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Research Paper

Nasal septum suture combined with inferior turbinate coblation after septoplasty: Does it improve quality of life and reduce complications?

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Abstract *Objective:* Nasal packing is routinely applied after septoplasty. Patients, however, report feeling very uncomfortable while the packing is in place. The aim of this study was to compare the effects of nasal septum suture combined with inferior turbinate coblation to the effects of nasal packing after septoplasty.
Methods: In this study, 135 patients undergoing septoplasty were divided into 3 groups: group 1 patients had microdebrider with packing, group 2 received coblation with packing and group 3 had coblation with suture. Early postoperative quality of life and complications were compared between the 3 groups.
Results: The patients in group 1 experienced the most postoperative nasal pain, headache, dysphagia, sleep disturbance and bleeding on the night of surgery; while the patients in group 3 experienced the fewest symptoms. No difference in epiphora was observed between the 3 groups. More pain and bleeding were experienced when comparing the pack removal (Group 1 and 2) with the clearance of the nasal cavity (Group 3). We noted one case of postoperative bleeding in group 1, one septal hematoma in group 1 and a second septal hematoma in group 2. No such postoperative complications were found in group 3.

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Conclusion: Nasal septum suture combined with inferior turbinate coblation was not only associated with less pain, increased patient satisfaction and an improved quality of life; but also reduced postoperative complications. Our results confirm that it is a more comfortable, reliable alternative to the more common nasal packing.

Introduction

Septoplasty is currently the only way to treat nasal septum deviation. It not only alleviates the symptoms of patients, but also provides a wide space for access to the middle meatus during endoscopic sinus surgery.[1] Nasal packing after septoplasty is routinely performed by most surgeons to reduce complications. However patient discomfort is always the most common complaint. Patients have, in fact, reported suffering pain constantly until the removal of the packing material.[2–4] This pain is especially severe at the time of nasal tampon removal,[5] and has always been regarded by patients as one of their most painful experiences.

Some surgeons have reported that septum suture during septoplasty without nasal packing is safe and effective.[6,7] However, only septoplasty was performed in most of these studies, and turbinoplasty was usually omitted. Septoplasty without inferior turbinate reduction cannot totally resolve nasal obstruction. If inferior turbinate reduction is performed simultaneously with a microdebrider to reduce the soft tissue of a hypertrophied inferior turbinate, nasal packing is always inevitable. This study was designed to combine the septum suture technique with inferior turbinate coblation during septoplasty and turbinoplasty. To the best of our knowledge, this study is the first time the 2 techniques have been combined during septoplasty and inferior turbinate reduction, eliminating the need for nasal packing.

Materials and methods

Patients

A total of 135 patients suffering from nasal obstruction due to nasal septum deviation and inferior turbinate hypertrophy were recruited for this study. All subjects were of the Han nationality and ranged in age from 18 to 60 years. Hypertension, diabetes, cardiac issues and other health problems were excluded. A CT scan was performed to preclude any other nasal diseases. Routine preoperative laboratory tests were normal for all subjects. Procedures were performed in the ENT department of the People's Hospital of Peking University in China, and all subjects gave informed written consent after acknowledging full understanding of the study. The study was approved by the Ethics Committee of Peking University, and was performed in accordance with the principles stated in the Declaration of Helsinki. Patients were equally allocated into 3 groups randomly matched for age and gender.

Patients in group 1 received treatment by microdebrider with packing. Merocel R was used for nasal packing after septoplasty and powered inferior turbinate reduction. Patients in group 2 received coblation with packing. Merocel R was used for nasal packing after septoplasty and inferior turbinate coblation. Patients in group 3 had coblation with suturing. Septal suture and inferior turbinate coblation were performed after septoplasty without nasal packing.

Surgical procedure

1. Septoplasty and powered turbinoplasty

Endoscopic septoplasty was performed by a standard technique under general anesthesia. After muco-perichondrio-periostal elevation, the deviated bony septum was removed and the cartilaginous part was retained and repositioned. Any visible residual deviation within the cartilage was weakened by multiple incisions.

In group 1, the hypertrophy of the inferior turbinate was reduced with a powered microdebrider in a classic technique.[8] Two pieces of Merocel (Metronic Xomed, Jacksonville, FL, USA) were inserted into both nostrils at the conclusion of surgery and the tampons were removed during the following 24—48 h.

2. Coblation of the inferior turbinate

In groups 2 and 3, inferior turbinate reduction with coblation followed the previous protocol.[9] Briefly, the nasal cavity was topically anesthetized with surgical neuro patties soaked with dicaine. The hypertrophy of the inferior turbinate was infiltrated with 2.5 ml of 1% lidocaine. First, outfracture was performed by an elevator to fracture the inferior turbinate laterally, and then coblation (Arthrocare Corp., Sunnyvale, CA) was performed. The wand was kept in position for 15 s at power level 4; withdrawal was performed at coagulation mode. The coblation wand was inserted into the mucosal enlargement in the anterior, the middle and the posterior portion of the inferior turbinate. The number and depth of passes were determined by the preoperative turbinate size and visual shrinkage during the procedure. For the subjects in group 2, 2 pieces of Merocel R were also inserted into both nostrils after surgery and were removed within 24—48 h. In group 3, no postoperative packing was placed in the nasal cavity after surgery.

3. The septal suture technique

In group 3, the continuous quilting suturing technique was performed with a slight modification.[10] Briefly, a 4.0 Vicryl Rapide (violet braided) absorbing suture was used

(Ethicon Inc, Somerville, NJ, USA) on a small, curved cutting needle (FS-2). A knot was placed in the distal end of the suture material. A needle was held along the shaft of the needle holder. The first suture passed just anterior to the middle turbinate. The needle was passed back through the septum, anterior to the middle turbinate, to the opposite side. A space of a few centimeters was then left before passing the needle through the septum, creating a quilting effect. Using a continuous suturing technique, flaps were approximated as the needle was advanced towards the caudal end of the septum. The final pass of the suture was placed just anterior to the incision site through the skin of the vestibule. At the conclusion of the suture, only one very small piece of Nasopore (Polyganics, Rozenburglaan, Groningen, The Netherlands) was placed at the bent area if the remaining cartilaginous portion is still somewhat deviated in some patients because of cartilage memory. No other tampon was inserted into nasal cavity. The nasal cavity was cleaned 48 h after surgery.

Assessment

The patients were asked to evaluate their discomfort and symptoms, including nasal pain, headache, epiphora, dysphagia, sleep disturbance and bleeding on a visual analog scale (VAS) of 1 (minimal) to 10 (unbearable) on the evening of surgery. When the Merocel was removed (groups 1 and 2) or the nasal cavity was cleaned (group 3), postoperative discomforts, including pain and bleeding were scored again on the same scale.

Patients were followed in clinic within 1 month after surgery. Postoperative bleeding, infection, septal perforation, septal hematoma and synechia formation were checked and recorded.

Statistical methods

Statistical analysis was performed with SPSS package version 13.0 for Windows. Comparisons between groups were made by using the one way analysis of variance (ANOVA) or ANOVA on ranks (the Kruskal–Wallis method, in cases of non-normally distributed outcomes). Pairwise multiple-comparison procedures with Bonferroni's or Dunnett's (in cases of non-normally distributed outcomes) methods were performed if the change was significant. A P value of <0.05 was considered statistically significant.

Results

Patient characteristics

All groups consisted of 45 patients. Group 1 had a distribution of 39 male and 6 female subjects, with a mean age of 37. In group 2, there were 37 male and 8 female subjects, with a mean age of 36. The final group consisted of 38 male and 7 female subjects, with a mean age of 36. There was no significant difference in sex or age between groups.

Comparison of the discomforts on the night of surgery between the 3 groups

As shown in Table 1, the patients in group 1 suffered the most significant nasal pain, headache, dysphagia, sleep disturbance and bleeding on the night of the surgery. These results were all calculated by one-way ANOVA, with the exception of the headache score, which was calculated by the Kruskal–Wallis method ($P < 0.001$). Nasal pain ($\bar{x} = 6.7$) and bleeding ($\bar{x} = 7.4$) were the most severe complaint of the patients in group 1. While the nasal pain ($\bar{x} = 2.1$) and bleeding ($\bar{x} = 1.7$) in group 3 were significantly less than the other 2 groups.

Comparison of the postoperative discomforts concerning packing removal (group 1 and 2) and clearing of the nasal cavity (group 3) between the 3 groups

As shown in Table 2, the patients of group 1 still suffered the most significant postoperative pain ($\bar{x} = 8.7$) and bleeding ($\bar{x} = 7.2$). While the postoperative pain ($\bar{x} = 1.6$) and bleeding ($\bar{x} = 1.1$) in group 3 was significantly less than the other 2 groups (One way ANOVA, $P < 0.001$).

Comparison of follow-up clinic visits within 1 month of surgery

During the patients' follow-up visits in clinic, we observed one case of postoperative bleeding in group 1, one case of septal hematoma in group 1 and one case of septal hematoma in group 2. We also noted 2 cases of synechia in group 1, 3 cases in group 2 and 2 cases in group 3. The case of

Table 1 Analysis results of the comparison between the 3 groups' discomforts on the night of surgery.

Symptoms	VAS scores ($\bar{x} \pm$ SD)			F value	P value
	Group 1 $n_1 = 45$	Group 2 $n_2 = 45$	Group 3 $n_3 = 45$		
Nasal pain	6.7 ± 1.6	3.8 ± 1.7	2.1 ± 1.7	86.8[a]	<0.001
Headache	4.9 ± 1.7	4.0 ± 1.5	2.3 ± 2.2	34.1[b]	<0.001
Epiphora	1.5 ± 1.1	1.9 ± 1.6	1.2 ± 1.5	2.8[a]	0.063
Dysphagia	5.7 ± 1.7	2.4 ± 2.3	1.3 ± 1.7	66.4[b]	<0.001
Sleep disturbance	3.0 ± 1.8	3.4 ± 2.2	1.7 ± 1.6	214.8[a]	<0.001
Bleeding	7.4 ± 1.8	2.9 ± 1.0	1.7 ± 1.2	304.2[a]	<0.001

[a] One Way ANOVA, F value.
[b] Kruskal–Wallis method, Chi-Square value.

Table 2 Analysis results of the comparison between the 3 groups' discomforts concerning packing removal (group 1 and 2) and clearing of the nasal cavity (group 3) 48 h after surgery.

Symptoms	VAS scores ($\bar{x} \pm$ SD)			F value[a]	P value
	Group 1 $n_1 = 45$	Group 2 $n_2 = 45$	Group 3 $n_3 = 45$		
Pain	8.7 ± 1.5	8.0 ± 1.8	1.6 ± 1.2	304.2	<0.001
Bleeding	7.2 ± 1.8	3.4 ± 1.7	1.1 ± 1.1	182.8	<0.001

[a] One Way ANOVA, F value.

postoperative bleeding in group 1 needed repacking, the 2 cases of septal hematoma in groups 1 and 2 required puncture and drainage. All synechiae were divided simply. All patients recovered later without any side effects. No infection or septal perforation was observed in any cases.

Discussion

Nasal packing following septoplasty is commonly used by most surgeons for several reasons. First, nasal packing maintains muco-perichondrial flap apposition and stabilizes the nasal septum to make it straight after surgery. In addition, it can help to control bleeding, prevent dead space, hematoma and infection. Finally, it can prevent synechiae and adhesions. Ribbon gauze and Merocel are usually kept in the nasal cavity for 24—48 h after surgery. However, patients with nasal packing very frequently complain about the severe pain and are eager to remove the packing as early as possible. The packing removal typically causes patients extreme pain. Although the objective of nasal packing is to reduce complications, it is not uncommon still to see postoperative complications. In 2011 Naghibzadeh et al[11] compared nasal packing with no nasal packing in patients after septoplasty and found that the rate of complications such as septal hematoma, synechia and postoperative hemorrhage was the same, except the postoperative pain and discomfort was increased in the nasal packing group. Nasal packing can also result in significant mucosal injury with loss of cilia, and can influence the mucociliary clearance of the nose in the postoperative healing phase.[12] Moreover some serious complications such as toxic shock syndrome and nasopulmonary reflex can cause a life-threatening problem.[13]

In order to overcome these issues, some authors have tried alternative ways to prevent pain and other complications. Intranasal splints have been used to replace nasal packing, but they also cause significant pain and do not decrease postoperative complications.[14]

As early as the 1970s and 1980s, some authors began to use nasal septal suture to minimize the postoperative morbidity of nasal packing. In this century an increasing number of surgeons prefer nasal septum suture to nasal packing. Compared with nasal packing, septum suture can eliminate pain and other discomforts for the patients, minimize complications and increase the stability of the septum.[6,7] Genc et al[15] compared the effects of suture and nasal packing in rabbit noses in 2004, and found that septal suture had nearly the same effects as nasal packs on the histological appearance of the nasal septum. A continuous suturing technique following septoplasty, designed by Hari et al[10] in 2008, is easy to perform and is an effective means to prevent complications. In 2011, Günaydın et al[16] found that when compared with a nasal packing group, patients in a suture group were more comfortable, extubation was easier, and post-anesthesia monitoring was shorter. There was no significant difference in terms of major bleeding, hematoma, or infection.

The results of this study on 135 patients who had septoplasty showed significant differences between the 3 groups in 5 aspects of discomfort on the night of surgery. Patients in group 1 experienced the most discomfort, including nasal pain, headache, dysphagia, sleep disturbance and bleeding, while patients in group 3 experienced the least discomfort. The VAS scores of nasal pain ($\bar{x} = 6.7$) and bleeding ($\bar{x} = 7.4$) were the highest in group 1, and the lowest ($\bar{x} = 2.1$ and $\bar{x} = 1.7$, respectively) in group 3. These findings indicate that combining nasal packing and inferior turbinate coblation without packing can significantly decrease patient discomfort. Our results also suggest that coblation alone with packing can also decrease patient discomfort some, while use of the microdebrider with nasal packing can aggravate discomfort postoperatively.

Our findings also show that the nasal pain of packing removal was the most painful ($\bar{x} = 8.7$) for patients in group 1, while the nasal pain of clearing the nasal cavity was the least ($\bar{x} = 1.6$) for the patients in group 3. The VAS score of bleeding during packing removal or nasal cavity clearing was also the highest in group 1 ($\bar{x} = 7.2$) and the lowest ($\bar{x} = 1.1$) in group 3. All of these results are consistent with previous studies.

In outpatient follow-up visits, there was more morbidity in groups 1 and 2 than in group 3. The one case of postoperative bleeding was in group 1, and the 2 cases of septal hematoma were in groups 1 and 2 in patients who were all packed postoperatively, but not in group 3 (no packing). While the intent of surgeons is to minimize the complications such as postoperative bleeding and septal hematoma by nasal packing, the results are often in conflict with that intent. Nasal packing cannot prevent complications. Septum suture maybe more reliable.

A few cases of synechiae were found in all 3 groups, and they highlight the need for meticulous manipulation to prevent the damage of the nasal mucosa. The outpatient postoperative visit is necessary.

The deviation of the nasal septum is always accompanied by inferior turbinate hypertrophy. There is no consensus on whether or not to perform turbinate surgery during septoplasty. Some studies show that, compared with the bone and the lateral mucosa, the medial mucosa of the inferior turbinate on the concave side becomes thicker.[17] Septoplasty without inferior turbinoplasty will improve the patency of the deviated side, but worsen the concave side. As a result, some surgeons suggest that inferior turbinate reduction should be performed simultaneously during septoplasty.[17,18]

There are many methods for turbinate reduction, including submucosal cautery, laser turbinate reduction, turbinate excision and microdebrider assisted turbinate reduction. Microdebrider assisted turbinate reduction is very popular. It is easy to manipulate but can cause

bleeding and patient pain, making packing unavoidable.[19] Even with the conservative procedure of powered inferior turbinoplasty,[1] patients still experience bleeding and need to be packed with surgicel to provide hemostasis. Coblation is a relatively new technique with many advantages. It is minimally invasive, can be performed at low temperatures and protects mucosal cilia function postoperatively.[19,20] The procedure is simple, and the efficacy is significant in the reduction of nasal obstruction.

To the best of our knowledge, this study is the first to combine nasal septum suture with inferior turbinate coblation to address nasal septum deviation and inferior turbinate hypertrophy without packing. We perform inferior turbinate outfracture before the turbinate coblation, as the adjuvant outfracture can effectively improve the patency of the nasal airway and allow a good visualization of the posterior portion of the inferior turbinate for subsequent coblation.[20]

With the development of functional endoscopic surgery techniques, more and more surgeons are adopting an increasingly conservative approach for septoplasty. Only the deviated bony portion of the septum is addressed by the surgery and the cartilage is retained as much as possible. However, the septal cartilage of some patients can sometimes still have a bend or twist even after multiple incisions on the cartilage because of the cartilage memory. The cartilage memory is very obvious when it is near the caudal end of the septum.[21] For some severe deviated cases, the mucosa of the curved side also tends to keep its deviation even after the removal of the bone and cartilage. Therefore we use a small piece of Nasopore in nasal cavity of the deviated side to press the residual deviated cartilaginous and mucosal part of nasal septum ensuring that the nasal septum will be kept straight postoperatively. The small piece of Nasopore can be easily removed with suction, and tampon removal is unnecessary.

Nasal septum suture combined with inferior turbinate coblation is not only associated with less patient pain, higher patient satisfaction and an improved quality of life, but it also reduces complications. It is a more comfortable, reliable method alternative to nasal packing.

Conflicts of interest

No authors have any conflicts to declare.

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