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Original Article

A comparative study on effects of vacuum nasal drainage and nasal packing after septoplasty

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Abstract: We studied the effects of vacuum sealing drainage (VSD) and nasal packing after correction of nasal septum deviation. One hundred and sixty patients treated by nasal septum deviation endoscopic correction were continuously selected and were randomly divided into control group (n = 80) and observation group (n = 80). The control group was treated with nasal packing using oil gauze or polymer hemostatic sponge. Patients enrolled in the observation group were treated with VSD and the treatment effects were compared. Results showed that post-operation visual analogue scale (VAS) values in the observation group were significantly lower than those in the control group. The measured degrees for nasal mucosa edema as well the incidence rate of complications were significantly lower than those in the control group. The total effective rate was significantly higher than that of the control group (P<0.05).

Keywords: Correction of nasal septum deviation, vacuum sealing drainage, nasal packing

Introduction

The incidence rate of nasal septum deviation is about 1-5%, which is often combined with inferior turbinate hypertrophy, chronic hypertrophic rhinitis, nasosinusitis, etc. Clinical symptoms include nasal obstruction, nasal bleeding, hyposmia and reflex headache. This condition can seriously affect patients life quality and can negatively affect patient's professional life [1]. At present, endoscopic correction of nasal septum deviation is the most commonly used operation method in China and other countries. This is characterized by small trauma, rapid recovery and definite effect [2]. Postoperative nasal packing can reduce the nasal septal hematoma and stabilize the nasal structure, avoiding nasal adhesions and stenosis [3]. However, as a foreign body, it could cause nasal congestion, breathing pattern alterations and xerostomia. All these can collectively affect the sleep and diet leading to an increase in the nasal pressure. This in turn results in head and nose swelling pain. The above conditions are also reported to be associated with induction of the nasosinusitis, otitis media, stuffing extraction-induced pain and secondary bleeding [4, 5]. Results obtained from prior studies showed that the use of improved packing material like oil gauze or polymer hemostatic sponge could improve patient's health [6]. Several other methods such as septal splint compression and absorbable suture for nasal septal mucosa were tried but the results were not confirmed [7]. Vacuum sealing drainage (VSD) has the ability to reduce the hematocele as well as effusion on wound surface. Furthermore, its application to septal operation reduced the swelling pain in nose and head, which are crucial complications of nasal packing [8, 9]. In the present study, the efficacy and side effects of VSD and nasal packing after septal operation were studied.

Materials and methods

Study subjects

A total of 160 patients in our hospital from January 2013 to June 2016 who were diagnosed with deviation of nasal septum with or without inferior turbinate hypertrophy, nasosinusitis were continuously enrolled in this study. The study protocol was approved by the ethics

Table 1. Comparisons of pain degrees

Group	1 d	3 d	7 d	F	P
Control group	5.8±1.5	3.5±1.2	1.9±0.4	5.632	0.007
Observation group	4.2±1.3	2.6±0.9	0.8±0.2	5.421	0.012
Bonferroni test	3.625	3.524	3.958		
P	0.021	0.025	0.015		

VAS values at day 1, day 3 and day 7, after operation.

Table 2. Comparisons of the degrees of edema in the nasal mucosa in both groups at 3 variable levels [case (%)]

Group	Case	Level 0	Level 1	Level 2
Control group	80	26 (32.5)	32 (40.0)	22 (27.5)
Observation group	80	40 (50.0)	24 (30.0)	16 (20.0)
χ^2			4.301	
p			0.038	

committee of Peking University First Hospital. All patients had the indications of operation, and the informed consent was obtained. Patients were divided into the control group (n = 80) and the observation group (n = 80) using random number method. In the control group, there were 45 males and 35 females with an average age of (32.6±12.3) years, including 35 cases of type C deviation, 16 cases of type S, 10 cases of ridge or rectangular process and 19 cases of mixed type. In the observation group, there were 43 males and 37 females with an average age of (35.2±14.6 years old), including 37 cases of type C deviation, 17 cases of type S, 8 cases of ridge or rectangular process and 18 cases of mixed type. The baseline data between the two groups were comparable.

Research methods

The same operation and nursing team performed endoscopic correction of nasal septum deviation. The incision was made from the top to the bottom of the anterior nasal septum. Submucosal resection was performed by fully separating the mucous membrane on both sides of nasal septum. The nasal septal cartilage and bone were completely removed, followed by the correction of deviation state and suture of nasal vestibule incision. During the operation, electrocoagulation was used to stop bleeding, ensuring that there was no active bleeding on wound surface, and no mucosal puncture. Micro perforation had no effects on vacuum drainage. Further, functional endoscopic surgery or partial inferior turbinectomy were also conducted at the same time.

The control group was treated with nasal packing using oil gauze or polymer hemostatic sponge, with 2-4 pieces on each side. No hemostasia drug was used, and the stuffing was extracted after 48 h. The observation group was treated with VSD. In this method, vacuum drainage tube was placed via incision gap [sterile silicone tube, diameter of about 2.5 mm, placement length of about 4.5 cm, placement interval of 1.0 cm, 4 side holes (placement interval of 4 side holes in silicone tube of about 1.0 cm) and the drainage tube was fixed in nasal cavity. This was followed by connection with vacuum drainage bottle. The drainage tube was pulled out after 48 h.

Observational indexes

The pain degrees at 1 d, 3 d and 7 d after operation were compared and evaluated using visual analogue scale (VAS) (0-10 points). Higher scores indicated more severe pain degree. The edema degrees of nasal mucosa were evaluated at 3d after operation. Level 0: no obvious edema or mild edema in inferior turbinate; Level 1: moderate edema in inferior turbinate; Level 2: severe edema. The postoperative complications included the re-bleeding, facial edema, hyposmia, headache, sleep disorders and anxiety. The total effective rates of treatment were divided into markedly effective, effective and ineffective. Markedly effective category included patients that showed deviation of nasal septum was corrected, healed incision, no symptoms and no complications. Effective category included patients that revealed deviation of nasal septum was corrected, healed incisions but with slight postoperative nasal discomfort like nasal congestion, headache, etc. Finally, the ineffective category included those patients that were without correction of deviation of nasal septum and they had serious nasal symptoms.

Statistical methods

The data analyses were performed by SPSS20.0 software. The results were presented as mean ± standard deviation (SD). Normal distribution

Table 3. Comparisons of postoperative complications [case (%)]

Group	Case	Re-bleeding	Facial edema	Hyposmia	Headache, sleep disorders, anxiety	Incidence rate of complications
Control group	80	6	4	2	8	20 (25.00)
Observation group	80	1	2	1	3	7 (8.75)
χ^2						7.530
P						0.006

Table 4. Comparisons of total effective rates in both the groups by observing patients in three different categories [case (%)]

Group	Case	Markedly effective	Effective	Ineffective	Total effective rate
Control group	80	46 (57.50)	21 (26.25)	13 (16.25)	67 (83.75)
Observation group	80	52 (65.00)	23 (28.75)	5 (6.25)	75 (93.75)
χ^2					4.006
P					0.045

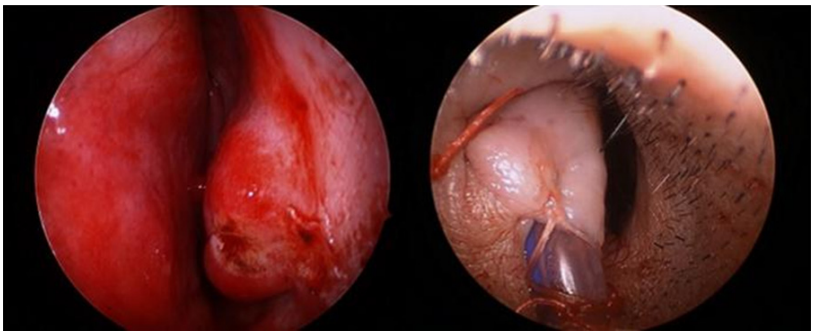

Figure 1. Left: Diagram of endoscopic correction of nasal septum deviation; Right: Diagram of vacuum sealing drainage. Endoscopic correction of nasal septum deviation could significantly reduce the occurrence of mucosal laceration.

and homogeneity of variance were assessed by the Kruskal-Wallis test and one-way ANOVA. One-way ANOVA followed by Bonferroni's post-hoc comparisons tests were performed for measurement data. Enumeration data were analyzed using chi square test. P<0.05 were considered statistically significant.

Results

Comparisons of degrees of pain

The VAS values were used to monitor pain degree between two groups. Higher levels of VAS are associated with more severe pain. Our results showed a significant decline in the VAS values in the observation group compared to the control group. Similar significant decline in VAS values were noticed at each time point viz at day 1, day 3 and day 7, after operation in comparison to control (P<0.05, **Table 1**). Significant decline in VAS values in observation group confirmed the efficacy of VAS method over conventional nasal packing method used in control.

Comparisons of degrees of edema in nasal mucosa

The degrees of edema were observed in the nasal mucosa of both groups at 3 variable levels. When compared with control group, significant decline in the nasal mucuosa edema were observed in the observation group at all three levels (P<0.05, **Table 2**). The highest difference was observed at level 2 that was indicative of severe edema. VSD method was efficient in terms of edema degrees in nasal mucosa, as it was able to alleviate level 2 edema in the observation group.

Comparisons of postoperative complications

We observed a significant decline in the incidence rates of complications in the observation group when compared with control group (P<0.05, **Table 3**). Highest differences between the control and observation groups were observed in the complications viz, re-bleeding, headache and sleep disorders. Our results showed that VSD method outshined the conventional method.

Comparisons of total effective rates

We also studied overall effective rates in both the groups by observing patients in three different categories viz. markedly effective, effective

and ineffective. The study results clearly confirmed that the total effective rates were significantly higher than that of control group, ($P<0.05$, **Table 4**). Moreover, all categories (viz. markedly effective, effective and ineffective) showed significant elevation in observation group in comparison to control group (**Figure 1**).

Discussion

Results obtained from prior studies showed several advantages associated with VSD. These included its ability to fully drain the necrotic liquefied tissues and inflammatory exudate in nasal cavity after operation. VSD was also shown to be effective in reducing the pressure of nasal mucosal tissues, and improved the blood circulation of nasal mucosa [10]. VSD can also increase the blood perfusion in surgical incision site and inhibit the bacterial infection [11]. Material used in this method has a good histocompatibility and stability, which could effectively inhibit the inflammatory and immune response [12]. Results obtained from other studies showed that VSD promoted the growth of new capillaries, and improved the blood circulation of local nasal mucosal tissues [13]. Moreover, it also promoted the rapid growth of new granulation tissues at incision site, and as a result it promoted fast healing [14]. Therefore, it could reduce the need for dressing change after operation which significantly relieved the pain and edema without stuffing. Furthermore, it significantly decreased the stuffing-related complications, such as nasal congestion, xerostomia, headache, insomnia and anxiety. Also, the nasal inflammatory secretions could be drained more thoroughly, and mucosal tissue could be repaired more frequently [15]. The inferior turbinate has no obvious wound surface, so the incidence of postoperative nasal adhesion was quite low. Moreover, the functional endoscopic surgery or partial inferior turbinectomy appeared safer at the same time [16].

The present study suggested that, VSD after correction of nasal septum deviation had a better clinical application value. Earlier studies showed [17, 18] that pseudomembrane might appear in the application of VSD and gradually develop into black scab, and mucous membrane defect could happen after the removal of necrotic mucosa. It might be due to the creation of a negative pressure in drainage tube and sharp edges of drainage port. If the mucous membrane around the side hole is too tight it can lead to poor blood supply, and cause necrosis or the poor attachment of mucous membrane on both sides of septum. Industrial vacuum drainage tube or bottle required the oval drainage tube section, which was conducive to mucosal attachment. The blunt edge can reduce the pressure for mucous membrane on side hole. This negative pressure in drainage bottle is adjustable in order to prevent reflux and reduced the complications to the largest extent.

We showed that endoscopic correction of nasal septum deviation could significantly reduce the occurrence of mucosal laceration. We achieved high brightness and clear field of operation characterized by the nasal endoscope. We successfully removed the posterior nasal septum and achieved the ideal correction effect. We showed that it was easier to remove the spinous or rectangular process and we effectively prevented the nasal septal mucosal laceration and placed the vacuum drainage tube easily. We concluded that VSD was more efficient after correction of nasal septum deviation in comparison to nasal packing.

Disclosure of conflict of interest

None.

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