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ENT

The Value of Intranasal Splints After Partial Inferior Turbinectomy

KEY WORDS: Partial inferior turbinectomy, Inferior turbinate hypertrophy, Intranasal splints, Nasal obstruction

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ABSTRACT

This is a Prospective, randomized comparative study for assess the value of using the intranasal septal splint after partial inferior turbinectomy (PIT). The study was conducted over a period of 2 years from January 2015 to January 2017 at Mallareddy hospital,MRIMS Hyderabad, India.A total of 100 patients underwent bilateral PIT. The total cases of 100 were randomly divided into 2 groups. Group A included 50 patients of PIT with intranasal splints and group B included 50 patients had PIT without splints. A comparison was made between the 2 groups regarding the postoperative pain, degree of nasal obstruction and the degree of tissue healing and adhesions formation at 2 time points (2 and 4 weeks postoperatively). At 2 weeks postoperatively: visual analogue score (VAS) for the pain was 5 in group A versus 2.1 in group B (P = 0.01), VAS for nasal obstruction was 6 in group A versus 5 in group B (P = 0.328), 70 % of patients had good healing in group A versus 24 % in group B (P = 0.02). At 4 weeks postoperatively: VAS for the pain was 1.5 in group A versus 1.8 in group B (P = 0.423), VAS for nasal obstruction was 7 in group A versus 6 in group B (P = 0.353), 80 % of patients had good healing in group A versus 54 % in group B (P = 0.03). The use of intranasal septal splints after PIT without septal surgery can cause increased postoperative pain in the short term follow-up period with significant evidence of decreasing rates of intranasal adhesions.

Introduction

Hypertrophy of inferior turbinates is a common cause of the nasal airway obstruction. When conservative treatment is not enough to offer a good nasal permeability, surgical treatment should be indicated. While turbinate surgery is commonly practiced, there has been a long disagreement over its clinical effectiveness and long-term benefit [1]. A variety of surgical procedures are performed for treatment of hypertrophic inferior turbinates such as total, partial or submucousturbinectomies, turbinoplasties, besides other procedures, such as electrocautery, chemocautery, cryosurgery, laser surface surgery. A recent addition is endoscopic shaver turbinectomy and coblation [2]. However the surgery widely practiced in our setup is "bilateral partial inferior turbinectomy". Any surgical procedures performed upon the nasal turbinates are certain to interfere with their physiological function. This interference and the possibility of postoperative complications are main reasons for the controversial attitudes toward this operation [3].

Nasal packing is used primarily to control bleeding in all endonasal surgery. It is also used for internal stabilization following operations on the cartilaginous/bony skeleton of the nose [4]. There are no generally accepted standards regarding the materials that should be used for nasal packing, how long the packing should be left in place or the indications for nasal packing [5]. Most sources describe experience with different kinds of packing methods and packing materials. Materials are produced in several brands and authors have their preferences. The most common packing method is the use of nasal packing materials such as: Telfa, paraffin gauze, Vaseline gauze, bismuth iodoform paraffin paste, glove fingers, silastic sheets, Oxycel, Surgicel, Gelfoam, Merocel [6], gauzes impregnated with different antibiotics, and fibrin glue [7]. Other packing methods are pneumatic balloons left in place for various amounts of time.

Some complications in endonasal surgery are induced by nasal packing, these are the result of increased swelling causing a disturbance in endonasal lymph and venous drainage. These complications are: mucosal injury and loss of ciliary function even in absence of surgical incisions, sleep respiratory disturbances [8], decreased arterial oxygen saturation during sleep [9], displacement and aspiration of various packing materials [10], allergy; toxic shock syndrome [10, 11], Eustachian tube dysfunction and paraffin-induced granuloma. Nasal packs are uncomfortable while they are in place and cause pain and bleeding when they are removed.

Intranasal splints are widely used after nasal septal surgery for the prevention of intranasal adhesions between the nasal septum and lateral nasal wall and to support the septal position [12]. However, the value of its use after partial inferior turbinectomy without septal surgery was not adequately addressed in the literature before. The aim of this study is to assess the role of intranasal septal splints to prevent intranasal adhesions after partial inferior turbinectomy.

Aims and objectives.

1. To evaluate Pain, nasal obstruction and healing in patients with intranasal splints and without intranasal splints 2 weeks after partial inferior turbinectomy
2. To evaluate Pain, nasal obstruction and healing in patients with intranasal splints and without intranasal splints 4 weeks after partial inferior turbinectomy

Materials and Methods

Study Design and Population

The current study is a prospective double-blinded randomized, comparative study conducted over a period of 2 years from January 2015 to January 2017 at Otolaryngology, Mallareddy hospital, Hyderabad, India. The study included 100 patients; out of them 40 were males and 60 were females; age range varied from 18 to 45 years. These patients were selected for bilateral partial inferior turbinectomy as they were suffering from inferior turbinate hypertrophy refractory to medical treatment. Patients were divided in two groups (A and B); group A: had bilateral partial turbinectomy with the use of intranasal splints. Group B: had bilateral partial turbinectomy without use of splints. Each group included 50 patients randomly divided using table of randomization. For every patient a thorough medical history was taken with special attention to nasal symptoms (nasal obstruction, nasal discharge, sneezing and snoring).

Nasal examination with nasal endoscope (4 mm diameter; 0° and 30°) was used to assess the turbinate size according to the following classification [13]: (grade 1: normal sized inferior turbinate fully retracted, grade 2: moderate size turbinate engorgement filling half of the nasal cavity not touching nasal septum with nasal obstruction that responds to local decongestant and grade 3: inferior turbinate engorgement reaching the nasal septum with nasal obstruction that doesn't respond to local decongestant). Each patient had an axial and coronal computed tomography (CT) for the nose and paranasal sinuses.

Inclusion criteria: Patients with grade 2 or 3 hypertrophy of their turbinates and not responding to medical treatment in the form of 3 months of local corticosteroids nasal sprays (2 puffs in each nostril once daily), systemic decongestants in the form of pseudoephedrine (45–120 mg every 12 h).

Exclusion criteria: Any patient with other cause of nasal obstruction e.g. (patients with marked septal deviation undergoing septoplasty, patients with nasal polyposis, antrochoanal polyps or sinonasal tumors, patients with previous nasal operation, also excluded patients with marked adenoid hypertrophy undergoing adenoidectomy).

Partial Inferior Turbinectomy Procedure and Postoperative Care

All surgeries were performed by the senior author. All the patients had a Complete blood count (CBC), Prothrombin time (PT) and activated partial thromboplastin time (aPTT) to rule out any coagulation disorder, none of the patient were receiving any NSAIDS or anticoagulants before surgery. All of the patients were admitted one night before surgery. General anesthesia with orotracheal intubation and the throat was packed in a standard fashion to prevent trickle down of blood into the hypopharynx. The nose was packed with ribbon gauze soaked in a mixture of 4 % xylocaine solution with Xylometazoline prior to the surgery and pack was left for at least 5–7 min. Once packs were removed the inferior turbinates were medialized using a blunt freer type of elevator and were trimmed by an angled turbinectomy scissors. Resection included the mucosa as well as part of the bone, the extent of resection depend on the degree of hypertrophy. In both cases the hemostasis was secured by putting ribbon gauze soaked in Xylocaine and Xylometazoline solution. In the final stages of the operation, the surgeon was informed whether the patient had been allocated to the splint or non-splint group through the method of four block randomization. If the patient was enrolled in the splint group, intranasal silicone splints [50 × 70 × 1 mm] trimmed to avoid touching either the nasal roof or the floor and the shape of the splint tailored according to the dimensions of the subject's nasal cavity and then inserted into both nasal cavities and fixed by one 3-0 Nylon sutures that crossed both septal sides and splint. After the surgery, anterior merocel nasal packs in each nasal cavity were left in situ for 2 days and the nasal splints were removed after 1 week.

All patients received postoperatively antibiotics in the form of cephalosporin (500 mg twice daily) and analgesics in the form of paracetamol (500 mg three times per day) for 7–10 days, also patients were instructed to use alkaline nasal douching with sodium bicarbonate for 2 weeks postoperatively.

Postoperative Evaluation

We assessed patients postoperatively at two time-points (2 and 4 weeks) regarding the postoperative pain, change of nasal obstruction and the degree of intranasal adhesions. Postoperative pain was analyzed according to visual analogue score (VAS) system [14] by asking the patient to score pain from 1–10 and was categorized as follows: mild pain: 1–3, moderate pain: 4–7 and severe pain: 8–10. Nasal obstruction also was analyzed according to VAS system [14] by asking the patient to score the relief of nasal obstruction from 1–10 and was categorized as follows: no improvement (VAS 1–3), partial improvement (VAS 4–7) and complete improvement (VAS 8–10).

Tissue healing was assessed by the senior author in all patients by using nasal endoscope (4 mm diameter; 0° and 30°) according to the following score [14]: good healing: minimal crustations and no nasal synechiae, moderate healing: mild to moderate crustations with mild nasal synechiae and poor healing: delayed mucosal re-epithelization, severe crustations and marked nasal synechiae. We didn't try to divide the formed intranasal adhesions to assess the natural process of the tissue healing, there were no differences in postoperative care methods among the patients in both groups.

Ethical considerations:

Institutional ethics committee permission was obtained. Informed consent was obtained,Explanation of the research was provided to each patient.

Statistical Analysis

The data was entered in Microsoft Excel Work Sheet and analyzed using proportions,Student's t tests were used to obtain information and analyze data. Descriptive approaches were used to evaluate the age and gender distribution.

Results

Characteristics of Enrolled Patients

After completion of follow-up, 100 patients were eligible for final analysis. There were 50 patients in the splint group (group A) and 50 patients in the non-splint group (group B). In group A, 24 (48 %) patients were male and 26 (52 %) were female. The mean age was 24.6 years. In group B, 27 (54 %) patients were male and 23 (46 %) were female with mean age 27.5 years with no statistically differences between the 2 groups regarding the sex and age distribution. In group A, there were 27 (54 %) patients with bilateral hypertrophied turbinates grade 2 and 23 (46 %) patients with grade 3. In group B, 25 (50 %) patients had grade 2 of turbinate hypertrophy and 25 (50 %) patients with grade 3. There was no significant difference regarding the stage of turbinate hypertrophy between the 2 groups.

Table 1 illustrates the preoperative distribution of different nasal symptoms in the 2 groups.

Nasal symptoms patients	Group A (splint group) 50 patients	Group B (no-splint group) 50
Nasal obstruction	50 (100 %)	50 (100 %)
Postnasal discharge	25 (50 %)	27 (54 %)
Headache	12 (24 %)	11 (22 %)
Change of smell	2 (4 %)	3 (6 %)
Halitosis	2 (4 %)	1 (2 %)
Snoring	12 (24 %)	15 (30 %)

Table 2. At 2 Weeks Postoperatively:
Comparison between the 2 groups at 2 weeks postoperatively

SYMPTOMS	Group A (splint group) N 50 N(%)	Group B (non-splint) N 50 N(%)	P value
Pain			
Mild	5 (10)	15 (30)	0.3
Moderate	25 (50)	30 (60)	0.4
Severe	20 (40)	5 (10)	0.001
Nasal obstruction			
No improvement	0	0	1.00
Partial improvement	25 (50)	28 (56)	0.1
Complete improvement	25 (50)	22 (44)	0.1
Healing			
Good	25 (50)	7 (14)	0.003
Moderate	20 (40)	30 (60)	0.2
Poor	5 (10)	13 (26)	0.1

The comparison of postoperative pain and discomfort, revealed that the average VAS score was 5 in the group A and 2.1 in the group B with a significant difference (P = 0.01). The average VAS for the relief of nasal obstruction was 6 in group A and 5 in group B with no significant difference (P = 0.328). Regarding the intranasal adhesions: In group A: 35 (70 %) patients had good healing, 12 (24 %) patients had moderate healing and 3 (6 %) patients had poor healing. In group B: 20 (40 %) patients had good healing, 20 (40 %) patients had moderate healing and 10 (20 %) patients had poor healing. The difference between the 2 groups was statistically significant (P < 0.05) with a better healing in group A.

Table 3. At 4 Weeks Postoperatively:
Comparison between the 2 groups at 4 weeks postoperatively

SYMPTOMS	Group A (splint group) N = 50 N(%)	Group B (non-splint) N = 50 N(%)	P value
Pain			
Mild	20(40)	35 (70)	0.2
Moderate	30 (60)	15(30)	0.4
Severe	0 (92)	0(80)	1.00

Nasal obstruction			
No improvement	0	0	1.00
Partial improvement	15(30)	20(40)	0.4
Complete improvement	35(70)	30(60)	0.3
Healing			
Good	35(70)	10(20)	0.0033
Moderate	12(24)	35(70)	0.09
Poor	3(6)	5(10)	0.3

The average VAS score was 1.5 in group A and 1.8 in group B with no significant difference between the 2 groups (P = 0.423). The average VAS for the relief of nasal obstruction was 7 in group A and 6 in group B with no significant difference (P = 0.353). Regarding the intranasal adhesions: In group A: 40 (80 %) patients had good healing, 8 (16 %) patients had moderate healing and 2 (4 %) patients had poor healing. In group B: 27 (54 %) patients had good healing, 15 (30 %) patients had moderate healing and 8 (16 %) patients had poor healing. The difference between the 2 groups remained statistically significant ($P < 0.05$) with better healing in group A.

Discussion

Prolonged persistent nasal obstruction resulting from inferior turbinate hypertrophy is a common complaint encountered in the rhinology practice. The inferior turbinates play a major role in the regulation of nasal airflow and development of nasal obstruction. Surgical turbinate reduction is often performed in patients after unsuccessful medical management of the turbinate hypertrophy. Inferior turbinate reduction can be performed by various techniques that resect, displace or decrease the volume of the turbinate [15]. The goals of surgery are to maximize the nasal airway, to preserve the nasal mucosal functions and to minimize the complications. One of the risks of surgery is hemorrhage; patients with coagulopathies are clearly at increased risk of complication [16]. The surgery to reduce the inferior turbinate has been modified and enhanced in the last few years [1]. These changes are important to achieve better results in the post-surgical period, as well as make the surgery less painful and uncomfortable to the patient.

The use of intranasal packing after turbinectomy is important, Velasco et al. [17] observed that the post-surgical bleeding degree of the group submitted to bilateral partial inferior turbinectomy who used the nasal pack was lower than the group not using a pack, However the use of nasal packs carry a lot of complications especially the tissue injury. Chaw et al. [18] in his study on nasal mucosa of sheep reported that the use of nasal packs resulted in a significant loss of the ciliated surface of the mucosa when compared with the control group and he attributed the formation of nasal synchia postoperatively due to the loss of the normal mucosa.

Intranasal splints are widely used after nasal septal surgery for prevention of intranasal adhesions and support of septal position. However the role of these splints in turbinate reduction surgery without septal surgery was not addressed in the literature before, and that was our aim of this resent study. We assessed our patients at 2 time-points to score the postoperative pain and the degree of mucosal healing and adhesion formation in 2 groups of patients had bilateral partial inferior turbinectomy (group A with septal splints and group B without splints). In our study it was clear that the use of intranasal splints resulted in significant nasal pain and discomfort during the 1st week of postoperative follow-up, these results matched the results of published studies that found patients who had septoplasty (group with intranasal splints and another group without splints) with inferior turbinectomy or not, experienced a similar degree of pain within the first 48 h, but at 1 week the mean pain score was higher in the splints group [19, 20]. However, Jung et al. [21] reported that at 1 week, the nasal discomfort score was not significantly different on the splint and control sides. In the early postoperative period, mucosal swelling of the nasal cavity and crust formation can be a causes of nasal discomfort. The insertion of a silastic septal splint caused significant increase in nasal discomfort at this time-point of the study. However, at 4 weeks postoperatively there was no significant difference between the 2 groups.

The use of splints in our study resulted in a significant decrease in the degree of intranasal adhesions formation after partial turbinectomy surgery that maintained all over the 1st postoperative month. These results matches the results addressing the use of splints after septoplasty with or without turbinectomy. Malki et al. [20] used trimmed Silastic splints, and found at 6 weeks, 1.8 % of the splint group had intranasal adhesions compared to 7.7 % of the no-splint group, but this difference was not significant. Von Schoenberg et al. [22] found the highest incidence of intranasal adhesions occurred in patients who had surgery concurrently on both the septum and the lateral nasal wall, of these, 31.6 % of the no-splint group had adhesions at 1 week compared to 3.6 % in the splint group and at 3 months, both groups only had 1 patient each with adhesions, notably, these authors included division of adhesions under topical anesthesia as part of routine postoperative nasal toilet.

It has been reported that there are no clear advantages to inserting an intranasal splint and that they should be used sparingly [19, 22]. However, these reports were published in the early 1990s, before development of the current-day more flexible and biocompatible splints. The key point for insertion of the septal splint is proper positioning of the splint on the septum [21]. Gunter [23] reported that splints must not touch the roof or floor of the nose. We think that our results attributed to the fact that nasal packing either as a preliminary before the operative steps, frequent suctioning with sharp suction tips and nasal packs at the final of the operation results in minor trauma to the nasal septal mucosa and loss of ciliated epithelium that promote the postoperative adhesions and may affect the procedure outcome. It was also clear from our results that the degree of intranasal adhesions decreased by the time and this reflects the importance of alkaline nasal douching in promoting mucosal re-epithelization and healing [24]. Our study can open a new era for further research and longer follow-up periods regarding the role of intranasal splints in nasal surgery.

Conclusion

From our study we can conclude that the use of intranasal septal splints after partial inferior turbinectomy without septal surgery can cause increased postoperative pain in the short term follow-up period with significant evidence of decreasing rates of intranasal adhesions.

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