AN ALTERNATIVE DELIVERY DEVICE IN NASAL IRRIGATION AFTER SINUS SURGERY

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ABSTRACT

BACKGROUND

Paranasal sinus problems are one among the major identified ENT symptoms in outpatients. Whenever there are alterations in nasal secretions and hindrance in drainage of sinuses, sinus diseases arise. To clear and maintain the proper sinus clearance, alkaline douche, a technique which is already proven and instantly made can be used. This research work tries to evaluate the feasibility of using 20 mL disposable syringe as a nasal delivery device in place of the routine red rubber bulb (RBB) in post-operative sinus patients.

MATERIALS AND METHODS

One hundred and twenty patients who underwent functional endoscopic sinus surgeries during the tenure of 2013 to 2015 in Melmaruvathur Adhiparasakthi Institute of Medical Sciences and Research (MAPIMS) were followed up postoperatively. Simple random sampling was done and was divided into two groups. One group used red rubber bulb and the other group used plastic syringe as a nasal delivery device. All patients were enquired with preformed questionnaires regarding pain and compliance and diagnostic endoscopic findings pertaining to persistent nasal discharge and synechiae were documented.

RESULTS

Syringe users showed lesser compliance than RRB users. It was evident that plastic material was more irritant than rubber bulb which was found out through questionnaire. Synechiae formation is more common in plastic syringe (39%) compared to RRB users (22%) especially in the region of anterior end of inferior turbinate, but these results doesn't satisfy the statistical significance($p=1.22$).

CONCLUSION

Even though disposable syringe is easily and readily available delivery device, its lesser compliance, more synechiae formation limits recommendation of plastic syringe to our post-operative patients.

KEYWORDS

Plastic Syringe, Red Rubber Bulb, Nasal Delivery Device.

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BACKGROUND

Paranasal sinuses are a group of air containing spaces around the nasal cavity. Mucosal secretion and air conditioning are primary functions of sinuses which is maintained properly by the mucociliary clearance of cilia present in the sinus. Any dysfunction in clearance leads to stasis of mucosal secretion and subsequently causes acute inflammation of the sinuses. The motto of the surgery is to widen the outflow tracts of sinuses.

Functional endoscopic sinus surgery helps to improve sinus ventilation and retain mucociliary clearance. The goal is to maintain the patency and mucociliary clearance after surgery. Nasal douching is one such manoeuvre to fulfil the

requirement. Here, the challenge lies in selecting the ideal solution and ideal delivery device. Isotonic saline solution, hypertonic saline,¹ sea water² and baby shampoo³ were tried in various studies. Otolaryngologists observed that saline irrigation after surgery reduced the risk of postoperative mucosal adhesions and enhanced mucosal healing rather than just clearing secretions, debris and crusts.⁴ Universally accepted ideal recipe for douching is salt and sodium bicarbonate in water.

The ideal delivery system should be comfortable to use, easy to clean, and inexpensive. Two varieties of device already exist in the market namely "Negative pressure delivery device" and "Positive pressure delivery device". Solution being drawn into the nose, i.e. sniffed from a bottle or snorted from a cupped hand is called negative pressure delivery. Positive pressure devices actively deliver the solution into the nose, either by gravity (neti pot), hand-generated pressure (bulb syringe, squeeze bottle).

Red rubber bulb syringe is the preferred delivery device in many hospitals all over the world. It satisfies two criteria i.e. comfortable to use and inexpensive but difficult to clean. Cleaning and sterilisation can be done by placing in hot water, which subsequently leads to spoilage of rubber. In case of replacement especially for patients residing in rural areas, he/she needs to commute to nearby hospitals to avail or buy

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the red rubber bulb. This ultimately leads to discontinuation of nasal douching.

To solve this problem, this paper discusses on an alternative delivery device which uses 20 mL disposable plastic syringe which is comfortable to use, inexpensive and also readily available in all pharmacies. This study had a valid reason of selecting 20 mL syringe because of easy availability which makes it replaceable without difficulty instead of repeated sterilisation.

MATERIALS AND METHODS

Around 120 functional endoscopic sinus surgeries with or without septoplasty for sinusitis and sinonasal polyposis in MAPIMS were carried out between the years 2013-2015. Importance was given to post-operative nasal cleaning to maintain sinus drainage naturally. The routine alkaline douche recipe was not changed, whereas alternative nasal delivery device (i.e.) 20 mL disposable plastic syringe was used instead of routine red rubber bulb. The study group was divided in to two groups by simple random sampling.

The inclusion criteria incorporated the following – (a) Age above 22 years, (b) Endoscopic sinus surgery patients for sinusitis and sinonasal polyposis, (c) Patient's acceptance and consent for study.

The exclusion criteria had the following – (a) Patients who doesn't turn up for regular review (at least once in a month for six months or totally 6 visits in 6 months), (b) Patients who haven't used nasal douching method.

Alkaline douche solution is prepared by adding 2 tablespoons of common salt and 1 tablespoon of baking powder in one litre of lukewarm water. Patients were advised to use half litre of solution three times daily. Douche solution is sucked into the nasal delivery device (red rubber bulb and 20 mL plastic syringe) and the crusts in the post-operative nasal cavity were flushed out by inserting tip of the device in to anterior naris. Patients were cautioned that initial use of nasal douching may cause tickling sensation of the nose and sometimes mild spot bleeding can be noticed in the discharged douche solution.

RESULTS

The findings were made in 120 patients, out of which only 88 of them had satisfied both inclusion and exclusion criteria. 47 were male (53.4%) and 41 were female (46.6%) in the above mentioned 88, in which 32 of them used red rubber bulb and 56 people used plastic syringe. Each of them had regular followup.

	Frequency	Percent
Female	41	46.6
Male	47	53.4
Total	88	100.0

Table 1. Sex Distribution

Criteria was fixed to achieve good compliance wherein the patients were advised to use delivery devices at least once in a day, even if they had issues like nasal pain, lack of time, etc. Red rubber users showed good compliance than syringe users. As per the questionnaire it was clear that the patients preferred rubber material than the plastic syringe because of its less irritancy. Our results also satisfied statistical significance.

	Good	Poor	Total
Red Rubber	25	7	32
%	78%	22%	36%
Syringe	31	25	56
%	55%	45%	64%
Total	56	32	88
%	64%	36%	
	Chi Square	4.56*	P<0.05

Table 2. Compliance of Nasal Douching

Fifty four percent of syringe users experienced pain during nasal douching compared to thirty one percent RRB users. The pressure exerted in the plastic syringe is along the direction of water flow; syringe moves and hits the nasal mucosa while pressing the piston. This was found to be a reason for more pain in patients using syringe.

	Pain		
	No	Yes	Total
Red rubber	22	10	32
%	69%	31%	36%
Syringe	26	30	56
%	46%	54%	64%
Total	48	40	88
%	55%	45%	
	Chi Square	4.09*	P<0.05

Table 3. Pain during Alkaline Douche in Two Groups

The most common undesirable presentations of the study were pain and synechia formation. The extent of study of using these two techniques is limited by the above mentioned presentations. Based on the post-operative evaluation of the usage of RRB & 20 mL syringe and also considering the limiting factors, it is found out that synechia formation is the most common complication of both techniques. Its incidence is lesser in RRB users. The study also aimed at an important outcome in post FESS patients which was judged by the persistence of nasal discharge in the corresponding sinus surgery area, during diagnostic nasal endoscopy. Plastic syringe users had little more percentage of nasal discharge than that of rubber bulb users as shown in the Table 4.

Cross Tabulation						
			Endoscopic Findings			Total
			Discharge	Normal	Synechia	
Treatment	Red Rubber	Count	6	19	7	32
		%	19%	59%	22%	36.4%
	Syringe	Count	13	21	22	56
		%	23%	38%	39%	63.6%
Total		Count	19	40	29	88
		% within DNE	100.0%	100.0%	100.0%	100.0 %
Table 4. Endoscopic Findings in Both Groups						

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Chi square = 4.205, p= 0.122 non-significant

DISCUSSION

Nasal douching with saline is the preferred solution⁵ in post-FESS patients in many institutes all over the world. The only difference is in the way it is delivered like using neti pot, nasal spray, irrigation bottles, etc. In this study, 20 mL plastic syringe (nasal delivery device) was introduced with the regime of nasal irrigation, where the patient has to use it at least once a day.

Wei JL et al⁶ tried once daily irrigation in his study, but they tried in unoperated paediatric patients with chronic rhinosinusitis and their duration of followup was six weeks only. Compliance in their study was about 94% which is greater than best compliance in red rubber users (78%) in our study. Wei JL also documented high tolerance, compliance, and effectiveness of nasal irrigation made it as a first-line treatment for paediatric chronic rhinosinusitis even before considering surgical intervention.

Around 45% of plastic syringe users and 22% of red rubber bulb users in this study discontinued the douching. Mari Egan⁷ also documented significant portion (21%) of pot users and 7% of nasal spray users discontinued treatment in his study. The reasons for non-compliance in this study were nasal pain, irritant plastic material, burning sensation due to saline solution, etc.

Out of 120 patients, only 88 (73.33%) patients had regular followup which is comparatively greater than 51.4% patients in Keerl R⁵ et al study. But their followup period was greater for about 27-36 months compared to the followups that was carried out in our study postoperatively for a period of six months.

Rabago D quoted that acceptance, ease of use, training, cost, and head position may all contribute to the overall effectiveness of nasal delivery devices in nasal irrigation.⁸ Both Brook I and Heatley DG accepted that reusable products has lower cost per irrigation compared with preformed nasal sprays, although there may be more risk of contamination in reusable delivery products.^{9,10} The product in this study had low volume (20 mL) compared to rubber bulb which has a capacity to deliver 80 mL and also there is difference in the direction of pressure exertion. Even though the red rubber bulb is 2.5 cm long, it can reach the nasal cavity only up to 1 cm from the external naris which can be done with the plastic syringe itself. Synechiae was present more in the plastic syringe users (39%) than rubber bulb users (22%) especially in between inferior turbinate and nasal septum and approximately 1 cm from external naris. The direction of pressure exertion in syringe was parallel to the direction of water flow which made the syringe to move forward. This was the cause for more synechiae formation and its plastic consistency also caused more pain. The pressure exerted in the red rubber bulb was perpendicular to the direction of water flow and there was no forward movement of tip of rubber bulb during nasal cleaning, which caused comparatively lesser synechiae and its rubber material caused lesser pain.

CONCLUSION

The above article with detailed study took up plastic syringe as an alternative delivery device for nasal irrigation. Positive aspects of using this device are that the plastic syringes are easily available, easy to use, can be replaced easily, etc., Test and trials were made and the feasibility of using this device resulted only up to 55% because of its evident formation of synechiae and pain.

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