

Does Nasal Septal Deviation Affect the Success of Tympanoplasty Surgery?

M Tan¹, MT Kalcioglu², M Akarcay³, Y Toplu¹, S Karaca²

ABSTRACT

Objective: This paper deals with the investigation of the effects of nasal septal deviation evaluated by acoustic rhinometry (ARM) in the success of tympanoplasty surgery.

Subject and Methods: All patients who underwent tympanoplasty surgery by the same surgeon were reviewed. The patients with nasopharyngeal or nasal masses, polyps, symptoms of allergic rhinitis or rhinosinusitis, or concha bullosa were excluded from the study. Forty patients who underwent tympanoplasty at least one year ago were included in the study. The patients were divided into two groups according to the graft success results. Acoustic rhinometry evaluations of the patients were performed.

Results: There were 25 and 15 cases in the intact graft (group A) and re-perforated group (group B), respectively. For the same side of the operated ear, ARM values of group A were 0.47 cm² at the first narrowest cross-sectional area (MCA 1), 0.43 cm² at the second narrowest cross-sectional area (MCA 2), 1.51 cm³ volume at the first 2 cm of the nasal cavity (Vol 1) and 3.33 cm³ volume between the second and fifth cm of the nasal cavity (Vol 2). Acoustic rhinometry values of group B were 0.50 cm², 0.47 cm², 1.60 cm³ and 3.19 cm³ for MCA 1, MCA 2, Vol 1, and Vol 2, respectively.

Conclusion: The results of this study showed that nasal septal deviation may not affect the success of tympanoplasty surgery, and septoplasty may not be necessary before ear surgery.

Keywords: Acoustic rhinometry, nasal septal deviation, treatment failure, tympanoplasty

¿La Desviación Septal Nasal Afecta el Éxito de la Cirugía de Timpanoplastia?

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RESUMEN

Objetivo: Este trabajo aborda la investigación de los efectos de la desviación del septum nasal, evaluados mediante rinometría acústica (RA), en el éxito de la cirugía de timpanoplastia.

Sujetos y métodos: Se examinaron todos los pacientes sometidos a cirugía de timpanoplastia por el mismo cirujano. Los pacientes con masas nasofaríngeas o nasales, pólipos, síntomas de rinitis alérgica o rinosinusitis, o concha bulosa, fueron excluidos del estudio. Cuarenta pacientes sometidos a timpanoplastia hace menos de un año, se incluyeron en el estudio. Los pacientes fueron divididos en dos grupos según los resultados de éxito del injerto. Se realizaron evaluaciones de rinometría acústica a los pacientes.

Resultados: Hubo casos de 25 y 15 en el injerto intacto (grupo A) y el grupo re-perforado (grupo B), respectivamente. Para el mismo lado del oído operado, los valores de RA del grupo A fueron 0.47 cm² en la primera área transversal más estrecha (1 MCA), 0.43 cm² en la segunda área transversal más estrecha (2 MCA), 1.51 cm³ de volumen, en los primeros 2 cm de la cavidad nasal (Vol 1) y 3.33 cm³ de volumen entre el segundo y el quinto cm de la cavidad nasal (Vol 2). Los valores de la rinometría acústica del grupo B fueron 0.50 cm², 0.47 cm², 1.60 cm³, y 3.19 cm³ para MCA 1, MCA 2, Vol 1, y Vol 2, respectivamente.

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Conclusión: Los resultados de este estudio mostraron que la desviación septal nasal puede no afectar el éxito de la cirugía de timpanoplastia, y septoplastia puede no ser necesaria antes de la cirugía de oído.

Palabras claves: Desviación septal nasal, rinometría acústica, timpanoplastia, fracaso del tratamiento

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INTRODUCTION

Tympanoplasty has been performed for many years for patients with tympanic membrane perforation. One of the goals of this surgery is to be able to have a closed middle ear cavity by fully improving tympanic membrane perforation. Sometimes, this goal is not achieved and re-perforation occurs. Success of tympanoplasty has been reported at the rates of 85–90% (1). The failure rates of the cases depend on the graft material, surgical technique, surgeon's experience, concomitant systemic diseases such as diabetes mellitus, or nasopharyngeal mass blocking the Eustachian tube (ET) orifice. There is another controversial opinion on the cause of failure of tympanoplasty and that is the role of nasal obstruction caused by septal deviation. In this case, some surgeons recommend performing septoplasty before tympanoplasty. There is no consensus on this subject.

Acoustic rhinometry (ARM) is an objective and simple test that measures the dimensions of nasal cavity, especially the anterior nasal cavity within 2 cm from the external nasal valve (2). The presence of nasal obstruction can be delineated, objectively, by this non-invasive test.

The aim of this study is the evaluation of ARM results of the patients who have successful or unsuccessful results after tympanoplasty surgery and to investigate the possible effects of nasal obstruction on the success of tympanoplasty.

SUBJECTS AND METHODS

After ethical approval from the human ethics committee of the university (2011/141), a prospective, randomized, double-blind study was performed. The patients who underwent tympanoplasty by the same surgeon (MTK) were evaluated by otomicroscopic, endoscopic nasopharyngeal examinations and ARM evaluation. The patients were divided into two groups according to the successful or unsuccessful tympanoplasty results. Intact graft group was named as group A and the re-perforated group as group B. Endoscopic nasal and nasopharyngeal examinations were performed. The patients who had endoscopic nasal pathologies such as nasal polyp or concha bullosa or nasopharyngeal mass were excluded from the study. Also, patients who had chronic otitis media with cholesteatoma or retraction pocket, systemic health problems such as diabetes mellitus, history of previous nasal surgery such as septoplasty or endoscopic nasal surgery were excluded. The researcher who performed ARM did not know the results of otomicroscopic examination during the study. Patients who had tympanoplasty at least one year before were included in the study. Acoustic rhinometry measurements were performed by using SRE2100 (Rhinometrics A/S, Lyngø, Denmark) to

produce acoustic signals in the form of cut-impulses in accordance with criteria recommended and set by the Acoustic Rhinometry Committee for Standardization. Cross-sectional areas obtained from the measurement curves, distances and measuring results of nasal cavity volume are determined by version 2.6 of the Rhino Scan programme. Possible technical errors were avoided by applying a new "start-up (initiation)" procedure in ARM and providing a calibration for each new measurement day.

SPSS for Windows version 13 was used for statistical evaluation. Mann-Whitney U test was used for the comparison of the groups. $P < 0.05$ was considered as statistically significant.

RESULTS

There were 819 patients who underwent tympanoplasty by using the temporalis muscle fascia or cartilage with or without mastoidectomy by the same surgeon. Three hundred and eighteen of 819 patients treated using temporalis muscle fascias were included in the study to create a homogeneous group. In the study group, all of the patients had only tympanic membrane perforation, without retraction or cholesteatoma. Fifteen of the patients in the fascia group had an unsuccessful tympanoplasty result without nasal pathology such as polyp or concha bullosa or nasopharyngeal mass and comprised group B. The number of patients for group A was limited to 25 randomly selected patients in order to create balance between groups.

The mean ages of the patients were 26.8 (range, 13 to 62 years old) and 26.4 (range, 13 to 52 years old) for groups A and B, respectively. Ten of the patients were male and 15 female for group A and 4 males and 11 females for group B. The mean follow-up was 23.4 months (between 12 and 39 months) for group A and 21 months (range, 12 to 36 months) for group B. During the endoscopic examination, there were no located nasopharyngeal mass or any other nasopharyngeal or nasal pathology such as polyp, symptoms of allergy or rhinosinusitis, or concha bullosa for the patients in both groups A and B.

Acoustic rhinometry values of group A were 0.47 cm² at the first narrowest cross-sectional area (MCA 1), 0.43 cm² at the second narrowest cross-sectional area [MCA 2] (Fig. 1), 1.51 cm³ volume at the first 2 cm of the nasal cavity (Vol 1), and 3.33 cm³ volume between the second and fifth cm of the nasal cavity [Vol 2] (Fig. 2) at the same side of the operated ear. For the opposite side, the results were 0.43 cm², 0.39 cm², 1.47 cm³ and 3.32 cm³ for MCA 1, MCA 2, Vol 1 and Vol 2, respectively (Figs. 1, 2). Acoustic rhinometry values of group B

were 0.50 cm², 0.47 cm², 1.60 cm³ and 3.19 cm³ at the same side of the operated ear and 0.47 cm², 0.47 cm², 1.52 cm³ and 3.41 cm³ for the opposite side for MCA 1, MCA 2, Vol 1 and Vol 2, respectively (Figs. 1, 2). There was no statistically significant difference between the groups ($p > 0.05$).

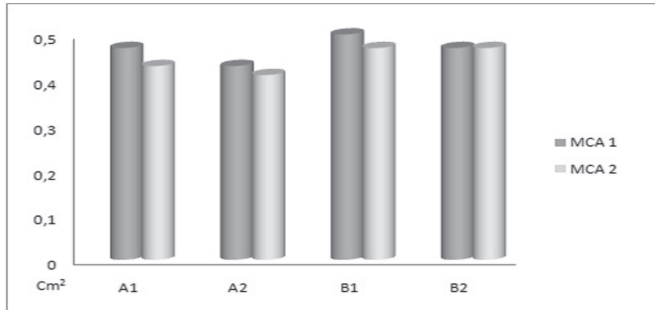


Fig. 1: The results of the acoustic rhinometric evaluations. MCA 1: first narrowest cross-sectional area; MCA 2: second narrowest cross-sectional area; A1: same side, A2: opposite side of the operated ear for the graft intact group. B1: same side, B2: opposite side of the operated ear for the graft perforated group.

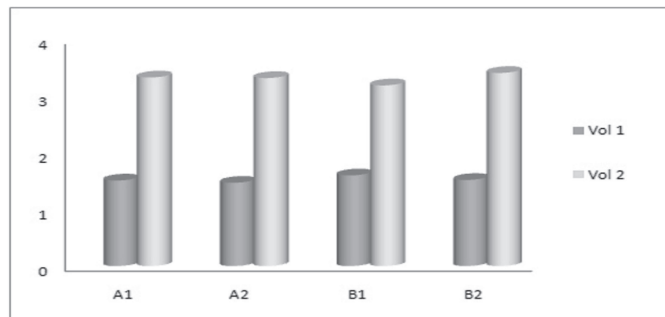


Fig. 2: The results of the acoustic rhinometric evaluations. Vol 1: volume of the first 2 cm in the nasal cavity; Vol 2: volume between the second and fifth cm in the nasal cavity. A1: same side, A2: opposite side of the operated ear for the graft intact group. B1: same side, B2: opposite side of the operated ear for the graft perforated group.

DISCUSSION

Chronic otitis media is characterized by perforation and sometimes accompanied with mastoid problems or cholesteatoma. Tympanic membrane perforation is treated surgically. The purpose of tympanoplasty is the closure of the perforation, provision of sound transmission and the creation of a dry middle ear cavity (3). Zöllner and Wullstein opened a new era in chronic otitis media surgery by defining the modern tympanoplasty for the first time in 1952 (4). Bhat and Ranit (5) have listed the factors that influence surgical success as age, location and diameter of the perforation, the ET function, middle ear mucosa status, graft material and the surgeon's experience.

Evaluation of the farther ear may be important to the success of the tympanoplasty. Bilateral tympanic membrane perforations may occur as a result of severe otitis media together with ET dysfunction (6, 7). The function of ET is important for wellness of the middle ear. Nasopharyngeal mass such as adenoid hypertrophy may be important in the development of middle ear problems because of their occlusive effects on ET and may be a factor for unsuccessful tympanic membrane repair (8). For this reason, in the current study, nasal and nasopharyngeal endoscopic examinations of the patients were performed and if any case had nasal or nasopharyngeal mass, they were excluded from the study.

There is ongoing debate on the ET function and nasal air flow. Some surgeons strongly believe that nasal septal deviation may affect ET function, and they prefer to perform septoplasty before tympanoplasty surgery, while the others do not. According to our knowledge, there is no objective study to show a direct relationship between the success of tympanoplasty and nasal septal deviation in the literature. It was reported that the function of ET and also the negative pressure in the middle ear were ameliorated after treatment of nasal septal problems and it is recommended to correct the septum before tympanoplasty (9). There are some other studies which report opposing views on this subject. Salvinelli *et al* (10) and Eyigor *et al* (11) studied the middle ear ventilation and tubal function of the patients who underwent nasal surgery. Salvinelli *et al* (10) performed preoperative and postoperative Valsalva and Toynbee tubal function tests, ear fullness sensation, and also tympanometry for each ear of the patients and reported that after nasal surgery for chronic nasal obstruction, clinical tubal function was improved significantly but postoperative tympanometric results performed one month after the surgery were almost the same when compared with preoperative results. A similar study was performed by Eyigor *et al* (11). They compared tympanometric results of the 25 patients performed before and at one week, one month and three months after the nasal septal surgery. They compared preoperative and postoperative tympanometry and reported no statistically significant difference in middle ear pressures.

Acoustic rhinometry, which can be defined as the measurement of the acoustic reflections of the nasal cavity, was first implemented by Hilberg *et al* in 1989 (12). It is a suitable method in the evaluation of nasal obstruction. It is widely used to evaluate some nasal problems such as nasal septum deviation, turbinate hypertrophy, and nasal polyp (13, 14). It was shown that there is a correlation between the nasal narrowness and value of MCA which is lower than 0.4 cm² (15). In the current study, MCA 1 and MCA 2 were 0.47 and 0.43 cm² and 0.50 and 0.47 cm² for the same side of the operated ear for groups A and B and 0.43 and 0.41 cm² and 0.47 and 0.47 cm² for the opposite side, respectively. The ARM results of the current study were higher than 0.4 cm² and thus mean that there was no nasal narrowness in both groups.

In this study, an assessment was made by using ARM which was an objective test on the possible effects of nasal congestion on the success of tympanoplasty. Since all operations were performed by the same surgeon, differences in surgical techniques, surgeon experience, and other possible factors such as differences in the selection of the graft have been disabled. There was no statistically significant difference

between the ARM values of the patients who had success or failed in the results of tympanoplasty. The results of this study support the view that nasal septal deviation may not have an effect on the success of tympanoplasty. Correspondingly, septoplasty may not be necessary before ear surgery. Further studies with more patients would help this subject to be clarified.

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