

Comparison of outcomes using conventional nasal pack with hydroxylated polyvinyl acetate pack following Septoplasty

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Abstract

Aim

To compare the conventional anterior nasal packing (CANP) with Hydroxylated polyvinyl acetate pack (Merocele) after septoplasty, in terms of pain, bleeding, and postoperative complications like synechia formation.

Material and Methods

This study was a prospective, randomized, interventional study conducted among 48 patients. Patients underwent septoplasty under general anesthesia for symptomatic deviated nasal septum. In all the 48 patients, post-surgery, one nasal cavity was packed with a conventional nasal pack and the other cavity was packed with Merocele nasal pack. Pain and bleeding were evaluated during pack removal on the third post-operative day. Synechia was assessed at the 8th postoperative week (2 months) follow-up. The results were compared between the two groups.

Result

Out of 48 patients who underwent surgery, 3 patients were lost to follow-up. So, results were compared between 45 patients. Pain and bleeding during removal of conventional and merocele packs were not seen to be statistically significant. Post-operative synechia was not seen in any of the nasal cavities, irrespective of the packing material used.

Conclusion

Hence, in terms of pain, bleeding during pack removal, and post-operative synechia; conventional and merocele nasal packs were comparable and there was no significant difference in using either of the materials post-septoplasty..

Key words: Merocele pack, nasal bleeding, nasal pack, septoplasty, surgery.

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Introduction

Septoplasty is one of the most common surgeries performed in otolaryngology-head and neck surgery. It ranks as the third most common head and neck operation in the United States (US), with 260,000 cases being performed annually in the ambulatory surgery setting.¹extracting all cases of nasal or sinus surgery. Sinonasal surgical procedures were grouped according to septoplasty and/or turbinate surgery, sinus surgery, facial plastic surgery, and other procedures. Overall and group population-based sinonasal procedure prevalences were estimated from the sample. Frequency of general anesthesia, discharge status, and unexpected emergency room visit estimates were obtained. Perioperative complication rates for cardiac arrest, malignant hyperthermia, postoperative emesis, and blood transfusion were determined as well.
Results: Overall, an estimated 600,000 patients underwent ambulatory sinonasal procedures in 2006 with a mean age of 40.4 years and 53.7% male predominance. On a per patient basis, there were 260,000 septoplasties, 257,000 sinus cases, 134,000 plastics cases, and 103,000 other cases. Facial plastics procedures were less likely to use general anesthesia (72.8% The most common indication is symptomatic Deviated Nasal Septum (DNS). In practice, a straight nasal septum is an uncommon finding in adults, with approximately 75-80% of individuals exhibiting some sort of anatomical deformity. If deviated septum completely obstructs the nasal passage, the patient undoubtedly needs surgery. However, if the symptoms or deformities are less pronounced, the decision to operate is left on the surgeon's assessment. Rhinometry, acoustic rhinomanometry, and nasal spirometry are objective tests that guide in assessment but they are seen to correlate poorly with symptomatology and are inconsistent when predicting outcomes.^{2,3}

There is no clear consensus regarding the indications for nasal packing. However, septoplasty is routinely followed by bilateral anterior nasal packing in most of the centers which itself remains controversial.⁴

The advantages of bilateral anterior nasal packing are the prevention of adhesions between the septum and lateral nasal wall structures, improved support to the septum during healing, reduction in the rates of postoperative bleeding, and the prevention of hematoma.⁵

However, patients frequently complain that the removal of nasal packs after nasal surgery is the most troublesome part of the surgical experience.⁶ Also, packing risks displacement with possible aspiration, toxic shock syndrome; nasopulmonary reflex resulting in an increase in parasympathetic activity which then leads to bronchoconstriction and hypoxia.⁷ Cardiopulmonary indicators like arterial pH levels, PaO₂, PaCO₂, arterial oxygen saturation are seen to be adversely affected by bilateral packing.⁸ Other temporary issues are edema of the nose and periorbital area, sleeplessness, dry mouth, epiphora due to nasolacrimal duct blockage, and dysphagia due to air insufflation into the middle ear during swallowing.⁷

To prevent the formation of septal hematoma and synechia formation in the postoperative period, some give credit to nasal packing whereas others argue that the traumatic effect of nasal packing makes the occurrence of septal hematoma and synechia more likely.⁷

Nevertheless, bilateral nasal packing is still justified and is widely used as a routine practice after nasal and sinus surgeries in many centers to date, even though there is no standard guideline regarding which material to be used and for how long the pack is to be kept in situ. Despite all these, the search for a more comfortable nasal pack is ongoing.

There are various packing materials available, including nonabsorbable packings such as gauze, Bismuth iodoform paraffin paste (BIPP), glove finger, foam packs, pneumatic balloons, and polyvinyl acetate sponge (Hydroxylated polyvinyl acetate; Medtronic Xomed, Jacksonville, FL) and absorbable packing such as Nasopore (Polyganics, Groningen, the Netherlands), modified hyaluronan, bovine gelatin mixed with thrombin, platelet-rich gels, tissue adhesives and Sorbsan (Aspen Medical Europe Ltd., Ashby-de-la-Zouch, United Kingdom) (calcium alginate).⁹⁻¹¹

This study aimed to compare the use of standard Hydroxylated polyvinyl acetate (Merocele) 8 cm nasal dressing with conventional anterior nasal packing following septoplasty in terms of patient pain and bleeding during pack removal, and post-operative synechia formation. Multiple studies have been conducted comparing all types of packing materials.¹²⁻¹⁴ However, there are very few studies that have compared conventional nasal packing and hydroxylated polyvinyl acetate pack and in all these studies, merocele pack was seen to result in more smooth post-operative recovery.^{15,16} In Nepal, so far, only one study has been conducted comparing these two packing materials.¹⁵ However, it has divided patients into two groups for packing. Our study has compared two packing materials in the same patient so that individual bias is removed. Hence, this study is the first one of its types that have been conducted in Nepal.

Methods

A prospective randomized interventional study was carried out. Patients seeking care at Otorhinolaryngology OPD at Dhulikhel Hospital, Nepal and diagnosed as having symptomatic Deviated Nasal Septum undergoing Septoplasty from January 2019 to June 2020 were included in the study.

Patients of 18 years of age and above and of all gender were included in the study. However, patients under 18 years, menstruating females, revision septoplasties, with accidental pack removal before the third post-operative day, bleeding disorders, acute nasal infection, with psychiatric illness, septoplasty conducted along with other procedures and patients unable to comply with the study protocol and unwilling to participate in the study were excluded.

For sample size estimation; fifty-five people underwent Septoplasty in the year 2017. Hence, taking this as a population with a Confidence level of 95 and confidence interval of 5, the sample size was calculated to be 48.

After a thorough evaluation, patients with symptomatic deviated nasal septum were planned for septoplasty. Written informed consent was taken one day before surgery and patients were informed about the pain scoring about the Visual Analogue Scale. The patient's telephone number and email id were noted for follow-up.

All these patients underwent septoplasty under general anesthesia. Nasal cavities were packed with cotton pledget soaked in oxymetazoline HCL, 0.05% 10 mins before surgery. On the operating table, the cotton pledgets in bilateral nasal cavities were removed. Patients were placed in reverse Trendelenburg position with 15 degrees head elevation. The operative field was cleaned with 10% Povidone-iodine solution.

Local anesthesia (2% Xylocaine + 1:200000 adrenaline), according to the patient's weight, up to 5 ml was infiltrated in the caudal border of the septum, floor, limen nasi, and the septum.

Freer's incision was made at the lower border of septal cartilage on the concave side. Mucoperichondrial and mucoperiosteal flaps were elevated to create the anterior and inferior tunnels respectively. The quadrilateral cartilage was separated from its posterior attachment and deviated part of ethmoid and vomer fractured and removed. The lower border of the septal cartilage was dislocated from its osseous groove, and a strip of cartilage about 3-4 mm wide was removed from its lower border. Deviated part of the maxillary and palatine crest was removed with the help of a gouge and hammer. Criss-cross incisions were given over the remnant cartilaginous septum. Hemostasis was secured. The figure of eight sutures was applied with Vicryl 3-0.

For placement of nasal pack, randomization was done with the help of a lottery system from a box of coupons kept in the operation theatre. Nasal packs, as shown in figure 1, were introduced along the floor of the nose (Conventional Anterior Nasal Packing in one and Hydroxylated polyvinyl acetate in other).

Figure 1 Conventional and Merocele nasal packs



Conventional nasal packing was done by a 1 meter long and 2.5 cm-wide gauze impregnated with Mupirocin ointment and Xylocaine jelly in one of the nasal cavities. Hydroxylated polyvinyl acetate nasal dressing pack (8*1.5*2.0) cm with string was inserted in the other side. Bolster was then applied. Patients were kept blind regarding the packs kept in the nasal cavity.

Packs were then removed on the third postoperative day. As per the pilot study conducted, beforehand the main study, 5 minutes interval was kept between the removal of the first and second pack; to reduce the bias, due to pain caused by pack removal of either side, on the other.

The pain was assessed based on the Visual Analogue Scale (VAS). VAS is a validated scale used for the subjective assessment of pain. The extreme endpoints are 'no pain at all' and 'pain as bad as it could be'.

The pain score was then divided into three groups:

Mild 1-3

Moderate 4-6

Severe 7-10

Bleeding was assessed by somebody, who is blinded to the type of packaging used and is not biased about the study. It was then graded as:

Grade 0 = No bleeding

Grade 1 = Blood seeping from the nose

Grade 2 = Continuous bleeding from the nose¹⁴

Patients were discharged on the fourth postoperative day. They were then followed up until 2 months at which they were evaluated for synechia formation, by anterior rhinoscopy.

Statistical analysis was done by Software Package for Social Sciences (SPSS) 20.0 version. The difference between postoperative pain, bleeding, and adhesions in between the two groups were analyzed for significance using the Chi-square test. The level of statistical significance was set at $p < 0.05$.

Results

From January 2019 to June 2020, a total of forty-eight patients were enrolled in this study. In all these patients, one nasal cavity was packed with Conventional nasal packing and the other was packed with Merocele. The randomization regarding which side to pack was done based on the lottery system in the operating theatre.

However, out of the total 48 patients, only 45 patients completed follow up and 3 patients were lost to follow-up. Hence, 45 patients were included in our study analysis.

Age distribution of patients:

Patients were divided into different age groups as shown in table 1. The age of patients enrolled ranged from 18 to 50 years with a mean age of 29.02 years. The most common age group was 21-30 years followed by 31-40 years.

Table 1: Age group distribution of patients (n=45)

Age group (in years)	Number of patients enrolled
<=20	6
21-30	20
31-40	15
41-50	4

Gender distribution of patients:

28 patients (62.2%) were male and 17 patients (37.8%) were female in our study. So, the male to female ratio was 1.65: 1.

Pain on pack removal

In all 45 patients who underwent septoplasty and post-operative nasal packing; pain score was assessed at the time of pack removal on the 3rd postoperative day by Visual Analogue Scale. It was then graded as Mild, Moderate, and Severe. There was no statistically significant difference in pain scores between the two groups. (p=0.2).

Table 2: Pain on pack removal (n=45)

Severity of pain	Groups (n=45)		'p-value (Chi-square test)
	Conventional Nasal Pack	Merocele Pack	
Mild	9	14	0.2
Moderate	25	17	
Severe	11	14	

Grading of nasal bleeding on pack removal

Patients were also assessed for bleeding at the time of pack removal. Bleeding was then categorized into Grade 0, 1, and 2. There was also no statistically significant difference between the two packing materials (p=0.46) in terms of bleeding.

Table 3: Bleeding on pack removal (n=45)

Severity of bleeding	Groups (n=45)		‘p-value (Chi-square test)
	Conventional Nasal Pack	Merocele Pack	
Grade 0	26	32	0.46
Grade 1	18	12	
Grade 2	1	1	

Assessment of post-operative synechia at 2 months:

Forty-five patients who completed follow-up were assessed at 2 months with anterior rhinoscopy for the presence of synechia.

Synechia was not seen in any patient irrespective of the packing material used as illustrated in table 4.

Table 4: Post-operative synechia at 2 months (n=45)

Post-operative Synechia	Groups (n=45)	
	Conventional Nasal Pack	Merocele Pack
Present	0	0
Absent	45	45

Discussion

Nasal packs are widely used after septal surgery. The use of packs prevents nasal bleeding, supports the septal mucoperichondrial flap, and minimizes the risk of formation of septal hematoma and adhesions. Various factors should be taken into consideration when deciding the type of nasal packing material. These are Ease of insertion and removal, discomfort/pain, and experience and preference of the surgeon.

There is no generalized consensus, yet, in defining an ideal packing material. Ideal packing material should be easy to insert and remove, with minimal discomfort, and should be very effective in preventing postoperative bleeding. In practice, the most common morbidity associated with packing in septoplasty is post-operative pain⁶.

The objective of this study was to compare conventional anterior nasal packing with Hydroxylated polyvinyl acetate (Merocele) pack after septoplasty in terms of pain and bleeding during pack removal on the third post-operative day and synechia formation at 2 months.

Multiple studies are comparing different packing materials dividing patients into two groups^{16,17}. However, there are very few studies comparing packing materials in between two nasal cavities in a single patient¹³. This helps in better assessment of pain, as a single patient falls under both categories and individual bias is removed.

In this study, patients who underwent septoplasty were 18 years and above and of all gender. The mean age of the patients was 29.02 years with a maximum age of 50 years and minimum age of 18 years. The commonest age group was 21-30 years followed by 31-40 years. In most of the studies, the predominant population undergoing septal surgery was seen to be young. This is expressed in studies conducted by Hesham A and Ghali A (mean age 26 years), Acioğlu and et al. (mean age 31.29 +/- 11), and Kim and et al. (mean age 33.3 years)¹²⁻¹⁴. The reason for the predominance of the younger patient is that the younger population is more educated than the older population. They are more aware and concerned about the symptomatology of deviated nasal septum and are more likely to seek treatment.

The gender distribution in this study showed that 28 patients (62.2%) were male and 17 patients (37.8%) were female. In another study done in Nepal, 58% were male and 42% were female¹⁵. In a study done by Hesham A and Ghali A, 66.67% of patients were male and only 33.33% were female.¹³ However, in other studies, there were no statistically significant differences in gender distribution^{14,18}. This is seen to vary as per the developmental status of the country in which it is conducted. As Nepal is a developing country, males have more access to health services in comparison to females which may be the reason for the difference.

In this study, randomization was conducted about the packing material to be inserted into the nasal cavities. It was done by a lottery system from a box of coupons kept in the operation theatre. Coupons wrote 'C' and 'M' were kept in a box and the first coupon pulled decided the pack to be kept in the right nasal cavity. This ensured that the surgeon is blind before packing in selecting the material. This helps as most surgeons prefer conventional nasal packing in the nasal cavity with expected heavy bleeding.

Also, patients were kept blind as to which packing material was inserted into the nasal cavities. This also assists in ensuring optimal scaling of the pain during removal.

In this study, an initial pilot study was conducted in 5% of the total sample size to study the average time required for the pain to diminish after one nasal pack was removed before removing the pack of the other side. The average time was seen to be 5 mins. So, an interval of 5 mins was taken in the removal of the 1st and 2nd packs.

Visual Analogue Scale was used to assess pain scores in this study. Various studies have used this scale for assessment^{13,14}. However, some other studies have used indirect methods for pain assessment like the number of paracetamol tablets required for postoperative pain by the patient^{14,18}.

In our study, bilateral nasal packs were removed on the third postoperative day. On conventional pack removal, 9 patients had mild pain, 25 had moderate and 11 had severe pain. During merocele removal, 14 patients had mild pain, 17 had moderate pain and 14 had severe pain. The results were not seen to be statistically significant ($p=0.2$). This is in contrast to the studies conducted by Mattoo and et al. and Kuchhal and et al. in which significantly higher pain levels were seen in the gauze packing group^{16,17}. Both the merocele and conventional nasal packing adhere to the nasal mucosa of the septum and lateral walls even though ointment is used for lubrication. As both are porous and with mesh, granulation tissue grows into the pores which cause intense pain during removal due to the trauma inflicted.

For assessment of bleeding on pack removal, some studies have graded bleeding into Grade 0, 1, and 2 which is by our study^{12,14}. However, some other studies have quantified bleeding with the help of soaked cotton balls^{16,17}.

In this study, bleeding during pack removal was assessed by an individual who was blinded to the type of packaging used. Among the 45 patients, 32 patients had mild, 12 had moderate and 1 had severe bleeding during Merocele pack removal. 26 patients had mild bleeding, 18 had moderate bleeding and 1 had severe bleeding in the side where the conventional pack was kept. The difference was not statistically significant ($p=0.46$). This is by the results of the study conducted by Mattoo and et al. and Kuchhal and et al. which also showed no statistical significance between bleeding from Merocele and Conventional packing^{16,17}.

Both the merocele and conventional gauze pack adhere to the nasal mucosa due to their porous open foam and open mesh characteristics respectively, resulting in trauma during removal. Also, during removal of either of the packing material, the bloody crust and clot residing between the pack surface and nasal mucosa are simultaneously removed which results in bleeding. Hemostasis during septoplasty is achieved by injecting local anesthesia along with vasoconstrictor in the septum before the surgery which is 2% Xylocaine + 1:2,00,000 adrenaline in this study. Also, if the mucoperichondrial flaps are raised in the appropriate plane, there is a remote chance of significant bleeding irrespective of the packing material used.

The healing of nasal mucosa after surgery is a complex process and comprises four stages: Coagulation, inflammation, tissue formation, and tissue remodeling¹⁹. The tissue remodeling phase of healing continues up to 8 weeks. In a study conducted by Wormald and et al., there was no significant difference in the incidence of synechia formation after nasal surgery at 2 weeks, 4 weeks, and 6-8 weeks²⁰. Also, Konstantinidis et al reported that although the healing process of the nasal mucosa can belong; the first 6-8 weeks is very important²¹. Hence, in our study, follow-up in 8 weeks was taken as the optimum time for synechia assessment.

Post-operative synechia can be assessed by either anterior rhinoscopy or endoscopic evaluation. In this study, we have evaluated by anterior rhinoscopy. However, synechia was not seen in any of the patients, irrespective of packing the nasal cavities with Merocele or Conventional pack. In a study conducted by Joshi and et al., out of the 106 patients, three patients developed synechia in the conventional packing group.¹⁵ We had only performed septoplasty in patients with no turbinectomy or turbinoplasty. This may have resulted in no synechia formation in either of the groups.

Conclusion

From this study, we can conclude that:

There is no statistical significance in pain score and bleeding on pack removal of either Conventional or Merocele pack.

There was no post-operative synechia present in nasal cavities packed with either Conventional or Merocele nasal packs.

Hence, we can conclude that both the merocele and conventional nasal packing can be used post-septoplasty. Also, the cost of Merocele can be minimized as conventional nasal packing has shown similar results in terms of postoperative pain, bleeding during pack removal, and synechia formation.

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