

Original Research Article

Comparative study of hypertonic saline nasal douching versus normal saline nasal douching in post operative endoscopic sinus surgery patients

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ABSTRACT

Background: Nasal douching is routinely done in the post operative functional endoscopic sinus surgery (FESS) patients. Douching helps to clear the nasal cavity of crusts, clots and any infected debris and also promotes quicker mucosal healing.

Methods: A total of 60 patients who underwent FESS in the ENT department were selected for the study. Patients were randomly allocated into two groups. Group 1 patients were subjected to nasal douching using hypertonic saline (3%) in the post operative period while the group 2 patients used isotonic saline (0.9%) for nasal douching. Patients were followed up on the 7th, 15th and 30th post operative day and various parameters were compared using nasal endoscopy, saccharine clearance test, sinonasal outcome test questionnaire (SNOT-22) and visual analogue scale (VAS).

Results: Group 1 patients who used hypertonic saline for nasal douching had a better symptom score on 30th post operative day in SNOT-22 and VAS ($p < 0.05$ in both) as compared with the group 2 patients who used isotonic saline for nasal douching. More patients in group 1 had a healthy and normal appearance of nasal mucosa on endoscopic examination as compared with group 2. There was not much significant difference in the mucocilliary clearance test (MCT) scores of both the group patients.

Conclusions: Patients who used hypertonic saline for douching in the post operative period were found to have lesser crusting, nasal obstruction as compared to those who used isotonic saline for douching.

Keywords: Hypertonic saline, Isotonic saline, Nasal douching, Functional endoscopic sinus surgery

INTRODUCTION

After FESS the nasal cavity is marked by edema, crusting and accumulation of clots and discharge in the immediate post operative period.¹ This leads to marked nasal obstruction, infection, bleeding and synechia formation in the nose.^{1,2}

Therefore nasal douching is advised to patients in the post operative period to prevent such complications and improve the quality of life in immediate post operative

period.² High volume and low pressure nasal douching with saline was found to be very effective in the immediate post operative period.²⁻⁴ Nasal douching helps to clear the nasal secretions, clots and infective debris from the nasal cavity, thereby reducing the chances of synechia formation and improving the mucosal healing.²⁻⁴ Nasal douching is also found to improve the mucocilliary transport function of the nasal mucosa.³ Douching has been tried in the past with different solutions like ringer's lactate, normal saline, budesonide solution with individual advantages and disadvantages.^{3,4} Isotonic

saline has been used as the most preferred solution for nasal douching in the past.⁴

Recently hypertonic saline is used more commonly for douching as it reduces post operative edema and synechia, and improves mucocilliary clearance by affecting the osmotic pressure.⁵ This study is done to compare the effect of hypertonic saline and isotonic saline nasal irrigation in the immediate post operative FESS patients.

METHODS

Study setting

A total of 60 patients between the ages of 20 to 60 years who underwent FESS in the department of Otorhinolaryngology, Teerthanker Mahaveer Medical College were selected for the study after obtaining informed and written consent from them.

Study design: A prospective randomized study.

Study duration: 1 year (from April 2018 to March 2019).

Sample size

60 patients who gave consent for the study were divided into two groups comprising of 30 each.

Inclusion criteria

Inclusion criteria were all patients who underwent FESS in the Otorhinolaryngology department and gave consent for the study.

Exclusion criteria

Exclusion criteria were patients who didn't give consent for the study. Patients who were undergoing revision FESS, had mucocilliary clearance diseases, any history of smoking or chemotherapy were excluded from the study.

Procedure

A total of 60 patients were selected for the study who had undergone FESS in the ENT department. The surgery was done by different surgeons while post operative evaluation was done by the same person. All patients were given antibiotic soaked nasal pack till 48 hrs after surgery. All patients were given the same antibiotic in the post operative period till 7 days and then evaluated on 7th, 15th and 30th postoperative day.

Randomization

All 60 patients were divided into 2 groups, each group consisting of 30 patients. Group 1 patients used hypertonic saline for douching while group 2 patients

used isotonic saline for nasal douching. The decision of whether the patient will be in first or second group was taken by random chit selection. The chit was selected by the observer and patient then put in respective group accordingly.

Nasal douching method

All subjects were made to do nasal douching from the third post operative day, two times a day till one month. 100 ml of the solution was used with 50 ml solution in each nasal cavity for douching. Irrigation was done with a 50 ml syringe and patient had to keep his head bend downwards and mouth open to spit out any fluid coming into throat.

Mucocilliary clearance assessment

Saccharine clearance test was done in all the patients on 7th, 15th, 30th postoperative day. A small piece of the saccharine tablet was placed on the anterior end of the inferior turbinate and the time when the patient gets the taste is noted. All patients were able to taste the saccharine and time taken for that was noted.

Endoscopic assessment

A 0 degree nasal endoscope was used to assess the nasal cavity on the 7th, 15th and 30th post operative day. The general appearance of the nasal mucosa, presence of any edema or synechia was noted. The appearance of nasal mucosa was documented as either normal, edematous or polypoidal. Crusting and synechia were described as nil, mild or severe in nature. Patients were also assessed in the post operative period using the visual analogue scale (VAS) and the sinonasal outcome test – 22 (SNOT-22). VAS scores were used to evaluate the severity of symptoms like headache, nasal obstruction, nasal discharge and facial pain in the post operative patient. Patients who had no symptoms got score of 10 while those with severe symptoms got 0 score.

Statistical analysis

Student's t test was used to determine the statistical significance of difference between both the groups. Data obtained was tabulated using the mean and odds ratio calculated by cross tabulation using a 95% confidence interval. The amount of change obtained in SNOT-22 and VAS score were calculated by subtracting the findings obtained on 7th post operative day from that obtained on the 30th post operative day. Data obtained was analyzed using ANOVA technique and a p value if obtained <0.05 was considered to be statistically significant.

RESULTS

60 patients between 20-60 years of age were selected for the study and divided into two groups. Mean age of patients in the first group was found to be 36.4 while in

second group it was 36.8. There were 14 females (46%) and 16 males (54%) in the first group while second group had 12 females (40%) and 18 males (60%). No statistically significant difference ($p=0.498$ and $p=0.489$ respectively) was found in the age and sex distribution of patients in both the groups.

Endoscopic evaluation

On the 7th post operative day none of the group patients had a normal mucosa while almost same percentage (90%

in hypertonic saline users and 88% in isotonic saline users) of patients in both the groups had an edematous or cobblestone mucosa. On the 30th post operative day more percentage of patients (37%) had normal mucosa in the group who used hypertonic saline for douching as compared to only 18% in the isotonic saline users. Similarly 74% of patients who used hypertonic saline had no crusting on the 30th post operative period in comparison to only 36% in the isotonic saline users. 92% of patients who used hypertonic saline had no synechia as compared to 86% in the isotonic saline user group.

Table 1: Endoscopic appearance of nasal mucosa in the post operative period (n=30).

Day of assessment	Endoscopic nasal mucosa	Hypertonic saline (%)	Isotonic saline (%)	P value
7 th day	Normal mucosa	0	0	0.0436
	Edematous /cobblestone	90	88	
	polypoidal	10	12	
15 th day	Normal mucosa	16	11	0.0412
	Edematous /cobblestone	80	83	
	polypoidal	4	6	
30 th day	Normal mucosa	37	18	0.0367
	Edematous /cobblestone	61	78	
	polypoidal	2	4	

Table 2: Endoscopic scores for crusting inside the nose in post operative period (n=30).

Day of assessment	Crusting inside nose	Hypertonic saline (%)	Isotonic saline(%)	P value
7 th day	No crusting	7	8	0.0442
	Mild crusting	41	38	
	Severe crusting	52	54	
15 th day	No crusting	32	28	0.0408
	Mild crusting	46	31	
	Severe crusting	22	41	
30 th day	No crusting	74	36	0.0386
	Mild crusting	23	41	
	Severe crusting	3	23	

Table 3: Endoscopic scores for synechia in the post operative period (n=30).

Day of assessment	Synechia inside the nasal cavity	Hypertonic saline (%)	Isotonic saline (%)	P value
7 th day	No synechia	78	73	0.0498
	Mild synechia	20	24	
	Severe synechia	2	3	
15 th day	No synechia	86	79	0.0432
	Mild synechia	12	18	
	Severe synechia	2	3	
30 th day	No synechia	92	86	0.0404
	Mild synechia	6	11	
	Severe synechia	2	3	

Mucocilliary clearance test (MCT)

The 30th day MCT values saw a significant improvement in comparison to 7th and 15th post operative day values in

both the groups. While no significant difference was found in the improvement in MCT values in both groups as p values were >0.05 . (15th day value – 7th day value, $p=0.596$. 30th day value -15th day value, $p=0.585$).

Visual analogue scale score

Symptomatic improvement was better seen in the patients who used hypertonic saline for douching in the post operative period. On 30th postoperative day the mean improvement seen in patients doing hypertonic saline douching was 18.2±4.3 whereas it was 13.6±2.8 in the isotonic saline users.

Sinonasal outcome test – 22 (SNOT – 22)

The SNOT -22 scores showed a marked improvement on 30th post operative day with a mean value of 32.8±4.6 in the hypertonic saline users as compared to a modest improvement of 24.2±3.3 in the isotonic saline users..

DISCUSSION

The immediate post operative period in endoscopic sinus surgery is marked by widespread mucosal edema, collection of clots and debris inside the nasal cavity.^{2,5} This is due to altered mucocilliary function of the nasal and paranasal sinus mucosa as a result of surgery, instrumentation and nasal packing.⁶ Thus the post operative patients are advised to do nasal douching after nasal pack removal to reduce the morbidity.⁶

Nasal douching helps to improve the mucocilliary function reduces mucosal edema and remove infected debris and clots from nasal cavity.^{5,7} Different solutions like normal saline, lactate ringer's solution, budesonide solution, and different concentration of hypertonic saline have been tried in the past for nasal irrigation in post operative endoscopic sinus surgery patients.⁷ Many studies have been done in the past comparing the efficacy of these different irrigating solutions with varying results.

This study is done to compare the efficacy of hypertonic saline with isotonic saline in post operative endoscopic sinus surgery patients. Nasal mucocilliary function is the key factor which helps in preventing infections in post operative patients.^{8,9} The efficacy of the nasal mucocilliary clearance can be checked using simple and in expensive saccharine clearance test.^{2,9} Nowadays hypertonic saline is more commonly used for nasal douching than other solutions. Hypertonic saline is thought to act by reducing the release of interleukin -8 which helps to reduce the post operative edema.^{8,9} It also affects the PH of the nasal mucosa thereby having a positive impact on the function, and also physically clears up the crust, debris, clots and inflammatory mediators preventing nasal obstruction in the post operative period.⁹

Despite the presence of many theories it is still unclear how exactly hypertonic saline irrigation improves the mucocilliary function of nose. Studies suggest the release of Ca²⁺ ions from the cells stimulates the ciliary beat frequency.¹⁰ Hypertonic saline use for irrigation for long time can lead to burning sensation and hypersecretion inside the nasal cavity.¹⁰

Kumar J et al found out that hypertonic saline nasal irrigation was more effective than isotonic saline nasal irrigation in post operative endoscopic sinus surgery patients, while Keojampa et al found no difference in efficacy of hypertonic and isotonic saline when used for nasal irrigation in post FESS patients.^{2,11}

Similar studies done by Hauptman et al found that use of buffered isotonic saline helped in relieving nasal obstruction better than hypertonic saline in the post operative period.¹² Similar observations were made in study done by salib et al, who reported that use of high volume low pressure saline irrigations have a better effect than low volume high pressure saline irrigation.¹³

Despite the fact that our study sample size was small our findings will contribute to the pre existing literature and hopefully further studies which will be double blind, and have a larger sample size can give even accurate results.

CONCLUSION

Nasal douching is very essential in post operative FESS patients to improve the quality of life. It improves the mucocilliary transport of nasal mucosa and allows it to heal at a faster rate. Hypertonic saline was found to be more effective than isotonic saline when used for douching in such patients to achieve a faster recovery and symptomless post operative period.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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