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Efficacy and Tolerability of Isotonic Normal Saline Nasal Irrigation During Postoperative Period of Nasal Surgery

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Original Article

Abstract

Saline nasal irrigation is a cost-effective and easy method of preparation. This technique is deemed to be safe for individuals of all age groups, including both adults and children, and is not associated with any significant adverse effects. The recommended method for cleansing the surgical cavity, enhancing wound healing, and increasing the mucociliary function of respiratory mucosa while reducing mucosal edoema involves the use of low pressure isotonic saline irrigation in the nose and paranasal sinus. The objective of this study was to assess the effectiveness and tolerability of isotonic normal saline nasal irrigation in the context of post-operative nasal surgery, as well as its impact on nasal symptoms. Therefore, a prospective, observational single group study was done over a period of 16 months at Alsader Teaching Hospital in Najaf. A total of 50 Iraqi patients of both genders aged 15 years or older, were enrolled in the study. The patients were given instructions to perform isotonic normal saline nasal irrigation (INSNI) following their nasal surgery. They were advised to perform this procedure three times daily for the first week, and then reduce it to two times daily for the remaining three weeks. The results of the study indicated that 90% of the patients (n=45) exhibited good tolerance to isotonic normal saline nasal irrigation, whereas only 10% of the patients (n=5) reported intolerance to this intervention. In conclusion,, the utilisation of isotonic normal saline nasal irrigation during the postoperative phase following nasal surgery is generally well tolerated and has been shown to result in a notable decrease in symptoms.

Keywords: *Normal saline,endoscopic sinus surgery,DCR and septoplasty.*

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1. INTRODUCTION

Nasal irrigation is a simple, inexpensive procedure that has been used to treat sinus and nasal conditions for many years.After nasal and sinus surgeries, patient may suffer from various complications and symptoms like nasal congestion, rhinorrhea, bleeding ,crustation and nasal pain . The aim of sinus surgery is to open narrow passages and allow more effective airflow and drainge . Because the nasal cavity quickly becomes encrusted following surgery, frequent cleaning and saline nasal irrigation are needed for 4-8 wk until the lining of the nose and sinuses has regenerated (1–4).

Saline nasal irrigation is an inexpensive and easy method of preparation. This technique is deemed to be safe for individuals of all ages, including both adults and children , and is not associated with any significant side effects. The recommended method for cleansing the surgical cavity, enhancing wound healing, and increasing the function of the respiratory mucosa, while reducing mucosal edoema, is the use of low pressure isotonic saline irrigation in the nose and paranasal sinus (5). Irrigation or nasal lavage techniques have undergone significant evolution throughout history, both in the characteristics of the different methods of application in the nasal cavity, and in the nature and composition of the solutions used in them. Topical nasal solutions can be applied through various practices, such as the use of positive pressure by spray, pulses or showers, or by gravity using different types of jets (1,3,6). The different solutions used in nasal irrigation can be divided according to their composition as isotonic saline, as isotonic saline, hypertonic nasal saline and buffered or non buffered solution (7). Outside of this proposed categorization to define the different types of solutions used, there are multiple commercial pharmaceutical compositions that include anti-inflammatory or antihistamine agents in the solutions (8). The saline solutions used in nasal irrigation act by bathing the nasal cavity by instilling the saline solution through one nostril and allowing it to drain through the contralateral nostril (9) . Typically 2 types of saline solutions are described: 0.9% and 3%, isotonic and hypertonic, respectively. However, the optimal concentration, pH, and appropriate temperature are unknown and may vary from patient to other. However, The precise mechanism by which saline nasal irrigation exerts its effects remains unclear. One potential factor contributing to upper respiratory disorders is the compromised integrity of the nasal mucosa's protective function. Saline nasal irrigation has the potential to enhance the

functionality of the nasal mucosa through various physiological mechanisms. These include direct cleansing, elimination of inflammatory mediators, and enhancement of mucociliary function, as indicated by the observed increase in ciliary beat frequency (3,9–12).

Nasal lavages using saline solution are useful for the symptomatic management, this being the most common indication for this technique (7,13). Contraindications for nasal irrigation in general, and for those with saline solution, include facial trauma, due to the potential risk of contamination from other neighboring regions, and conditions associated with a greater risk of aspiration, such as neurological pathology or musculoskeletal problems. Indications of saline nasal irrigation mainly include chronic rhinosinusitis (7), viral upper respiratory infections (15), allergic rhinitis, mild to moderate rhinitis of pregnancy, post-operative sinonasal surgery and sinonasal granulomatosis (7). Nasal irrigation is not recommended in children with swallowing disorders, epistaxis, or suspected foreign body in the upper airways,(14).

Despite the beneficial effect and safety of nasal saline irrigation, some minor adverse events may developed including a sense of discomfort and nervousness during the first use. Other adverse reactions including nasal irritation, nasal discomfort, otalgia, or pooling of saline in paranasal sinuses with subsequent drainage, self-limited ear fullness, stinging of the nasal mucosa and rarely epistaxis, however, these adverse effect are not serios and mainly self limited (15,16). None of clinical studies noted a significant adverse side effects associated with the use of nasal irrigation (2,7,17–20). We aimed in this study to assess the efficacy and tolerability of isotonic normal saline nasal irrigation during the post-operative period of nasal surgery among Iraqi patients .

2. PATIENTS and METHODS

This was a prospective study conducted at the Department of Otolaryngology in Al-Sadar medical city in Najaf, during a period of 16 months. The study involved 50 patients aged 15-64 years, of them 24 females and 26 males. Types of performed surgery were septoplasty (27 patients),endoscopic DCR(10 patients), polypectomy (9 patients)and FESS (4 patients). Patients were instructed to use manual isotonic normal saline (0.9%) nasal irrigation after nasal surgery and to administer nasal irrigation 3 times per-day during first week and two times per-day for 3 weeks. Methods for using normal saline (0.9%) nasal irrigation during post-operative period either through bulb syringes (20 cc) or drop of any previous nasal or eye drop after washing

and sterilization by boiling. Use 20cc of isotonic normal saline in each nostril Two to three times per day for 4th wks. Responses for the nasal symptoms and adverse events were recorded on the first visit at the end of the first week postoperatively and then follow the patients weekly for 3 weeks. Nasal symptoms like nasal congestion, nasal pain, nasal bleeding, crustation and rhinorrhea, and adverse events were were assessed. Efficacy and tolerability evaluated at the end of therapy according to response for nasal symptoms and adverse events.

3. RESULTS

Study involved 50 patients who completed follow up, with age range from 15-64 years ,26 males and 24 females. Types of operations used in our study, septoplasty done with 27 patients ,10 patients with endoscopic DCR, polypectomy used for 9 patients and 4 patients with FESS. Efficacy evaluation related to the therapy as excellent for 48(96%)patients,depending on response of patients to saline nasal therapy at the end of 4th weeks(4th visit),there are only two patients had nasal symptoms, one of them (2%) had nasal congestion and other one(2%) with rhinorrhea, this patient with persist nasal congesition for 4 weeks post-operative of endoscopic DCR and limited septoplasty and patient with rhinorrhea at end of 4 weeks during post-operative septoplasty. Tolerability evaluation related to adverse events was excellent in 45(90%) patients and only 5(10%) patients untolerate isotonic normal saline nasal irrigation therapy at the end of 4th weeks during post-nasal surgery and 3(6%)patients of them suffers from minor adverse effects including a sense of discomfort and others reported ear fullness 1(2%)patient and stinging of the nasal mucosa 1(2%)patient and did not cause patients to discontinue nasal irrigation therapy. Patients with sense of discomfort at the end of therapy, two of them with septoplasty and one with FESS. Patient with ear fullness post-operative polypectomy and patient with stinging of the nasal mucosa occure during post-operative period of FESS. At the end of the study the number of patients suffer from nasal symptoms like nasal congestion and rhinorrea at 4th post-operative week are two patients , one patient female with nasal congestion and other patient male with rhinorrea. To evaluate tolerability at the end of therapy, 5 patients not tolerate isotonic normal saline nasal irrigation , 3 of the patients with sense of discomfort are females and patient with ear fullness is male and the patient with stinging of the nasal mucosa is male too, (**Tables 1, 2, 3, 4 & 5**).

Table 1. Age and gender distribution of the studied group

Variable		No.	%
Age (year)	15-20	14	28.0
	21-30	16	32.0
	31-40	17	34.0
	> 40	3	6.0
Gender	Male	26	52.0
	Female	24	48.0
Nasal Symptom	Nasal congestion	1	2.0
	Rhinorrhea	1	2.0

Mean age : 28.3 + 9.6, range 15 – 64 years

Table 2. Types of operations performed for the studied group (N=50)

Operation	No.	%
Septoplasty	27	54
DCR	10	20
Polypectomy	9	18
FESS	4	8

DCR: Dacryocystorhinostomy, FESS: Functional endoscopic sinus surgery

Table 3. Frequency distribution of adverse events after to isotonic normal saline nasal therapy

Adverse events	No.	%
Sense of discomfort	3	6.0
Ear fullness	1	2.0
Stinging of nasal mucosa	1	2.0
Total	5	10.0

Table 4. Response to isotonic normal saline nasal therapy among the studied group

Nasal symptoms	First visit		Second visit		Third visit		Fourth visit	
	No.	%	No.	%	No.	%	No.	%
Nasal Congestion	5	10.0	2	4.0	1	2.0	1	2.0
Crustation	2	4.0	1	2.0	0	0.0	0	0.0
Nasal Pain	1	2.0	0	0.0	0	0.0	0	0.0
Nasal bleeding	2	4.0	1	2.0	0	0.0	0	0.0
Rhinorrhoea	4	8.0	2	4.0	1	2.0	1	2.0
Total	14	28.0	6	12.0	2	4.0	2	4.0

Table 5. Response to adverse events among the studied group

Adverse events	First visit		Second visit		Third visit		Fourth visit	
	No.	%	No.	%	No.	%	No.	%
Discomfort	5	10.0	4	8.0	3	6.0	3	6.0
Stinging of the nasal mucosa	2	4.0	1	2.0	1	2.0	1	2.0
Nasal pain	1	2.0	1	2.0	0	0.0	0	0.0
Nasal bleeding	0	0.0	0	0.0	0	0.0	0	0.0
Ear fullness	3	6.0	1	2.0	1	2.0	1	2.0
Total	11	22.0	7	14.0	5	10.0	5	10.0

4. DISCUSSION

The findings of the current study demonstrate that the utilisation of isotonic normal saline nasal irrigation (INSNI) in a cohort of 50 patients aged 15-64 years during the post-operative period following nasal surgery is well pereceived by patients and yields significant improvement of symptoms such as nasal congestion, nasal pain, nasal bleeding, rhinorrhoea, and crustation. According to this results only two patients continue with symptoms one of them with nasal

congestion (2%) and the other one with rhinorrhea (2%), from this results the efficacy is evaluated according to responses to INSNI as 96% (48 patients).

Not all cases similarly perceive isotonic normal saline nasal irrigation as a comfortable method, nor do all individuals opt to persistently employ it for the management of their nasal problems. Vast majority of patients (96%), reported perceiving the treatment as effective, while 45 patients expressed good satisfaction and comfort level. In their study, Papsin and McTavish (1) observed that the act of irrigating the nasal cavity with a saline solution has the effect of enhancing mucociliary clearance. This is achieved by the moisturization of the nasal cavity and the subsequent removal of encrusted debris. The aforementioned treatment has been implemented with a high degree of safety in both adult and paediatric populations (5). , with no reported instances of significant adverse effects. Patients who undergo nasal irrigation treatment have a reduced dependence on alternative medications and experience a decrease in the frequency of medical appointments. Both Canadian and United States treatment guidelines currently recommend the utilisation of nasal irrigation for the management of all forms of rhinosinusitis, as well as for postoperative nasal cavity cleansing

Tolerability evaluated according to responses to the adverse events at end of therapy at 4th weeks, only 5 patients continue with adverse events, 3 patients suffers from minor adverse effects including a sense of discomfort (6%) , one patient reported ear fullness (2%) and one patient (2%) with stinging of the mucosa continue to the end of the treatment (4th weeks). Tomooka et al. (15) conducted a survey on the quality of life of a sample of more than 200 individuals with sinonasal symptoms of various origins. Following their analysis, the researchers suggested a treatment regimen consisting of twice daily isotonic saline irrigation using a WaterPik™ device for a duration of 6 weeks. Of the total participants, 108 completed a subsequent questionnaire, revealing that 23 out of 30 symptoms shown improvement. A total of 114 patients did not adhere to the official follow-up procedure. These patients were subsequently reached via telephone. Among the contacted patients, 76% reported experiencing improvement, whereas 24% (equivalent to 12% of the original sample) reported either no improvement or adverse side effects that resulted to discontinuation of irrigation use.

Our findings revealed that the efficacy and tolerability at the 3rd visit were similar to efficacy and tolerability at the 4th visit, this indicated that 3 weeks of therapy of normal saline nasal irrigation enough period for post-operative nasal surgery to reduce the nasal symptoms and reduces the adverse events. Postoperative care following sinonasal surgery was more important than the surgery itself (21).

An earlier study was performed to assess the clinical evidence pertaining to the effectiveness of saline nasal irrigation in managing sinonasal diseases and to examine the possible advantages it may offer. According to Rabago et al. (22), saline nasal irrigation is a supplementary therapeutic approach for upper respiratory disorders, involving the application of spray or liquid saltwater to cleanse and moisturise the nasal cavity. The utilisation of liquid saline for nasal irrigation is employed for the purpose of managing symptoms that are commonly linked with chronic rhino sinusitis. There is limited evidence available to support the efficacy of spray and liquid saline nasal irrigation in the management of symptoms associated with mild to moderate allergic rhinitis and acute upper respiratory tract infections. Saline nasal irrigation is recommended as a therapeutic intervention for several disorders, such as pregnancy-related rhinitis and acute rhinosinusitis, according to consensus guidelines (22). The safety of saline nasal irrigation has been observed, as there have been no documented instances of major adverse reactions

Technique modification and salinity correction have the potential to mitigate minor detrimental effects. In their study, Unal et al. (23) conducted measurements of mucociliary clearance time (MCT) in a sample of 32 adult participants both before and after undergoing septoplasty. The participants were divided into two groups, with one group receiving isotonic saline and the other group receiving Lactated Ringer's solution through atomizer. This intervention was administered four times daily for a duration of 3 weeks following the surgical procedure. The saccharin clearance test exhibited no significant alteration when administered with isotonic saline, but demonstrated improvement when administered with Lactated Ringer's solution. In a study conducted by Shoseyov et al. (24), children presenting with chronic sinonasal symptoms were subjected to treatment with either isotonic saline or 3.5% saline. This treatment involved the administration of nose drops three times a day for a duration of four weeks. Following an

initial three-day period of reported increased burning sensation in the hypertonic group, said group exhibited improvements in cough, post-nasal drainage, and radiographic score in comparison to the isotonic saline group, which only demonstrated improvement in post-nasal drainage. In a study involving 40 persons diagnosed with chronic sinusitis, the effectiveness of isotonic sodium chloride solution was compared to isotonic Ems solution (buffered). The participants were instructed to irrigate their sinuses twice daily using a RhinoCare™ device, with each irrigation consisting of 200cc of the respective solution. This irrigation regimen was followed for a duration of 7 days. The symptoms, nasal endoscopy, saccharin clearance time, olfactometry, and plain x-rays were assessed and compared on both day 1 and day 7 with the pre-irrigation data. Both groups exhibited considerable improvements in all parameters as compared to their initial baseline. There was no discernible distinction observed between the two solutions (17).

5. CONCLUSIONS

In sinonasal surgery, the postoperative use of isotonic normal saline nasal irrigation therapy is found to be highly tolerable and effective in improving symptoms such as nasal congestion, nasal pain, nasal bleeding, rhinorrhea, and crust formation. The occurrence of adverse effects is minimal, hence enhancing patient adherence and tolerance. Various factors such as patient comfort, convenience, availability, ease of use, and affordability are expected to play a significant role in determining the selection of devices and solutions by individuals. The normal saline solution is readily accessible and cost-effective, rendering it suitable for administration to all patients. There is a substantial body of research that strongly supports the use of saline nasal irrigation as a safe and effective therapeutic approach for treating sinonasal symptoms, regardless of their underlying cause, across all age groups. The aforementioned treatment has been implemented with a high level of safety among individuals of various age groups, including both adults and young people, as well as both males and females. Furthermore, there is a lack of documented evidence regarding any significant side effects associated with this procedure. The study's findings indicate that nasal irrigation is an affordable and straightforward therapeutic approach that effectively alleviates symptoms associated with various sinus and nasal complaints. Therefore, we propose the utilization of

Isotonic nasal irrigation as a supplementary therapy for individuals experiencing chronic sinonasal symptoms. However, additional research is necessary to establish a more substantial effectiveness of saline irrigation treatments in comparison to saline spray for the provision of temporary relief of chronic nasal symptoms. Furthermore, it is imperative to compare the efficacy of saline nasal irrigation and decongestant nasal drops subsequent to nasal septal surgery.

Ethical Clearance:

Ethical issues were taken from the research ethics committee. Informed consent was obtained from each participant. Data collection was in accordance with the World Medical Association (WMA) declaration of Helsinki for the Ethical Principles for Medical Research Involving Human Subjects, 2013 and all information and privacy of participants were kept confidentially.

Conflict of interest: Authors declared none

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