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Comparative study between biodegradable nasopore (BNP) and Merocel hemox 10 cm after septo-turbinoplasty procedure

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Abstract. – OBJECTIVE: The purpose of our study was to compare Merocel (Merocel Hemox 10 cm) and BNP (biodegradable nasopore) during a septoturbinoplasty procedure in terms of efficiency and patient comfort.

PATIENTS AND METHODS: We carried out a retrospective review of 72 patients who had undergone septoturbinoplasty between January 2015 and January 2016. Each group, packed with BNP or Merocel Hemox 10 cm was composed of 36 patients. A standard visual analogue scale ranging from zero (no symptoms) to 10 (the most severe symptoms) was used to assess subjective symptoms. To compare the usefulness of materials we evaluated the postoperative bleeding, infection and adhesion after the removal of packing with and endoscopic examination using a 5-point scale (zero, absent; 1, mild; 2, moderate; 3, severe; and 4, very severe). Secretions and crusts were evaluated 1 week and 4 weeks after surgery in both groups using a 5-point scale (zero, absent; 1, mild; 2, moderate; 3, severe; and 4, very severe).

RESULTS: A total of 72 patients were enrolled in the study, 45 women and 27 men; age range 15-78 with a mean age of 47 years. In the group A (Merocel group), 21 cases showed grade 1 bleeding (58%), 11 cases grade 2 (30%) and 4 patients grade 0 (11.1%). In the group B (BNP group), 29 cases showed grade 0 bleeding (80.56%) and 7 cases showed grade 1 bleeding (19.44%). There was a statistical significant difference between the Merocel group and the BNP group in terms of bleeding after removal of packing material ($p < 0.05$). In the group A, 16 patients developed mild adhesion (44%), 8 patients moderate adhesion (22.2%), 3 patients severe adhesion (8.33%) and 1 patient very severe adhesion (2.77%). BNP nasal packing didn't cause any adhesion in 25 patients (69.4%), 11 patients developed mild adhesion (30.5%). So there was a statistical significant difference between group A and group B regarding the adhesion ($p < 0.05$). There was a statistically significance reduction of nasal secretions and crusts at a week after surgery in the BNP group *vs*. Merocel group. The difference is not statistically significant 4 weeks after surgery. About the severity of symptoms related to nasal packing, we found a statistically significant difference ($p < 0.05$) between Merocel and BNP group regarding the pain during packing removal, the general satisfaction and the pressure.

CONCLUSIONS: Biodegradable nasopore reduced pain and patient discomfort during packing removal and causes less bleeding compared to Merocel hemox 10 cm. This type of material can be used after septoturbinolplasty.

Key Words:
Septoturbinoplasty, Septoplasty, Biodegradable nasopore, Merocel, Nasal packing.

Introduction

Nasal packing after septoturbinoplasty is commonly used to reduce postoperative complications such as septal hematoma, postoperative bleeding and to prevent synechiae formation.

Generally, packing removal is remembered by patients as the worst experience during hospitalization time due to the acute pain they may feel and the discomfort experienced should nasal bleeding occur[1]. Precisely, for this reason, rhinologysts are trying to find nasal packing able to decrease this type of discomfort[2,3]. Merocel (Medtronic Xomed Surgical products, Jack-

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sonville, FL, USA) is a foam-type nasal packing material. It is made from a polymer of hydroxylated polyvinyl acetate. Irritation of nasal mucosa, mucosal edema, and secondary bleeding are its disadvantages. Furthermore, removal of the Merocel pack is a very painful procedure[4]. Nasopore (Polyganics, Groningen, Netherlands, Europe), one of the most frequently used dissolvable materials, is a bioresorbable material produced using a freeze-drying process. It consists of fully synthetic biodegradable, fragmenting foam that absorbs water while supporting the surrounding tissue and providing pressure against bleeding vessels in the nasal cavity. It starts to dissolve within days and can be suctioned from the nasal cavity after few days. Dissolving of this material starts within a day and then biodegradable nasopore (BNP) can be easily sucked out and removed on the postoperative 2nd day. Many studies have been carried out comparing Merocel and Nasopore during Endoscopic sinus surgery (ESS) and nasal septoplasty[5-7]. This is the first study that compares Merocel (Merocel Hemox 10 cm) and BNP (biodegradable nasopore) during a septoturbinoplasty procedure in terms of efficiency and patient comfort.

Patients and Methods

A prospective, randomized, controlled and single-blinded study was conducted evaluating the amount of bleeding and patient discomfort during removal of three different sponges. A total of 72 patients who had undergone septoturbinoplasty at the Maxillofacial Surgery Department of the University Federico II of Naples from January 2015 to January 2016 were included in the study. Each group, packed with BNP or Merocel Hemox 10 cm was composed of 36 patients. Informed consent was obtained from all patients. Patients with sinonasal malignancy, being in need of nasal surgery other than septoturbinoplasty [such as functional endoscopic sinus surgery (FESS), nasal valve surgery, etc.], sinonasal infections, sinonasal inflammatory disease, or systemic disorders were excluded from the study.

All cases of septoturbinoplasty were performed by one surgeon (A.R.).The procedure was performed under general anesthesia. The septum was injected with 1% xylocaine in 1: 20.000 epinephrine on the convex side of the septum using a 0° rigid 4 mm Hopkins Rod Lens endoscope.

The Hemitransfixation incision was made. A Stortz Drillcut X 40711070 was used for microdebrider-assisted turbinoplasty as described by Romano et al[8]. After all procedures Merocel or BNP was packed in both nasal cavity. BNP is two cm shorter than Merocel but is sufficient in the surgical procedure that doesn't involve the lateral wall of the nose. In most patients with BNP dissolution of the material started on the first postoperative day, however, we removed the material by nasal suction on the second postoperative day and at a week after surgery. Removal of Merocel was also done on the second postoperative day.

Each patient was studied preoperatively by performing a computed tomographic scan without contrast media of the nose and paranasal sinus and with an endoscopic examination.

A standard visual analogue scale ranging from zero (no symptoms) to 10 (the most severe symptoms) was used to assess subjective symptoms including pain on the removal of packing, nasal obstruction, dysphagia, sleep disturbance, postnasal drip, general satisfaction, pressure, headache, as previously used[2,4,7,9,10] (Table I). To compare the usefulness of materials we evaluated the postoperative bleeding after the removal of packing, the condition of the mucosa and the eventual septal hematoma. The endoscopic examination allowed to graded these three factors as 0-4 (zero, no bleeding; 1 minimal bleeding; 2 moderate bleeding; 3 severe bleeding; 4 very severe bleeding) (Table II). Infection and adhesion were evaluated in the treatment of these patients using a 5-point scale (zero, absent; 1, mild; 2, moderate; 3, severe; and 4, very severe) after and endoscopic examination at the second and the fourth week after surgery (Table III).

Secretions and crusts were evaluated 1 week and 4 weeks after surgery in both groups using a 5-point scale (zero, absent; 1, mild; 2, moderate; 3, severe; and 4, very severe) (Table IV).

Table I. Grading scale for bleeding after removal of packing materials.

	Bleeding
0	No bleeding
1	Minimal
2	Moderate
3	Severe
4	Very severe

Table II. Grading scale for adhesion, and infection after removal of packing materials.

Adhesion	
0	No adhesion
1	Mild
2	Moderate
3	Severe
4	Very severe
Infection	
0	No infection
1	Mild
2	Moderate
3	Severe
4	Very severe

Statistical Analysis

Statistical calculations were performed with the Statistical Package for Social Sciences (version 17.0; SPSS, Chicago, IL). The difference between groups was measured with a 2-test. The level of statistical significance was $p < 0.05$.

Results

A total of 72 patients were enrolled in the study, 45 women and 27 men; age ranges 15-78 with a mean age of 47 years. Group A (the Merocel group) was composed of 36 patients. Group B (the BNP group) was composed of 36 patients.

Bleeding after pack removal was treated in case of patients with grade 0 and grade 1 of bleeding was controlled without any intervention, grade 2 with the application of cotonoids soaked in phenylephrine hydrochloride only, and grade 3 with repacking with Merocel. After removal of packing material, no very severe bleeding (grade 3) requiring repacking was detected. In the group A, 21 cases showed grade 1 bleeding (58%), 11 cases grade 2 (30%) and 4 patients grade 0 (11.1%). In the group B, 29 cases showed grade 0 bleeding (80.56%) and 7 cases showed grade 1 bleeding (19.44%). No cases of grade 2 or grade 3 were founded. There was a statistically significant difference between the Merocel group and the BNP group in terms of bleeding after removal of packing material ($p < 0.05$). No cases of septal hematoma and infections were detected at follow-up until the 4th week of the postoperative period.

In the group A, 16 patients developed mild adhesion (44%), 8 patients moderate adhesion (22.2%), 3 patients severe adhesion (8.33%) and 1 patient very severe adhesion (2.77%). The grade 3 and 4 were treated with synechiolysis.

Table III. Average Visual Analog Scale (VAS) scores of 3 Merocel and BNP.

	Average of VAS scale		
	Merocel	BNP	*p*-value
Pain on removal of packing	8.1 ± 0.9	2.8 ± 0.8	< 0.05
Nasal obstruction	8.3 ± 0.8	7.4 ± 0.8	> 0.05
Dysphagia	3.6 ± 0.6	3.2 ± 0.7	> 0.05
Sleep disturbance	3.9 ± 1.0	3.9 ± 1.0	> 0.05
Post nasal drip	3.2 ± 0.9	3.0 ± 0.8	> 0.05
General satisfaction	7.5 ± 1.7	2.4 ± 1.0	< 0.05
Pressure	6.2 ± 0.7	3.3 ± 0.7	< 0.05
Headache	5.3 ± 1.0	5.5 ± 1.1	> 0.05

Values are statistically significant at $p < 0.05$.

Table IV. Secretions and crusts 1 week and 4 weeks after surgery in both groups using a 5-point scale.

Secretions			Crusts		
	1 week	4 weeks		1 week	4 weeks
Group A (Merocel)	2.24 ± 0.50	0.30 ± 0.35	Group A (Merocel)	2.76 ± 0.61	0.21 ± 0.26
Group B (BNP)	0.98 ± 0.47#	0.22 ± 0.28	Group B m (BNP)	0.84 ± 0.45#	0.18 ± 0.21

#*p*-value < 0.05.

BNP nasal packing didn't cause any adhesion in 25 patients (69.4%), 11 patients developed mild adhesion (30.5%). So there was a statistically significant difference between group A and group B regarding the adhesion ($p < 0.05$).

There was a statistical significance reduction of nasal secretions and crusts at a week after surgery in the BNP group *vs.* Merocel group (0.98 ± 0.47 and 0.84 ± 0.45 *vs.* 2.24 ± 0.50 and 2.76 ± 0.61, respectively). The difference is not statistically significant 4 weeks after surgery.

About the severity of symptoms related to nasal packing, we found a statistically significant difference ($p < 0.05$) between Merocel and BNP group regarding the pain during packing removal, the general satisfaction and the pressure. Respectively, 8.1 ± 0.9 in group A and 2.8 ± 0.8 in group B; 7.5 ± 1.1 in group A and 2.4 ± 1.0 in group B, 6.2 ± 0.7 in group A and 3.3 ± 0.7 in group B.

No significant differences were founded regarding nasal obstruction, dysphagia, sleep disturbance, post-nasal drip and headache between the two groups.

Discussion

Nasal packing is a standard procedure done routinely after septoturbinoplasty to prevent some postoperative complications like septal hematoma, bleeding and nasal synechiae.

Moreover, this practice could stabilize the cartilage and ensure mucoperichondrial flap coaptation[11,12]. The issue of making nasal packing or not after septoturbinoplasty is a matter still open in the literature[10-12]. It brings some disadvantages like epiphora, local infection, discomfort in swallowing, discomfort, nasal mucosa trauma and sleep disturbances[13-15].

In any event, pain upon nasal packing removal (present only in patients with nasal packing) is also a really important factor to consider.

Because removal of packing is the most painful part of a septoturbinoplasty procedure, various absorbable packing materials, including modified hyaluronan, bovine gelatin mixed with thrombin, tissue adhesives, and biodegradable synthetic polyurethane foam have been newly proposed to avoid the need for removal of packing[6,7,16].

The nasal packing with BNP has already been compared with Merocel following ESS procedures[7] and following septoplasty[5,6] with excellent results.

Kim et al[6] and Yilmaz et al[5] showed how the use of BNP reduces pain during packing removal compared with Merocel, but showed no differences in terms of nasal obstruction, post nasal drip or sleep disturbance.

This is the first study that compares Merocel and BNP during a septoturbinoplasty procedure. The point that BNP is also evaluated following the inferior turbinates surgery is very important, because it is amply demonstrated in literature that septoplasty with inferior turbinates surgery (whether it be partial inferior turbinotomy or turbinoplasty) is due to bleeding most of the time more impressive compared with the only septoplasty. Kim et al[6] in their sample in case of inferior turbinate hypertrophy preferred the lateralization technique.

In our study, there was a statistically significant difference between the Merocel group and the BNP group in terms of bleeding after removal of packing material ($p < 0.05$), because BNP can only be removed by suction without touching the nasal mucosa.

We also detected a statistically significant difference between group A and group B regarding the adhesion ($p < 0.05$), 4 patients developed severe adhesion and they require sinechiolysis.

Another important issue to consider was the formation of crusts and nasal secretions postoperatively. There was a statistical significance reduction of nasal secretions and crusts at a week after surgery in the BNP group *vs.* Merocel group (0.98 ± 0.47 and 0.84 ± 0.45 *vs.* 2.24 ± 0.50 and 2.76 ± 0.61 respectively). This value can perhaps be explained by the fact that this type of material without packing removal less damage the nasal mucosa, so there is less crusting and nasal secretions formation. The difference is not statistically significant 4 weeks after surgery when crusts and nasal secretions are almost completely disappeared.

We considered several important parameters such as pain on the removal of packing, pressure, nasal obstruction, postnasal drip, dysphagia, general satisfaction and sleep disorders. To classify these factors we used the 10-cm VAS scale as previously used[2,4,7,9,10].

The first parameter evaluated was the pain as a result of the removal of the nasal packing. This is statistically significant compared to Merocel group (8.1 ± 0.9 *vs.* 2.8 ± 0.8). The degradation of BNP begins in the first 24h after application and thanks to saline lavage terminates at one week after surgery, therefore does not cause great

pain and bleeding on the contrary of the packing removal that is proven to be more dangerous to the nasal mucosa.

Compared to the study by Kim et al[6] BNP group reported a lower degree of pressure than the Merocel group with a statistically significant difference (6.2 ± 0.7 *vs.* 3.3 ± 0.7).

According to Kim et al[6] the general satisfaction was higher in BNP group compared to Merocel group (7.5 ± 1.1 *vs.* 2.4 ± 1.0).

During the post-operative follow-up period, the status of the mucosa of both groups had been examined using nasal endoscope on the 1st and 4th weeks, and there was no local infection or hematoma of the septum in both groups. Also, the mucosal healing was faster in the BNP group.

Other symptoms, such as nasal obstruction, dysphagia, sleep disturbance, post-nasal drip and headache between the two groups were assessed and showed no statistical significance difference.

Conclusions

To our knowledge, this is the first study that compares Merocel foam and biodegradable nasopore foam during a septoturbinoplasty procedure in terms of efficiency and patient comfort with a very large sample of 72 patients. Given the results obtained, we can state that BNP reduced pain and patient discomfort during packing removal and causes less bleeding. The patients feel less pressure and are more satisfied with the BNP packing. So Biodegradable nasopore is a suitable material that can be used after septoturbinolplasty.

Conflict of Interest

The Authors declare that there are no conflicts of interest.

References

1) Fairbanks DNF. Complications of nasal packing. Otolaryngol Head Neck Surg 1986; 94: 412-415.
2) Bresnihan M, Mehigan B, Curran A. An evaluation of Merocel and Series 5000 nasal packs in patients following nasal surgery: A prospective randomised trial. Clin Otolaryngol 2007; 32: 352-355.
3) Prabhu V, Kaushik V, Rhodes S, Tay H. Foam nasal packs: A prospective, randomised, patient-controlled study. Rhinology 2007; 45: 242-247.
4) Arya AK, Butt O, Nigam A. Double-blind randomized con- trolled trial comparing Merocel with Rapid Rhino nasal packs after routine nasal surgery. Rhinology 2003; 41: 241-243.
5) Yilmaz MS, Guven M, Elicora SS, Kaymaz R. An evaluation of biodegradable synthetic polyurethane foam in patients following septoplasty: a prospective randomized trial. Otolaryngol Head Neck Surg 2013; 148: 140-144.
6) Kim YS, Kim YH, Kim NH, Kim SH, Kim KR, Kim KS. A prospective, randomized, single-blinded controlled trial on biodegradable synthetic polyurethane foam as a packing material after septoplasty. Am J Rhinol Allergy 2011; 25: 77-79.
7) Shoman N, Gheriani H, Flamer D, Javer A. Prospective, double- blind, randomized trial evaluating patient satisfaction, bleeding, and wound healing using biodegradable synthetic polyurethane foam (NasoPore) as a middle meatal spacer in functional endoscopic sinus surgery. J Otolaryngol Head Neck Surg 2009; 38: 112-118.
8) Romano A, Orabona GD, Salzano G, Abbate V, Iaconetta G, Califano L. Comparative study between partial inferior turbinotomy and microdebrider-assisted inferior turbinoplasty. J Craniofac Surg 2015; 26: 235-238.
9) Bugten V, Nordgard S, Skogvoll E, Steinsvag S. Effects of non-absorbable packing in middle meatus after sinus surgery. Laryngoscope 2006; 116: 83-88.
10) Awan MS, Iqbal M. Nasal packing after septoplasty: A randomized comparison of packing versus no packing in 88 patients. Ear Nose Throat J 2008; 87: 624-627.
11) Dubin MR, Pletcher SD. Postoperative packing after septoplasty: is it necessary? Otolaryngol Clin North Am 2009; 42: 279-285.
12) Guyuron B. Is packing after septorhinoplasty necessary? A randomized study. Plast Reconstr Surg 1989; 84: 41-44.
13) Weber R, Keerl R, Hochapfel F, Draf W, Toffel PH. Packing in endonasal surgery. Am J Otolaryngol 2001; 22: 306-320.
14) Cantone E, Castagna G, Ferranti I, Cimmino M, Sicignano S, Rega F, Di Rubbo V, Iengo M. Concha bullosa related headache disability. Eur Rev Med Pharmacol Sci 2015; 19: 2327-2330.
15) Salzano FA, Guastini L, Mora R, Dellepiane M, Salzano G, Santomauro, Salami A. Nasal tactile sensitivity in elderly. Acta Otolaryngol. 2010; 130: 1389-1393.
16) Reiter D, Alford E, Jabourian Z. Alternatives to packing in septorhinoplasty. Arch Otolaryngol Head Neck Surg 1989; 115: 1203-1205.