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Effect of intranasal Merocel packs, silicone splint, and trans-septal suture after septoplasty on Eustachian dysfunction

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ABSTRACT

Objective: In this study, we aimed to compare the effects of nasal obstruction caused by nasal packing, trans-septal suture, and silicon splint after septoplasty on the Eustachian tube functions and middle ear ventilation.

Methods: The study included 60 patients who were operated on for septum deviation between January and July 2017. The ages of the patients ranged from 19 to 53 years. A total of 24 patients were female, and 36 patients were male. The patients were divided into three groups. Group 1 comprised patients who received trans-septal suture, Group 2 comprised patients who received silicon splint, and Group 3 comprised patients who received Merocel packing. The preoperative and postoperative tympanometric evaluations were performed for each patient.

Results: The middle ear pressures of the patients in the three groups were compared; there was no significant difference between the second and the third groups in the right and left middle ear pressures. The middle ear pressures of the first group were significantly lower in both ears than those of the other groups. We have found that trans-septal suture after septoplasty without using a splint or Merocel packing did not affect the middle ear pressure.

Conclusion: Trans-septal U suture application after septoplasty did not increase middle ear pressure and did not affect Eustachian tube functions in comparison with the other alternative methods.

Keywords: Eustachian tube, merocel packing, septoplasty, silicon splint, transseptal suture

Introduction

Nasal septum deviation is one of the most common diseases treated by ear, nose, and throat specialists. Nasal septum deviation may be congenital, developmental, or secondary to nasal trauma. Symptomatic patients present with the complaint of nasal obstruction. Complaints can be a runny nose, decreased sense of smell, difficulty in sleeping, nasal dryness, and headache. In patients with chronic symptoms of nasal septum deviation, surgery should be considered because their quality of life is severely affected (1).

Nasal packs are frequently used after septoplasty to prevent bleeding and the formation of hematoma and adhesions and to support mucoperichondrial flaps (2). Merocel packing and silicon splint are the most used nasal packing methods after nasal surgery (3).

The Eustachian tube connects the middle ear cavity and the nasopharynx and provides the middle ear's ventilation. The dysfunction of the Eustachian tube causes a feeling of obstruction in the ear. It causes inflammation in the middle ear and can result in otitis media (4, 5).

There are many methods to evaluate Eustachian tube functions. The most frequently used method is tympanometry. We have used tympanometry for measuring the middle ear pressure in our study.

After septoplasty, patients complain about ear disorders, aural fullness, and pressure sensation. It is thought that this is caused by the nasal packing, which is generally used after nasal surgery and causes dysfunction of the Eustachian tube (6).

Nasal packings results in nasal airflow obstruction, and the release of inflammatory mediators, which can cause Eustachian tube dysfunction (7, 8).

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Because the nasal packing used after septoplasty completely occlude the nasal passage, silicone nasal splints have begun to be frequently used, in which case the passage remains partially open (9).

The aim of our study is to measure and compare the effects of Merocel packing, silicone splint, and septal trans-septal suture applications on the middle ear air pressure in patients who underwent septoplasty for isolated septum deviation.

Methods

The study was designed as a prospective study. Approval for this prospective study was granted by the Atatürk University Medical Faculty Clinical Research Ethical Committee (Number B.30.2.ATA.0.01.00/59). A total of patients underwent septoplasty for septum deviation between January and July 2017 in the otorhinolaryngology department. The preoperative physical examination of the external ear canal and tympanic membrane and the tympanometric evaluation of the patients were performed. A total of 60 patients with normal physical examinations and tympanometric values were included in the study. Patients with allergies, asthma, chronic diseases, and ear pathologies were excluded from the study. The 60 consecutive patients had either trans-septal suture, silicon splint, or Merocel packing after the septoplasty. Trans-septal U suture was a continuous quilting suture applied along the nasal septum with absorbing suture after septoplasty. We had three groups of patients: Group 1 had trans-septal suture, Group 2 had silicon splint, and Group 3 had Merocel packing. Written informed consent was obtained from the patients who participated in this study.

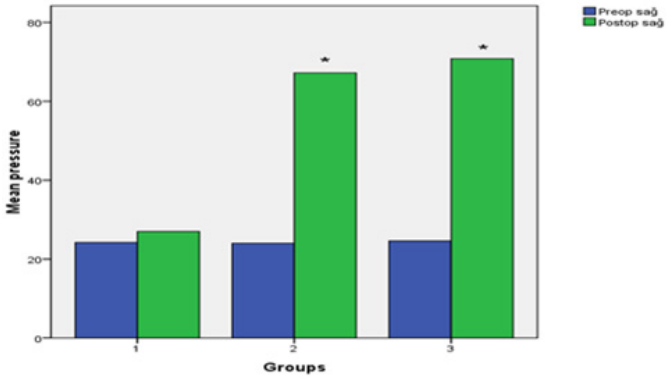

Figure 1. Preoperative and postoperative tympanometric middle ear pressure values of the right ears

Main Points:

- Nasal septum deviation is one of the most common diseases treated by ear, nose, and throat specialists.
- Nasal packs are frequently used after septoplasty to prevent bleeding and the formation of hematoma and adhesions and to support mucoperichondrial flaps.
- The Eustachian tube connects the middle ear cavity and the nasopharynx and provides the ventilation of the middle ear.
- Trans-septal suture application after septoplasty resulted in less nasal obstruction, did not increase middle ear pressure, and did not affect the Eustachian tube functions.

The ages of the patients ranged from 19 to 53 years. A total of 36 of the 60 patients were male, and 24 were female. There was no statistically significant difference in terms of age and sex of the three groups. All of the patients had tympanometry for both ears before the surgery and 48 hours after the surgery after the removal of nasal splints and packings.

Tympanometry is an objective test that evaluates the mobility or permeability of the tympanic membrane and middle ear system. There is a gap between the device's probe and the external ear canal. The air pressure is manipulated by the gap that is limited by the probe, the external ear canal, and the tympanic membrane (10).

The tympanometry findings are represented by a graphic called a tympanogram (pressure/fit graph). In the tympanogram, the air pressure peak indicates the middle ear pressure of the patient. The normal middle ear pressure range is between 0 and 150 mm of water and indicates the normal Eustachian tube function (10).

The Statistical Package for the Social Sciences version 20.0 software (IBM Corp, Amonk, NY, USA) was used for statistical analysis. The distribution of the data was controlled by the Shapiro-Wilk test. Because the distribution was normal, the quantitative data of the three groups were compared with the one-way analysis of variance and the posthoc Tukey tests. Chi-square test was used for the analysis of the categorical data. The paired-samples *t*-test was used for the analysis of the values before and after the surgery. $p<0.05$ value was considered statistically significant for all tests.

Results

There were three groups of patients depending on whether the patients received trans-septal sutures, silicon splints, or Merocel packing**.** The first group comprising patients who received trans-septal suture had a mean age of 27±7 years, the second group comprising those who received a nasal splint had a mean age of 31.2±9.6 years, and the third group comprising those who received Merocel packing had a mean age of 29.2±10.1 years. There was no statistically significant difference between the ages of these three groups (p=0.348).

Of the 60 patients, 36 were male, and 24 were female. In the first group, there were 11 males and nine females; in the second group, there were 17 males and three females, and in the third group, there were eight males and 12 females. There was no significant difference in gender among the groups (p=0.324).

Preoperative tympanometric evaluation of the right middle ear pressures of the patients was recorded as follows: 24.2±15.6 for the first group, 25±11.5 for the second group, and 24.6±16.7 for the third group. There was no significant difference in the

Table 1. Basic demographic information of the groups

Groups	Mean age	Gender, M/F
1	27±7	17/3
2	31.2±9.6	19/1
3	29.2±10.1	16/4

F: Female, M: Male

Table 2. The tympanometric right and left middle ear pressure values of the groups

	Right ear pressure			Left ear pressure		
Groups	Preop pressure	Postop pressure	p	Preop	Postop	p
1	24.2±15.6	27±14.5*	>0.05	19.8±8.3*	23.3±11.8	>0.05
2	25±11.5	67.2±64.3	<0.05	20.8±12.4	50.5±34.8	<0.05
3	24.6±16.7	70.8±44.1	<0.05	21.2±10.1	63±37.7	<0.05
p	>0.05	<0.05		>0.05	<0.05	

Preop: Preoperative, Postop: Postoperative

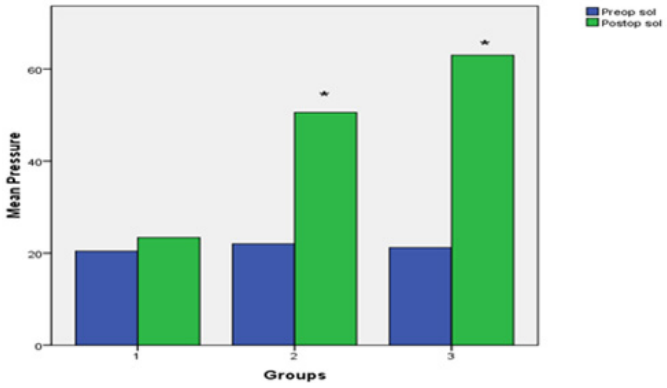

Figure 2. Preoperative and postoperative tympanometric middle ear pressure values of the left ears

Figure 3. Silicone splint

Figure 4. Merocel nasal packing

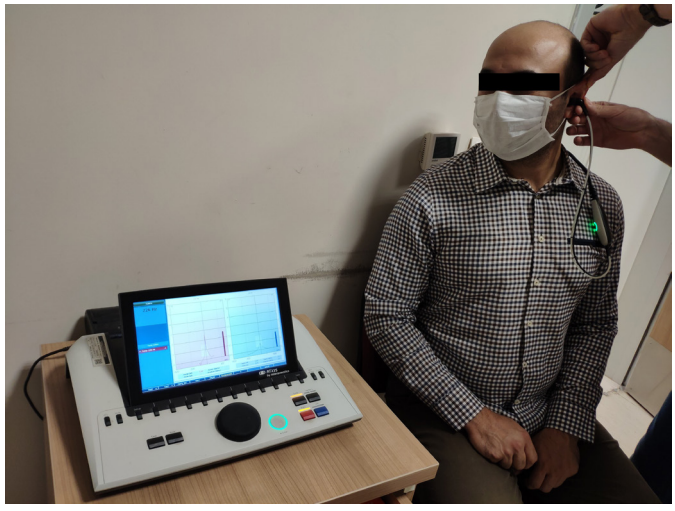

Figure 5. Tympanometry setup

right middle ear pressures among the three groups (p=0.984). Preoperative middle ear pressure in the left ear was 19.8±8.3 in the first group, 20.8±12.4 in the second group, and 21.2±10.1 in the third group. There was no significant difference in the middle ear pressures of the left ear among the three groups before the surgery (p=0.908).

The nasal splints and packings were removed 48 hours after the surgery. The tympanometric evaluation of the postoperative middle ear pressures was performed right after the removal of the packings and splints. The mean postoperative middle ear pressures of the right ear were 27±14.5 in the first group, 67.2±64.3 in the second group, and 70.8±44.1 in the third group. Regarding the left ear, the mean postoperative middle ear pressure of the first group was 23.3±11.8, that of the second group was 50.5±34.8, and that of the third group was 63±37.7. When the preoperative and postoperative values

for each ear were compared, there was a significant increase in middle ear pressures in patients using splint and packing ($p<0.05$). There was no significant change in the middle ear pressures of patients using trans-septal sutures after the surgery ($p>0.05$).

When the middle ear pressures of the patients in the three groups were compared, there was no significant difference in the values between the second group and the third group in both the right and left ear. The middle ear pressures of patients in the first group were significantly lower for both ears than those of patients in the other groups.

There was no difference in the middle ear pressures between the use of a splint or nasal packing. It was found that the application of trans-septal sutures without using a splint or Merocel packing did not alter the middle ear pressures after septoplasty.

Discussion

Merocel packing, silicon splint, or trans-septal suture applications are alternative methods to prevent synechia, hematoma, and hemorrhage and provide mucoperichondrial flap fixation after septoplasty (2, 12). Nasal obstruction caused by packings and splints can result in Eustachian tube dysfunction and inflammation of the middle ear (4, 5, 11). In this study, we have measured and compared the preoperative and postoperative middle ear pressures of patients who had undergone septoplasty using each of the methods mentioned earlier. The trans-septal suture technique yielded less middle ear pressures than packings and splints.

Sereflican et al. (11) evaluated 60 patients who underwent septoplasty and grouped them into two. After the surgery, Merocel packing was applied to the first group, and silicon splint was applied to the second group. Whereas no change in the postoperative middle ear pressure was observed in the group of patients who were applied silicone splint, there was a significant increase in the postoperative middle ear pressure in patients who received Merocel packing.

Yilmaz et al. (9) reported in a similar study that whereas intranasal silicon splint did not affect middle ear pressure, the use of Merocel packing increased middle ear pressure.

Yildirim et al. (12) investigated the effects of intranasal silicon splint and Merocel packing placed after nasal septoplasty on Eustachian tube functions by performing acoustic impedance measurements at the preoperative and postoperative second and fifth days. When they compared their results, they concluded that the use of Merocel packing caused Eustachian tube dysfunction and that the use of internal nasal splint did not cause any changes in Eustachian tube functions.

Margon et al. (13) found in their study that the application of cannulated or noncannulated packings did not cause a significant difference in middle ear pressure.

In this study, the comparison of the three alternative methods after septoplasty revealed that the trans-septal suture provided less increase in middle ear pressures. We suggest that otolaryngologists consider using trans-septal sutures after septoplasty owing to the lack of increase in middle ear pressures resulting in impairment of Eustachian function.

Ethics Committee Approval: This study was approved by Ethics committee of Atatürk University Medical Faculty Clinical Research (Number B.30.2.ATA.0.01.00/59)

Informed Consent: Written informed consent was obtained from the patients who agreed to take part in the study.

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Conflict of Interest: The authors have no conflict of interest to declare.

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