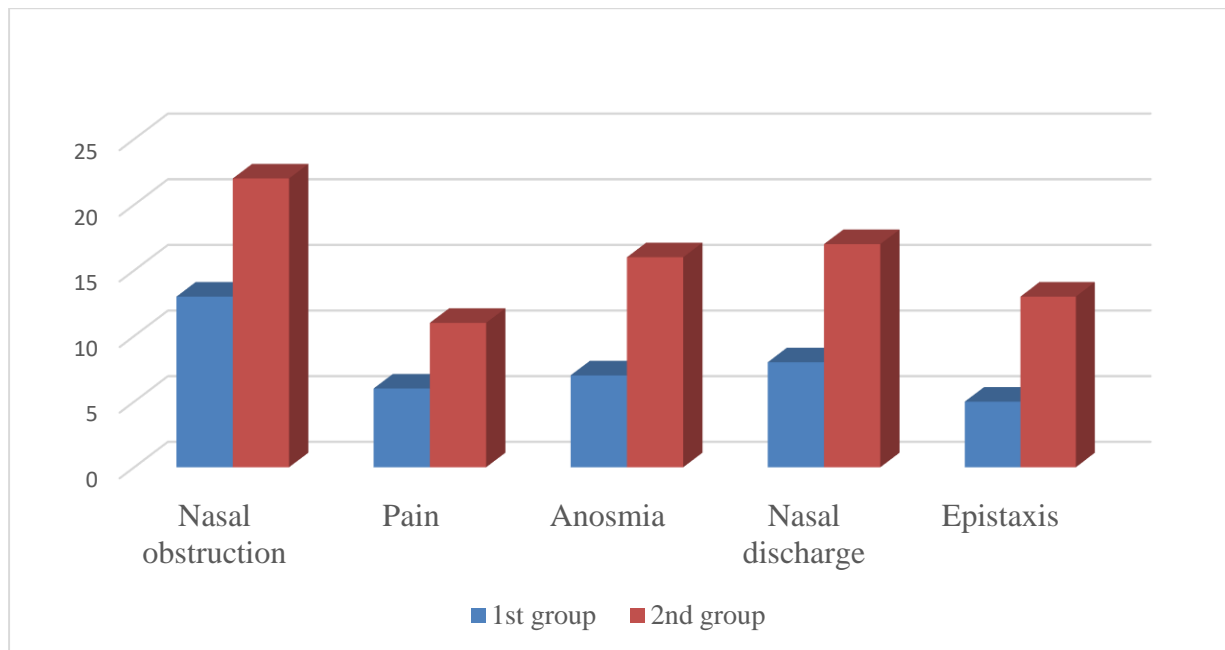


Figure (2): Shows the Subjective improvement difference between the two groups at the end of the follow up period (6 weeks).

DISCUSSION

Chronic allergic rhinosinusitis represents one of the most common diseases worldwide. The first line of treatment is medical treatment in the form of combination between antibiotic to treat infection, local and systemic courses of corticosteroids to reduce mucosal edema, mucolytic to improve sinus drainage and mucociliary clearance and antihistaminic to control antigen antibody reactions. With the failure of medical treatment, surgical treatment in the form of Functional Endoscopic Sinus Surgery represents the second line of treatments that remove polyps and restore aeration of sinuses ostia to facilitate the future penetration of medical treatment to the targeted sinuses. FESS was explained by **Stammerger and Kennedy** in 1985⁽⁸⁾, the term functional described their surgical philosophy that spare healthy mucosa. It's obvious that there is a lack of guidelines regarding the post-operative follow up period and the majority of surgeons perform their postoperative care according to their experience and their own preference.

There are many factors influence the protocols of postoperative care including the extent of surgery performed, occurrence of post-operative inflammation, patient' tolerance and additional cost. Postoperative follow up period and medical treatment is so important to maintain nasal cavity and ostia of sinuses clean and clear until complete healing of mucoperiosteal lining occurs.

The aim of the present study focused on the local effect of nasal irrigation of the nasal cavity with N-acetylcysteine to determine its effect in prevention of formation of nasal crusts, and so ensure complete healing of nasal cavity without formation of nasal adhesions. At the end of the follow up period, the

presence of nasal crusts, nasal adhesions and blood clots appeared in 5, 3 and 4 patients in the first group that used N acetylcysteine and saline irrigation in contrast to 13, 10 and 12 patients in the second group that used saline irrigation only, and the difference was statistically significant.

The results of the present study are in agreement with **Macchi et al.**⁽¹³⁾ study that confirm the significant role of local application of N - acetylcysteine in treatment of chronic rhinosinusitis as it decrease the formation of crusts, improve mucociliary clearance, and prolong the duration between attacks.

The results of the present study registered significant subjective improvement in nasal symptoms between the two groups at the end of the follow up period as sensation of nasal obstruction, nasal pain, anosmia, nasal discharge and epistaxis were registered in 13, 6, 7, 8 and 5 patients from the first group in contrast to 22, 11, 16, 17 and 13 patients of the second group respectively.

The results of the present study concluded that usage of atomized nasal douches of N- acetylcysteine post Functional Endoscopic Sinus Surgery is an effective strategy to prevent post-operative crusts formation and nasal adhesions, so improve healing process of nasal mucosa.

CONCLUSION

Both NAC and saline irrigation promoted post-operative healing and prevented crusts formation, but combination between both of them resulted in better healing of nasal mucosa and prevented crusts formation and nasal adhesions.

Limitations of the study:

The studies that discussed the efficacy of local application of NAC were in cases of chronic rhinosinusitis but no previous studies discussed its effect post FESS. So, the lack of data that allow comparison between our study and other studies represent the main limitation of this study.

Declarations:

Consent for Publication: I confirm that all authors accept the manuscript for submission

Availability of data and material: Available

Competing interests: none

Funding: No fund

Conflicts of Interest: The authors declare no conflicts of interest regarding the publication of this paper.

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