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Comparison of Subjective and Objective Success of Septoplasty in Patients with Nasal Septum Deviation: A Before and After Study

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ABSTRACT

Objective: Aim of the study is to evaluate the subjective outcomes and objective outcomes postoperatively and investigate correlations between these measurements.
Material and Methods: This prospective before and after surgical study was conducted with patients admitted with symptomatic nasal septum deviation (NSD) and who underwent Cottle's septoplasty. Morphometric diameters of the nasal cavity were measured using a multi-detector computed tomography. Preoperative and postoperative one-month Nasal Obstruction Symptom Evaluation Scale (NOSE) score, acoustic rhinometry (AR), and anterior active rhinomanometry (AAR) measurements were used to evaluate the success of surgery. The correlations between these measurements were also evaluated.
Results: The study population consisted of 30 patients, including 19 males and 11 females, with a median age of 27.5 years. There was a statistically significant difference between pre and postoperative NOSE scores, with a mean difference of 53.17 points (p<0.001). There were statistically significant differences between pre and postoperative AR parameters of both the deviated side (DS) and non-deviated side (NDS) of the nose both before and after decongestion. There were statistically significant improvements in all postoperative airflow and airway resistance parameters of the DS of the nose before decongestion when compared to preoperative measurements. There were moderate to large positive correlations between morphometric diameters and differences in NOSE score. Further, there were several statistically significant correlations between differences in AR and AAR measurements and differences in NOSE score.
Conclusion: Our findings showed that the objective measurements are strongly correlated with the NOSE score.

Keywords: Pyriform aperture, choana, nasal septum deviation, septoplasty

INTRODUCTION

Nasal obstruction is one of the most common complaints in the rhinology clinical practice (1, 2). Although conservative non-surgical medical therapy is the first option for the treatment of nasal obstruction, it is usually unsuccessful in relieving complaints of nasal obstruction which resulted from a deviated or deformed nasal septum (3). Septoplasty is widely performed to correct the septal deviation or deformity, and therefore is one of the most commonly performed surgical procedures in otorhinolaryngology (4-6).

Septoplasty is the surgical correction of the deviated or deformed nasal septum, the first examples of which date back to ancient Egypt (7). Nowadays, a variety of techniques are performed by surgeons in septoplasty operations; the types of nasal septal deviation (NSD) and surgeon's preferences are important to decide which technique to be applied (8, 9). Cottle's septoplasty with a hemitransfixion incision is one of the most frequently used techniques in the world (9).

In clinical practice, there are several diagnostic tools including subjective and objective measurements (10). Subjective

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measurements use validated questionnaires and try to determine the level of the patient's discomfort before surgery and also the relief of the patient's symptoms after surgery (2). Although subjective measurements have been used widely in clinical practice, their subjective nature is an ongoing problem, especially in long-term follow-up assessments (11, 12).

Objective measurements use several analysis methods, examine the deformed anatomy of the nose, measure the degree of nasal obstruction and evaluate nasal resistance (10). These methods provide detailed objective measurements before the surgery and guide the surgeons to decide the most convenient surgical technique (2). They are also repeated after surgery to show the effectiveness of the applied surgery, such as the correction of an anatomical part or obtaining openness (lack of obstruction) of a bodily passage (6). However, several studies have demonstrated that favorable postoperative measurements did not result in the patient's satisfaction (10). Therefore, there is a long and still ongoing conflict in the reliability of objective measurements of nasal patency and patient satisfaction (2).

This study aims to compare subjective outcomes such as the Nasal Obstruction Symptom Evaluation Scale (NOSE) score and objective outcomes such as acoustic rhinometry (AR) and anterior active rhinomanometry (AAR) measurements of Cottle's septoplasty in patients with NSD, and to evaluate the correlations between morphometric measurements and the difference in those subjective and objective outcomes.

MATERIAL AND METHODS

Design and setting

This prospective before and after surgical study was conducted with patients admitted with symptomatic nasal septum deviation (NSD) and underwent septoplasty in the University of Health Sciences Izmir Tepecik Training and Research Hospital between October 2016 and November 2016. Ethical approval was obtained from Izmir Tepecik Training and Research Hospital Ethics Committee (Approval date:18/08/2016, No:22), and written informed consent was obtained from all patients included in the study after detailed information about the study was given.

Patients

Patients between the ages of 18-45 who presented complaints of nasal obstruction, difficulty in breathing through the nose and were diagnosed with NSD after physical examination, paranasal endoscopy, and paranasal computed tomography, were evaluated for eligibility. The patients with additional nasal or paranasal pathology, history of previous nasal or paranasal surgery, craniofacial anomaly, sinonasal malignancy, adenoid hypertrophy, nasal valve collapse, additional lower and upper respiratory pathology, cardiovascular or neurological pathology were excluded from the study.

Surgical procedure

All patients underwent Cottle's septoplasty by a 3-years experienced surgeon under general or local anesthesia. A hemitransfixion incision was performed, and the deviated septal portion was excised after elevating the mucoperichondrium and mucoperiosteum. After surgery, a nasal packing was applied and removed on the second postoperative day. All patients were prescribed postoperative antibiotics, analgesics, and decongestants. Patients were followed-up with outpatient visits at the postoperative first and second week and first month.

Variables and outcomes

Patients' demographics and clinical features were recorded. The type of NSD was classified according to the Mladina classification using nasal endoscopic evaluation (Karl Storz Image 1 HUB HD camera system H3-Z Head, Germany) of the patients (13).

A multi-detector computed tomography (MDCT) (Siemens SOMATOM Definition AS 128 Slice CT scan, Germany) was used to exclude paranasal sinus pathologies preoperatively and to do morphometric measurements. The morphometric diameters were measured in millimeters (mm) based on a Turkish anatomic study by Aksu et al. (14). The morphometric variables were: (1) piriform aperture height, (PAH) which was defined as the distance between the rhinion and the anterior nasal spine; (2) piriform aperture width, (PAW) which was defined as the widest distance between the left and right bone margin on the transverse plane of pyriform aperture; (3) upper anterior face height, (UAFH) which was defined as the distance between nasion and anterior nasal spine; (4) choana height, (CH) which was defined as the distance between the furthest points on the vertical midline; (5) choana width, (CW) which was defined as the distance between the furthest points on the horizontal midline; (6) airway length, (AL) which was defined as the distance between the anterior nasal spine and the posterior nasal spine; and (7) upper palate width, (UPW) which was defined as the distance between the junction of the juga alveolaria of the first and second molar teeth (Figure 1).

There are three primary outcomes of the study. These are the Nasal Obstruction Symptom Evaluation Scale (NOSE) score, acoustic rhinometry (AR) measurements, and anterior active rhinomanometry (AAR) measurements. Preoperative and postoperative one-month measurements were compared to evaluate the success of the surgery. Also, the correlation between the morphometric measurements, the differences (as an effect size) in AR and AAR parameters between pre and postoperative measurements, and the difference between pre and postoperative NOSE scores were evaluated.

AR (Rhinoscan®V2.6) and AAR (Rhinostream®v2.1) measurements were performed using the SRE 2000 Rhinometer before and one month after surgery, (RhinoMetrics, Lynge, Denmark) following the recommendations of the International Rhinology Society and the European Rhinology Society in 2000 and 2005 (15, 16). The measurements were made on both the deviated side (DS) and non-deviated side (NDS) of the nose before nasal decongestion (BD) and after nasal decongestion (AD). AD parameters were measured 30 minutes after applying 0.01% xylometazoline HCL to both nostrils.

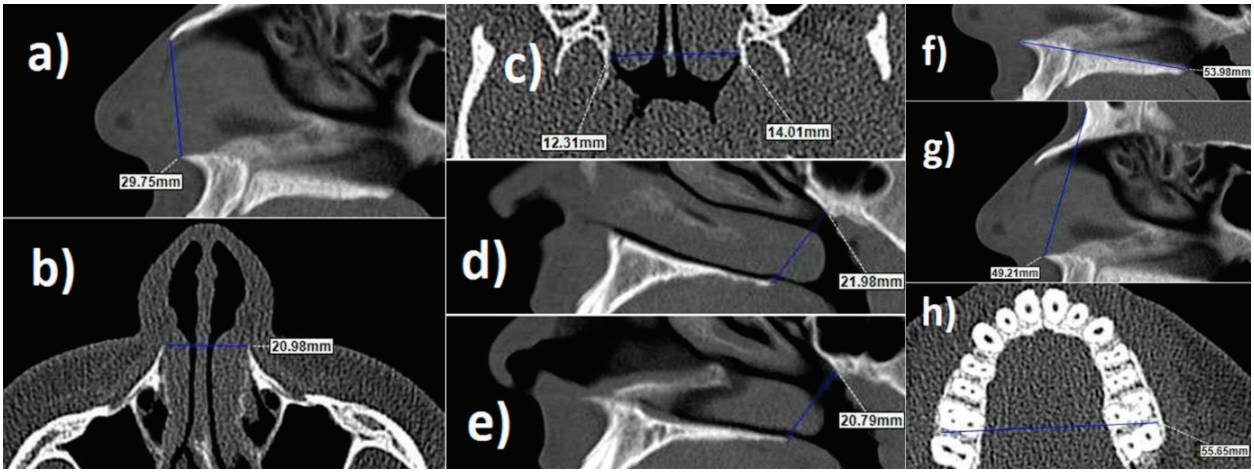

Figure 1 shows the morphometric measurements of a patient with right-sided nasal septal deviation.

a) piriform aperture height of 29.75 mm, b) piriform aperture width of 20.98 mm, c) deviated side choana width of 12.31 mm and non-deviated side choana width of 14.01 mm, d) non-deviated choana height of 21.98 mm, e) deviated side choana height of 20.79 mm, f) airway length of 53.98 mm, g) upper anterior face height of 49.21 mm, and h) upper palate width of 55.65 mm.

The variables of the AR were: (1) the first minimal cross-sectional area (MCA1), which was the narrowest cross-sectional area (cm^2) at a distance of 0-2.2 cm from the nostril; (2) the second minimal cross-sectional area 2 (MCA2), which was the narrowest cross-sectional area (cm^2) at a distance of 2.2-5.4 cm from the nostril (3) the first volume (Vol1) of one side of the nasal cavity, which was the unilateral volume (cm^3) of the nasal cavity between the nostril and 2.2 cm into the cavity; (4) the second volume (Vol2) of one side of the nasal cavity, which was the unilateral volume (cm^3) of the nasal cavity between 2.2 to 5.4 cm from the nostril; (5) total volume of one side of the nasal cavity (tVol), which was the sum of Vol1 and Vol2; and (6) Total volume of two sides of the nasal cavity (TVol).

The AAR parameters were: (1) inspiration airflow of one side of the nasal cavity ($Flow_{ins}$); (2) expiration airflow of one side of the nasal cavity ($Flow_{ex}$); (3) total airflow of one side of the nasal cavity (tFlow) which was the sum of $Flow_{ins}$ and $Flow_{ex;}$ (4) Total airflow of two sides of the nasal cavity (TFlow); (5) inspiration airway resistance of one side of the nasal cavity (AR_{ins}); (6) expiration airway resistance of one side of the nasal cavity (AR_{ex}); (7) total airway resistance of one side of the nasal cavity (tAR) which was the sum of AR_{ins} and $AR_{ex;and}$ (8) Total airway resistance of two sides of the nasal cavity (TAR).

Statistical analysis

Statistical analysis was performed using SPSS 22.0 (IBM Corporation, Armonk, New York, United States). Descriptive statistics were presented as median with interquartile range (IQR) for non-normal distributed numeric variables, and frequency (n) with percentage (%) for categorical variables. The descriptive statistics of pre and postoperative numerical measurements and the differences between those two measurements were presented as mean with 95% confidence interval (95% CI). A Related-Samples Wilcoxon Signed Rank Test was used for comparing pre and postoperative numerical measurements. The Spearman's Rank Order Correlation was used for evaluating the correlation between anatomical measurements, differences in functional measurements, and differences in NOSE scores before and after surgery. A *p*-value less than 0.05 was considered as the statistically significant level.

RESULTS

Although 37 patients were enrolled in the study, 7 patients were excluded from the study due to the development of septal perforation in 2 patients, nasal synechia in 1 patient, inadequacy of the surgery in 1 patient, inappropriate MDCT images in 1 patient, and 2 patients not coming for a control visit during the follow-up period. Finally, the study population consisted of 30 patients, including 19 males and 11 females, with a median age of 27.5 years. Of the patients, 21 (70.0%) had right-sided deviation and 9 had left-sided deviation, and most of the patients (60.0%) were classified as type 7 according to the Mladina classification. The second most common type was type 2 with a percentage of 16.7. The median PAH was 33.94 mm, the median PAW was 21.25 mm, the median UAFH was 53.25 mm, the median CH of the deviated side of the nose 23.62 mm, the median CH of the non-deviated side of the nose was 23.33 mm, the median CW of the deviated side of the nose was 13.66 mm, the median CW of the non-deviated side of the nose was 13.60 mm, the median AL was 53.39 mm, and the median UPW was 55.57 mm (Table 1).

Table 2 presents the comparison of the pre and postoperative NOSE scale scores of the patients. There was a statistically significant difference between pre and postoperative NOSE scores with a mean difference of 53.17 points ($p<0.001$).

Table 3 shows the comparison of the pre and postoperative acoustic rhinometry parameters of the patients. Except for the MCA2 measurements of the non-deviated side of the nose

Table 1: Demographics, clinical features and nasal morphometric measurements of the patients

Characteristics (n=30)		
Age (years), Median (IQR)		27.50 (24.75-35.00)
Sex, n (%)	Female	11 (36.7)
	Male	19 (63.3)
Deviation side, n (%)	Right	21 (70.0)
	Left	9 (30.0)
Mladina classification, n (%)	Type 1	3 (10.0)
	Type 2	5 (16.7)
	Type 3	1 (3.3)
	Type 4	1 (3.3)
	Type 5	1 (3.3)
	Type 6	1 (3.3)
	Type 7	18 (60.0)
PAH (mm), Median (IQR)		33.94 (30.98-35.25)
PAW (mm), Median (IQR)		21.25 (20.06-22.96)
UAFH (mm), Median (IQR)		53.25 (50.83-55.57)
CH (deviated side) (mm), Median (IQR)		23.62 (21.71-25.63)
CH (non-deviated side) (mm), Median (IQR)		23.33 (21.93-25.99)
CW (deviated side) (mm), Median (IQR)		13.66 (12.55-14.84)
CW (non-deviated side) (mm), Median (IQR)		13.60 (12.56-14.56)
AL (mm), Median (IQR)		53.39 (51.40-56.37)
UPW (mm), Median (IQR)		55.57 (53.27-57.96)

Note: IQR: Interquartile range; PAH: Height of the piriform aperture, PAW: Width of the piriform aperture; UAFH: Upper anterior face height; CH: Choana height; CW: Choana width; AL: Airway length; UPW: Upper palate width.

Table 2: Comparison of the pre and postoperative NOSE scale scores of the patients

	Preoperative, mean (95% CI)	**Postoperative, mean (95% CI)**	**Difference, mean (95% CI)**	***p****
NOSE Score	60.50 (53.71 - 67.30)	7.33 (4.04 - 10.62)	-53.17 (-59.68 - -46.66)	**<0.001**

*Related-Samples Wilcoxon Signed Rank Test was used.

both before and after decongestion, there were statistically significant differences between all pre and postoperative acoustic rhinometry parameters of deviated and non-deviated sides of the nose both before and after decongestion.

Table 4 presents the comparison of the pre and postoperative rhinomanometry parameters of the patients. There were statistically significant improvements in all postoperative airflow and airway resistance parameters of the deviated side of the nose before decongestion when compared to preoperative measurements. Also, there was a statistically significant difference between pre and postoperative inspiration airway resistance of the deviated side of the nose after decongestion.

Table 5 shows the statistically significant correlations between anatomical measurements, differences in functional measurements, and differences in NOSE scores of the patients. There were moderate positive correlations between the CW of the deviated side of the nose, UPW, and difference in NOSE score (R:0.429, p:0.018 and R:0.397, p:0.030). Similarly, there was a large positive correlation between the CW of the non-deviated side of the nose and the difference in NOSE scores (R:0.514, p:0.004). There were statistically significant moderate positive correlations between differences in acoustic rhinometry measurements such as Vol1 of the deviated side of the nose before decongestion, Vol2 of the non-deviated side of the nose before deviation, tVol1 of the non-deviated side of the nose before decongestion, TVol1 before decongestion, and difference in NOSE score.

The difference in flow parameters of the rhinomanometry of the deviated side of the nose which showed moderate negative correlations with difference in NOSE scores were Flowins, Flowex, and tFlow after decongestion. However, the

Table 3: Comparison of the pre and postoperative acoustic rhinometry parameters of the patients

Parameter	Side	Decongestion	Preoperative, mean (95% CI)	Postoperative, mean (95% CI)	Difference, mean (95% CI)	*p**
MCA1 (cm^2)	Deviated	Before	0.443 (0.383-0.502)	0.569 (0.522-0.616)	0.127 (0.091-0.162)	**<0.001**
		After	0.487 (0.434-0.540)	0.605 (0.561-0.650)	0.118 (0.077-0.159)	**<0.001**
	Non-deviated	Before	0.587 (0.544-0.630)	0.679 (0.643-0.715)	0.092 (0.049-0.135)	**<0.001**
		After	0.598 (0.558-0.638)	0.684 (0.651-0.717)	0.087 (0.057-0.116)	**<0.001**
MCA2 (cm^2)	Deviated	Before	0.495 (0.393-0.598)	0.580 (0.500-0.661)	0.085 (0.014-0.156)	**0.006**
		After	0.502 (0.432-0.571)	0.636 (0.556-0.716)	0.134 (0.071-0.197)	**<0.001**
	Non-deviated	Before	0.783 (0.712-0.854)	0.838 (0.751-0.925)	0.055 (-0.023-0.133)	0.198
		After	0.853 (0.760-0.947)	0.940 (0.845-1.036)	0.087 (-0.018-0.192)	0.245
Vol1 (cm^3)	Deviated	Before	1.810 (1.666-1.953)	1.987 (1.852-2.122)	0.177 (0.058-0.297)	**0.001**
		After	1.766 (1.651-1.881)	2.007 (1.880-2.135)	0.241 (0.162-0.320)	**<0.001**
	Non-deviated	Before	1.792 (1.676-1.908)	2.061 (1.948-2.175)	0.269 (0.192-0.346)	**<0.001**
		After	1.785 (1.659-1.911)	2.070 (1.961-2.179)	0.285 (0.211-0.358)	**<0.001**
Vol2 (cm^3)	Deviated	Before	4.513 (3.460-5.566)	6.405 (5.667-7.143)	1.892 (1.102-2.681)	**<0.001**
		After	5.265 (4.392-6.137)	7.600 (6.796-8.404)	2.335 (1.441-3.230)	**<0.001**
	Non-deviated	Before	5.570 (4.638-6.502)	6.677 (6.017-7.337)	1.107 (0.204-2.010)	**0.002**
		After	6.905 (5.915-7.895)	8.014 (7.331-8.697)	1.110 (0.264-1.955)	**0.024**
tVol (cm^3)	Deviated	Before	6.323 (5.203-7.442)	8.392 (7.636-9.147)	2.069 (1.266-2.872)	**<0.001**
		After	7.031 (6.123-7.939)	9.607 (8.781-10.434)	2.577 (1.675-3.478)	**<0.001**
	Non-deviated	Before	7.362 (6.404-8.320)	8.738 (8.091-9.385)	1.377 (0.458-2.296)	**0.001**
		After	8.690 (7.683-9.696)	10.084 (9.399-10.769)	1.394 (0.515-2.273)	**0.010**
TVol (cm^3)		Before	13.684 (12.085-15.283)	17.130 (15.984-18.276)	3.446 (2.224-4.667)	**<0.001**
		After	15.720 (14.204-17.237)	19.691 (18.356-21.027)	3.971 (2.726-5.216)	**<0.001**

Note: MCA1: Minimal cross-sectional area 1 of one side of nasal cavity; MCA2: Minimal cross-sectional area 2 of one side of nasal cavity; Vol1: Volume 1 of one side of nasal cavity; Vol2: Volume 2 of one side of nasal cavity; tVol: Total volume of one side of nasal cavity; TVol: Total volume of two sides of nasal cavity.
*Related-Samples Wilcoxon Signed Rank Test was used.

difference in flow parameters of the rhinomanometry of the non-deviated side of the nose which showed moderate positive correlations with the difference in NOSE scores were Flowex, and tFlow after decongestion. Additionally, the difference in airway resistance parameters of the deviated side of the nose which had moderate positive correlations with the difference in NOSE scores were ARins after decongestion, ARex before decongestion, ARex after decongestion, and tAR before decongestion.

DISCUSSION

The major expectancy of patients who have a septoplasty operation due to nasal septum deviation is to have more comfortable nasal breathing (5, 17). However, the main postoperative outcome is the satisfaction and improvement of the quality of life of the patient. The effectiveness of the performed surgery is evaluated by the patients and can be accepted as a success if their preoperative symptoms related to nasal septum deviation are completely improved and they feel an apparent increase in life quality (6). Therefore, the patient's feelings and welfare evaluated by the subjective measurements provide a more meaningful picture of the effectiveness of the applied surgery than the objective methods (17). However, the subjective nature of these methods is a challenge, especially in repeated measures. Follow-up measures are performed by the surgeons to show the ongoing effectiveness of the performed surgery at 3, 6, or 12 months after septoplasty. Therefore, lots of investigators use objective measurements besides the subjective ones, and also investigate their correlations (5, 18).

In the literature, lots of studies have used symptom score questionnaires such as the NOSE score, which is one of the most widely used. These questionnaires provide valuable information about the severity of nasal obstruction from a patient's point of view, and also about the degree of postoperative satisfaction (5, 19). Eren et al. reported a significant decrease in the NOSE score of patients with nasal obstruction after septoplasty (20). Mondina et al. stated that all NOSE scores of patients with nasal obstruction decreased significantly after an applied septoplasty operation (10). Lodder et al. reported that the mean preoperative and postoperative NOSE score was 78.4 and 23.0, respectively, and the mean improvement was 55.4 (21). We found similar results in the literature that the mean

Table 4: Comparison of the pre and postoperative rhinomanometry parameters of the patients

Parameter	Side	Decongestion	Preoperative, mean (95% CI)	Postoperative, mean (95% CI)	Difference, mean (95% CI)	*p**
$Flow_{ins}$ (cm^3/s)	Deviated	Before	269.70 (238.35-301.06)	344.93 (329.98-359.89)	75.23 (41.60-108.87)	**<0.001**
		After	318.67 (297.40-339.93)	340.63 (331.53-349.74)	21.97 (-1.49-45.43)	0.052
	Non-deviated	Before	329.43 (321.66-337.20)	348.23 (324.05-372.42)	18.80 (-9.32-46.92)	0.616
		After	364.33 (330.68-397.99)	357.17 (333.42-380.91)	-7.17 (-51.88-37.55)	0.854
$Flow_{ex}$ (cm^3/s)	Deviated	Before	296.87 (267.61-326.12)	363.77 (347.18-380.35)	66.90 (36.10-97.70)	**0.003**
		After	355.53 (330.27-380.80)	358.20 (346.16-370.24)	2.67 (-24.75-30.08)	0.787
	Non-deviated	Before	347.93 (338.03-357.83)	371.50 (341.70-401.30)	23.57 (-13.07-60.20)	0.673
		After	394.30 (355.00-433.60)	383.93 (353.86-414.01)	-10.37 (-63.16-42.43)	0.880
tFlow (cm^3/s)	Deviated	Before	566.57 (507.84-625.30)	708.70 (677.52-739.88)	142.13 (79.51-204.76)	**0.001**
		After	674.20 (629.56-718.84)	698.83 (677.91-719.75)	24.63 (-24.25-73.52)	0.309
	Non-deviated	Before	677.37 (660.36-694.37)	719.73 (665.85-773.62)	42.37 (-22.05-106.79)	0.666
		After	758.63 (686.54-830.73)	741.10 (687.42-794.79)	-17.53 (-114.34-79.27)	0.948
TFlow (cm^3/s)		Before	1243.93 (1182.18-1305.69)	1428.43 (1350.71-1506.16)	184.50 (89.30-279.70)	**0.001**
		After	1432.83 (1343.25-1522.42)	1439.93 (1372.74-1507.12)	7.10 (-103.32-117.52)	0.116
AR_{ins} (150Pa/cm^3/s)	Deviated	Before	0.685 (0.529-0.840)	0.440 (0.425-0.455)	-0.245 (-0.400 - -0.089)	**<0.001**
		After	0.496 (0.445-0.546)	0.442 (0.432-0.453)	-0.053 (-0.105 - -0.001)	**0.048**
	Non-deviated	Before	0.457 (0.447-0.467)	0.442 (0.421-0.462)	-0.016 (-0.042 - -0.011)	0.649
		After	0.432 (0.402-0.462)	0.431 (0.410-0.452)	-0.002 (-0.042-0.039)	0.787
AR_{ex} (150Pa/cm^3/s)	Deviated	Before	0.579 (0.477-0.682)	0.417 (0.403-0.432)	-0.162 (-0.263 - -0.061)	**0.002**
		After	0.437 (0.408-0.467)	0.422 (0.410-0.433)	-0.016 (-0.047-0.016)	0.658
	Non-deviated	Before	0.434 (0.421-0.448)	0.416 (0.396-0.436)	-0.018 (-0.049-0.013)	0.704
		After	0.402 (0.373-0.431)	0.404 (0.382-0.426)	0.002 (-0.037-0.041)	0.957
tAR (150Pa/cm^3/s)	Deviated	Before	0.309 (0.249-0.369)	0.214 (0.207-0.221)	-0.095 (-0.155 - -0.036)	**0.001**
		After	0.231 (0.213-0.249)	0.216 (0.211-0.221)	-0.015 (-0.034-0.003)	0.284
	Non-deviated	Before	0.223 (0.217-0.228)	0.214 (0.204-0.224)	-0.008 (-0.022-0.006)	0.688
		After	0.208 (0.193-0.223)	0.208 (0.198-0.219)	0.000 (-0.019-0.020)	0.905
TAR (150Pa/cm^3/s)		Before	0.123 (0.116-0.131)	0.107 (0.103-0.111)	-0.017 (-0.025 - -0.009)	**0.001**
		After	0.107 (0.102-0.113)	0.106 (0.102-0.109)	-0.002 (-0.008-0.005)	0.116

Note: $Flow_{ins}$: Inspiration airflow of one side of nasal cavity; $Flow_{ex}$: Expiration airflow of one side of nasal cavity; tFlow: Total airflow of one side of nasal cavity; TFlow: Total airflow of two sides of nasal cavity; AR_{ins}: Inspiration airway resistance of one side of nasal cavity; AR_{ex}: Expiration airway resistance of one side of nasal cavity; tAR: Total airway resistance of one side of nasal cavity; TAR: Total airway resistance of two sides of nasal cavity.
*Related-Samples Wilcoxon Signed Rank Test was used.

preoperative and postoperative NOSE score was 60.50 and 7.33, respectively, with a mean difference of 53.17 points. This difference was found to be statistically significant.

In a study, it was reported that an improvement in NOSE score of approximately 40% or higher was required to define the surgery as successful (22). Also, changes in NOSE scores after surgery were evaluated in a systematic review and meta-analysis, and the mean improvement was found as 50.0 points at the early evaluation (12). Stewart et al. demonstrated a 31 to 37 points change in NOSE score in their original septoplasty study (23). In our study, all patients had improvements of more than 30 points in NOSE scores, except two patients with improvement scores of less than 30 points.

AR and AAR measurements have been performed after decongestion of the nose with a topical decongestant in the studies that investigated the effectiveness of the septoplasty (6, 11, 21). The use of nasal decongestants eliminates vascular causes of nasal obstruction and provides a more appropriate evaluation chance for the hard tissue components of nasal obstruction (6). In our study, we measured all parameters BD and AD and took part in AR and AAR measures. We have demonstrated a comparison of preoperative and postoperative results in Tables 3 and 4 and exhibited the statistically significant correlations between the differences in objective measurements and the differences in NOSE scores of the patients. In our study, we found statistically

Table 5: Statistically significant correlations between anatomical measurements, differences in functional measurements and differences in NOSE scores

		Difference in NOSE score		
		R	**n**	***p****
Anatomical measurements	CW (DS)	0.429	30	**0.018**
	CW (NDS)	0.514	30	**0.004**
	UPW	0.397	30	**0.030**
Difference in functional measurements	Vol1 (cm^3) (DS/BD)	-0.438	30	**0.015**
	Vol2 (cm^3) (NDS/BD)	-0.377	30	**0.040**
	tVol1 (cm^3) (NDS/BD)	-0.401	30	**0.028**
	TVol1 (cm^3) (BD)	-0.372	30	**0.043**
	$Flow_{ins}$ (cm^3/s) (DS/AD)	-0.409	30	**0.025**
	$Flow_{ex}$ (cm^3/s) (DS/AD)	-0.396	30	**0.030**
	$Flow_{ex}$ (cm^3/s) (NDS/AD)	0.367	30	**0.046**
	tFlow (cm^3/s) (DS/AD)	-0.396	30	**0.030**
	tFlow (cm^3/s) (NDS/AD)	0.365	30	**0.047**
	AR_{ins} (150Pa/cm^3/s) (DS/AD)	0.418	30	**0.022**
	AR_{ex} (150Pa/cm^3/s) (DS/BD)	0.366	30	**0.047**
	AR_{ex} (150Pa/cm^3/s) (DS/AD)	0.412	30	**0.024**
	AR_{ex} (150Pa/cm^3/s) (NDS/AD)	-0.368	30	**0.045**
	tAR (150Pa/cm^3/s) (DS/BD)	0.405	30	**0.026**

Note: CW: Choana width; UPW: Upper palate width; Vol1: Volume 1 of one side of nasal cavity; Vol2: Volume 2 of one side of nasal cavity; tVol: Total volume of one side of nasal cavity; TVol: Total volume of two sides of nasal cavity; $Flow_{ins}$: Inspiration airflow of one side of nasal cavity; $Flow_{ex}$: Expiration airflow of one side of nasal cavity; tFlow: Total airflow of one side of nasal cavity; AR_{ins}: Inspiration airway resistance of one side of nasal cavity; AR_{ex}: Expiration airway resistance of one side of nasal cavity; tAR: Total airway resistance of one side of nasal cavity; DS: Deviated side; NDS: Non-deviated side; BD: Before decongestion; AD: After decongestion.
* Spearman's rank-order correlation was used.

significant differences between all pre and postoperative acoustic rhinometry variables (Except for the MCA2 of NDS) of DS and NDS of the nose both before and after decongestion. We also found significant improvements in all postoperative airflow and airway resistance parameters of DS of the nose before decongestion, when compared to the preoperative measurements.

Although AR provides detailed information about the geometry of nasal structures, it does not provide any information about the flow field and physiology of nasal pressure (5, 17). These parameters have critical importance because the evaluation of the physiology of the nasal airway helps surgeons to decide which patients would get better from performing a septoplasty operation (17). AAR provides detailed information about the physiology of nasal airflow and demonstrates abnormal measurements in nasal airflow and nasal pressure. Also, studies have reported that patients with severe anatomic deviation may have mild symptoms, whereas other patients with a small septal deviation have significant nasal obstruction symptoms (1). It is thought that these characteristics of AAR complete the missing parts of other objective measurements such as morphometric variables and AR measures (24).

Lara-Sanches et al. reported that performed surgery resulted in statistically significant differences with the NOSE score and AAR measures. They did not, however, observe any correlation between the NOSE score and AAR, and concluded that the objective and subjective measurements complete each other and provide useful information from a different point of view (25). Currently, the correlation between the subjective evaluation scores and detailed objective measurements is still debated. Several studies showed correlation, whereas others did not (2, 5, 17, 26). It was pointed out that the correlation between NOSE score and objective evaluations could be affected by study design, such as having a small sample size, non-homogenous groups, or the surgical techniques performed (12, 27). Jones et al. observed no correlation between the objective nasal resistance measurements and subjective measures (28).

It has been stated in the literature that the lack of correlation between the objective and subjective measurements related to nasal function may be due to surgeons focusing on the nasal passage of the deviated side and ignoring the fact that the nose has two separate nasal passages (5). In a study, a significant nasal airflow increase was observed on the deviated side, but a significant airflow decrease was not observed on the non-deviated (wide side) part (29). In another study, during follow-up measurements, a significant increase in nasal resistance was observed in the non-deviated nasal cavity in 23 of 30

patients with nasal obstruction (30). In the presented study, surgery significantly increased nasal airflow and reduced nasal resistance in the deviated side of the nasal septum, but did not cause any significant airflow or nasal resistance changes in the non-deviated side. It has been thought in the literature that asymmetrical nasal airflow resulting from deviated nasal septum may create spontaneous changes in the nasal cycle and that may lead to the symptoms related to nasal congestions (5).

NOSE score refers to subjective feelings about the nasal patency, AR and AAR provide additional objective detailed information on the anatomy of the nasal cavity, nasal airflow, and nasal resistance, respectively (5). In our study, we performed both objective measurements in all patients and investigated the existence of a correlation between NOSE score, AR, and AAR measurements. We then demonstrated significant correlations between the NOSE score and lots of AR and AAR parameters.

There are several limitations in the presented study. First, we could have studied a relatively smaller group of patients. Also, we did not include a control group. Another limitation of our study was the short follow-up time because several studies have reported that the improvement in symptoms and subjective evaluations at early stages decreased at the long term observation (31). In the presented study, the control measures of patients were performed at the end of the first month and therefore, we cannot comment on the long-term consequences of the surgery.

CONCLUSION

Many different follow-up and evaluation methods have been proposed to evaluate the effectiveness of the performed operations in septoplasty surgery. Some of them include subjective measurements and others include objective measurements. We performed both methods in the presented study, and then investigated the correlation of these tests. We showed that objective measurements correlate strongly with the subjective one, and further studies should be conducted to evaluate positive or negative preoperative predictors of surgical outcomes.

Ethics Committee Approval: Ethical approval was obtained from Izmir Tepecik Training and Research Hospital Ethics Committee (Approval date:18/08/2016, No:22)

Informed Consent: Written informed consent was obtained from all patients included in the study after detailed information about the study was given.

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REFERENCES

1. Konstantinidis I, Triaridis S, Triaridis A, Karagiannidis K, Kontzoglou G. Long term results following nasal septal surgery. Focus on patients' satisfaction. Auris, Nasus, Larynx 2005;32(4):369-74.
2. Tsang CLN, Nguyen T, Sivesind T, Cervin A. Long-term patient-related outcome measures of septoplasty: a systematic review. European archives of oto-rhino-laryngology: official journal of the European Federation of Oto-Rhino-Laryngological Societies (EUFOS): affiliated with the German Society for Oto-Rhino-Laryngology - Head and Neck Surgery 2018;275(5):1039-48.
3. Sedaghat AR, Busaba NY, Cunningham MJ, Kieff DA. Clinical assessment is an accurate predictor of which patients will need septoplasty. Laryngoscope 2013;123(1):48-52.
4. Shah J, Roxbury CR, Sindwani R. Techniques in Septoplasty: Traditional Versus Endoscopic Approaches.Otolaryngol Clin North Am 2018;51(5):909-17.
5. Hsu HC, Tan CD, Chang CW, Chu CW, Chiu YC, Pan CJ, et al. Evaluation of nasal patency by visual analogue scale/nasal obstruction symptom evaluation questionnaires and anterior active rhinomanometry after septoplasty: a retrospective one-year follow-up cohort study.Clin Otolaryngol 2017;42(1):53-9.
6. Moore M, Eccles R. Objective evidence for the efficacy of surgical management of the deviated septum as a treatment for chronic nasal obstruction: a systematic review. Clin Otolaryngol 2011;36(2):106-13.
7. Fettman N, Sanford T, Sindwani R. Surgical management of the deviated septum: techniques in septoplasty. Otolaryngol Clin North Am 2009;42(2):241-52.
8. Kim JS, Heo SJ. Questionable Effect of Crosshatching Incision in Septoplasty. Clin Exp Otorhinolaryngol 2020;13(1):47-51.
9. Most SP, Rudy SF. Septoplasty: Basic and Advanced Techniques. Facial Plast Surg Clin North Am 2017;25(2):161-9.
10. Mondina M, Marro M, Maurice S, Stoll D, de Gabory L. Assessment of nasal septoplasty using NOSE and RhinoQoL questionnaires. Eur Arch Otorhinolaryngol 2012;269(10):2189-95.
11. Sahin C. Evaluation of Patient Satisfaction After Nasal Septoplasty Operation Using Peak Nasal Inspiratory Flow and Nasal Obstruction Symptom Score Questionnaire. J Craniofac Surg 2016;27(5):1289-91.
12. Floyd EM, Ho S, Patel P, Rosenfeld RM, Gordin E. Systematic Review and Meta-analysis of Studies Evaluating Functional Rhinoplasty Outcomes with the NOSE Score. Otolaryngol Head Neck Surg 2017;156(5):809-15.
13. Mladina R. The role of maxillary morphology in the development of pathological septal deformities. Rhinology. 1987;25(3):199-205.
14. Aksu F GMN, Kahveci O, Cırpan S, Karabekir S. Diameters of piriform aperture and choana: An anatomic study. Dokuz Eylül Univ Sch Med J. 2013;27(1):1-6.
15. Hilberg O, Pedersen OF. Acoustic rhinometry: recommendations for technical specifications and standard operating procedures. Rhinol Suppl 2000;16:3-17.
16. Clement PA, Gordts F. Consensus report on acoustic rhinometry and rhinomanometry. Rhinology 2005;43(3):169-79.
17. Cantone E, Ricciardiello F, Oliva F, De Corso E, Iengo M. Septoplasty: is it possible to identify potential "predictors" of surgical success? Acta Otorhinolaryngol Ital 2018;38(6):528-35.

18. André RF, Vuyk HD, Ahmed A, Graamans K, Nolst Trenité GJ. Correlation between subjective and objective evaluation of the nasal airway. A systematic review of the highest level of evidence. Clin Otolaryngol 2009;34(6):518-25.
19. Apaydın E, İkincioğulları A, Çolak M, Atan D, Ensari S, Dere HH. The Voice Performance After Septoplasty With Surgical Efficacy Demonstrated Through Acoustic Rhinometry and Rhinomanometry. J Voice 2020;34(4):649.e15-.e20.
20. Eren SB, Tugrul S, Dogan R, Ozucer B, Ozturan O. Objective and subjective evaluation of operation success in patients with nasal septal deviation based on septum type. Am J Rhinol Allergy 2014;28(4):e158-62.
21. Lodder WL, Leong SC. What are the clinically important outcome measures in the surgical management of nasal obstruction? Clin Otolaryngol 2018;43(2):567-71.
22. Ziai H, Bonaparte JP. Determining a Successful Nasal Airway Surgery: Calculation of the Patient-Centered Minimum Important Difference. Otolaryngol Head Neck Surg 2017;157(2):325-30.
23. Stewart MG, Smith TL, Weaver EM, Witsell DL, Yueh B, Hannley MT, et al. Outcomes after nasal septoplasty: results from the Nasal Obstruction Septoplasty Effectiveness (NOSE) study. Otolaryngol Head Neck Surg 2004;130(3):283-90.
24. Vogt K, Jalowayski AA, Althaus W, Cao C, Han D, Hasse W, et al. 4-Phase-Rhinomanometry (4PR)--basics and practice 2010. Rhinol Suppl 2010;21:1-50.
25. Lara-Sánchez H, Álvarez Nuño C, Gil-Carcedo Sañudo E, Mayo Iscar A, Vallejo Valdezate L. Assessment of nasal obstruction with rhinomanometry and subjective scales and outcomes of surgical and medical treatment. Acta Otorrinolaringol Esp 2017;68(3):145-50.
26. Mengi E, Cukurova I, Yalçın Y, Yiğitbaşı OG, Karaman Y. [Evaluation of operation success in patients with nasal septal deviation with quality of life scale and objective methods]. Tr-ENT 2011;21(4):184-91.
27. Gamerra M, Cantone E, Sorrentino G, De Luca R, Russo MB, De Corso E, et al. Mathematical model for preoperative identification of obstructed nasal subsites. Acta Otorhinolaryngol Ital. 2017;37(5):410-5.
28. Jones AS, Willatt DJ, Durham LM. Nasal airflow: resistance and sensation. J Laryngol Otol 1989;103(10):909-11.
29. Pirilä T, Tikanto J. Acoustic rhinometry and rhinomanometry in the preoperative screening of septal surgery patients. Am J Rhinol Allergy 2009;23(6):605-9.
30. Haavisto LE, Sipilä JI. Acoustic rhinometry, rhinomanometry and visual analogue scale before and after septal surgery: a prospective 10-year follow-up. Clin Otolaryngol 2013;38(1):23-9.
31. De Corso E, Bastanza G, Di Donfrancesco V, Guidi ML, Morelli Sbarra G, Passali GC, et al. Radiofrequency volumetric inferior turbinate reduction: long-term clinical results. Acta Otorhinolaryngol Ital 2016;36(3):199-205.

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Audiovestibular Manifestations in Autoimmune Disorders: A Case Clinical Control Study in Celiac Patients

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ABSTRACT

Objective: The aim of this study was to evaluate audiovestibulopathy in patients with celiac disease using vestibular evoked myogenic potentials (VEMP), video head impulse test (vHIT), and audiometric examinations.
Material and Methods: Thirty-one patients with celiac disease from the gastroenterology department of Cerrahpasa Medical School, and 30 healthy controls were included in the study between 2013 and 2015. Pure tone audiometry, tympanometry, acoustic reflex test, and vestibular evaluation with VEMP and vHIT were performed in both groups. The anti-tissue transglutaminase IgA levels of all participants and disease duration of affected individuals were documented.
Results: The mean age±SD was 35.9±12.82 (27-48) years and 37.6±11.6 (26-48) years for the patient and control groups, respectively. The pure tone thresholds did not differ between the two groups. However, a subgroup of patients with high antibody levels had significantly higher high-frequency hearing thresholds. The two groups had similar VEMP test results, but a comparison of the vestibuloocular reflex (VOR) gains of six semicircular canals (SSC) revealed significant decreases in the right anterior canal in the patient group.
Conclusion: Subclinical audiovestibular pathologies can occur in patients with celiac disease. Following these patients with periodic audiovestibular test batteries may reduce patient morbidity by providing early diagnosis and rehabilitation.

Keywords: Celiac disease, VEMP, vHIT, vestibuloocular reflex

INTRODUCTION

Autoimmune diseases are known to play a role in the etiology of sensorineural hearing loss (SNHL) and vestibular dysfunction. This relationship was first reported as a separate clinical condition in 1979 by McCabe, who showed improvement in patients with bilateral progressive hearing loss using corticosteroid treatment (1). Subsequently, it was proposed that autoimmunity was the cause of inner ear pathologies, such as sudden sensorineural hearing loss or acute vertigo, because various autoimmune diseases (e.g., rheumatoid arthritis to polyartheritis nodasa, systemic lupus erythematosis, and ulcerative colitis) may include auditory and vestibular system symptoms (2, 3).

One of the most common autoimmune diseases is celiac disease, a food-related condition of the small intestine in humans (4). The clinical findings of celiac disease are most prominently associated with the intestinal system. However, autoimmune-related neurological system findings are also observed in 6–10% of patients. These neurological findings have been associated with autoimmunity due to the appearance of inflammatory cells in the cerebrospinal fluid, the presence of antibodies in the circulation, and the regression of symptoms after an appropriate diet (5). It has been proposed that the SNHL associated with neurological symptoms develops in patients with celiac disease due to immunological markers such as organ-unspecific autoantibodies and antineural antibodies (6). Therefore, SNHL should be defined as extraintestinal involvement in patients with celiac disease (7).

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The peripheral vestibular system is also a part of the inner ear and the neurological system. Therefore, we believe that this system could inevitably be affected by autoimmune mediators and that this issue should be tested. The aim of the present study was therefore to evaluate the vestibular system in patients with celiac disease, as well as their audiological systems. To the best of our knowledge, this is the first study to assess the vestibular system using VEMP and vHIT in patients with celiac disease.

MATERIALS AND METHODS

Patients and study design

The study was approved by the Istanbul University Cerrahpaşa Medical Faculty Ethics Committee (approval ID: 02/16-47473) and included 31 patients with celiac disease who were diagnosed, followed up, and treated at Cerrahpaşa Medical School Adult Gastroenterology outpatient clinic. A control group of 30 age- and sex-matched healthy volunteers was also included. None of the patients with celiac disease or the healthy volunteers had any audiovestibular complaints. Exclusion criteria included ototoxic drug use, ear surgery history, middle ear pathology, presence of spontaneous nystagmus, or presence of another autoimmune, metabolic, or neurological disease.

Evaluation of serum antibody levels

The disease activity in patients with celiac disease included in the study was determined by measuring serum anti-tissue transglutaminase IgA levels two weeks prior to the audiovestibular tests. The median value of 12U/mL was used to divide the patients into a low-antibody level group (Group I) and a high-antibody level group (Group II).

Audiological evaluation

Autoscopic and routine otolaryngological examinations were performed by an expert otolaryngologist on all individuals included in the study. Acoustic impedancemetry and reflex measurements were performed using Interacoustics AZ26 and AT235H (Interacoustics A/S, Denmark) clinical tympanometry devices. Audiological evaluations were made in double-walled IAC (Industrial Acoustic Company, Inc.) soundproof rooms in a standard quiet cabin. An Interacoustics AC 40 clinical audiometer was used to detect air conduction hearing thresholds with TDH 39P Telephonics headphones, and bone conduction hearing thresholds with a Radioear B-71 bone vibrator.

Vestibular evaluation

The VEMP test was performed with Chartr model EP 200 device (Otometrics,Natus M.,Denmark). VEMP recordings were obtained by providing a 95 dB tone-burst stimulus at 500 Hz frequency with an insert headphone. The patients were asked to contract the sternocleidomastoid muscle by turning their head to the opposite side of the stimulated ear. Amplitude and latency values were recorded by detecting p1 and n1 waves.

The vHIT measurements were performed with an ICS impulse system (GN Otometrics, Denmark) vHIT device. During the test, eye movements were recorded with the aid of a pair of slanted glasses held to the head with rubber bands. Depending on the semicircular canal being tested, the test was performed by tilting the head right, left, front, or back by about 15 degrees and waiting for at least one second between consecutive head movements. Individuals with a semicircular canal gain score under 0.7 were considered pathological, while those scoring above 0.7 were considered normal.

Statistical analyses

SPSS 15.0 for Windows software was used for statistical analyses. Descriptive statistics were given as numbers and percentages for categorical variables and as mean and standard deviation for numerical variables. Comparison of two independent groups was made using the Student's t-test when numerical variables showed normal distribution and with the Mann-Whitney U-test when the variables did not show normal distribution. Ratios in independent groups were tested using Chi-square analysis. Correlations between numerical variables were analyzed using Pearson correlation analysis when a parametric test condition was met and with Spearman correlation analysis when the parametric test condition was not met. Statistical alpha significance level was accepted as $p<0.05$.

RESULTS

In the celiac patient group included in the study, 11 (35.5%) were male and 20 (64.5%) were female, with a mean age ± of 35.9±12.82 years (27–48 years). The mean disease duration was 10.4±8.1 years (1–29 years). Of the healthy volunteers, 14 were female (47%) and 16 were male (53%), with a mean age of 37.6±11.6 years (26–48 years).

The mean anti-tissue transglutaminase IgA level was 117.1±132.6 U/mL (0.7–300) in the patient group. Anti-tissue transglutaminase IgA was below 12 U/mL (Group I) in 15 (48.4%) patients and above this value (Group II) in 16 (51.6%) patients.

Audiological findings

No statistically significant differences were found between the patient and control group for any of the air and bone conduction frequency measurements. Air conduction thresholds in right and left ears were significantly lower, at 1000, 2000, 4000, and 6000 Hz, and bone conduction thresholds in the right ear were also significantly lower in Group I than in Group II only at 4000 Hz (Table 1). Air conduction thresholds in both ears were significantly higher at all frequencies tested in the group with a disease duration of 10 or more years (Table 2).

Comparison of the gains of vHIT semicircular canals revealed a significantly higher rate of low RA (Right Anterior) in the patient group than in the control group (Table 3).

The results for semicircular canal gain in the vHIT test showed no significant difference between the anti-tissue transglutaminase IgA groups or different disease duration groups.

Table 1: Comparison of the hearing thresholds (dBHL) in the right and left ear in anti-tissue transglutaminase IgA groups of patients with celiac disease.

	Right ear			Left ear		
	Group I	Group II		Group I	Group II	
	Mean±SD	Mean±SD	p	Mean±SD	Mean±SD	p
Air Conduction Thresholds						
125 Hz	7.33±5.80	11.56±10.28	0.123	7.67±6.09	10.31±7.18	0.180
250 Hz	7.56±5.80	10.94±8.98	0.173	7.67±5.50	8.13±6.80	0.813
500 Hz	7.00±5.78	10.00±6.06	0.093	7.33±5.39	9.06±4.55	0.255
1000 Hz	7.33±5.60	11.88±6.02	0.011	7.11±5.28	10.00±4.08	0.032
2000 Hz	7.11±5.38	13.75±8.27	0.003	7.33±5.18	13.13±6.80	0.003
4000 Hz	7.11±5.79	17.50±12.91	0.001	7.44±6.27	17.50±15.28	0.001
6000 Hz	8.11±7.48	18.13±10.31	<0.001	8.44±7.22	17.50±12.52	0.002
Bone Conduction Thresholds						
500Hz	5.78±4.76	6.25±7.19	0.871	5.67±4.34	5.00±5.16	0.575
1000Hz	6.36±5.10	6.25±7.42	0.530	5.67±4.21	4.69±4.27	0.466
2000Hz	6.22±5.66	8.44±9.61	0.778	5.89±4.56	7.19±8.16	0.904
4000Hz	6.22±6.23	13.75±13.23	0.031	6.56±5.82	13.13±14.13	0.091

A comparison of VEMP quantitative values in patient and control groups is summarized in Table 4. No significant differences were noted between the right and left ear p1 and n1 latencies and amplitudes in the anti-tissue transglutaminase IgA groups or in the different disease duration groups.

The differences in the right and left ear p1 and n1 latency and amplitudes between patient and control groups were not statistically significant.

DISCUSSION

The pathophysiology of systemic autoimmune diseases has not yet been fully unraveled, but some publications suggest that these diseases can affect the audiovestibular system through cross-reaction, immune complex accumulation, vasculitis, or the passage of autoantibodies to the perilymph through the cerebrospinal fluid (8). The involvement of the audiovestibular system in celiac disease, an autoimmune disease, is apparently inevitable. In patients with celiac disease, the effects of the disease on the audiological system have been investigated. However, not enough attention has been paid to any potential effects on the vestibular system. To the best of our knowledge of the literature available to us, we believe that our study, with its aim of understanding the effect of celiac disease on the vestibular and audiological systems, is the first to investigate this relationship using VEMP and vHIT test batteries in this group of patients.

Autoimmune inner ear disease is clinically heterogeneous and depends on the type of immune reaction and the location of the damage to the inner ear. One study conducted in patients with psoriatic arthritis, another immune-mediated inflammatory disease, showed increases in the frequency of audiovestibular symptoms, such as hearing impairment and vertigo, and detected bilateral sensorineural hearing loss in these patients, especially at high frequencies. In addition, hearing loss prevalence was significantly higher in patients with psoriatic arthritis compared to the control group (9). Leggio et al. reported that 41.7% of patients with celiac disease had SNHL and suggested that SNHL might be considered an extraintestinal symptom of celiac disease and that immunological markers might be effective for monitoring the formation of SNHL in these patients. (10) Similarly, Umberto et al. found a higher prevalence of SNHL in patients with celiac disease than in healthy controls; however, the difference was not statistically significant (11). They also found no correlation between SNHL findings in patients with celiac disease and the presence of immunological markers (11).

In another study on pediatric patients with celiac disease, Urganci et al. found no statistically significant differences in patients in terms of mean hearing levels, disease activity and duration, or other extraintestinal symptoms (12). Conversely, Karabulut et al. performed hearing evaluations including tests of the medial olivocochlear efferent system in pediatric patients with celiac disease and found a statistically significant difference in the pure tone thresholds at 250 Hz frequency between the patient and control groups (13). In our study, no significant difference was found in the pure tone thresholds in both ears between the patient and control groups; however, comparison of the anti-tissue transglutaminase IgA groups revealed significantly higher pure tone thresholds at the 1000Hz, 2000Hz, 4000Hz, and 6000Hz frequencies in the high antibody group than in the low antibody group. This observation of hearing impairment at high frequencies in a high antibody group might be explained by the fact that more arterial structures are present in the cochlea base than in the apex; thus, the effect of autoantibodies could be more prominent in this region.

Table 2: Comparison of hearing thresholds (dBHL) in the right and left ears with celiac disease duration.

	Right ear			Left ear		
	Disease duration			Disease duration		
	Less than 10 years	10 years or more		Less than 10 years	10 years or more	
	Mean±SD	Mean±SD	p	Mean±SD	Mean±SD	p
Air Conduction Thresholds						
125 Hz	6.18±5.16	13.21±10.49	0.026	6.47±4.60	12.50±8.03	0.023
250 Hz	5.29±4.83	13.93±8.13	0.002	5.59±4.64	11.07±5.94	0.009
500 Hz	4.71±4.50	12.50±5.80	0.000	5.88±4.41	11.07±4.01	0.002
1000 Hz	6.47±4.24	13.57±6.33	0.002	6.18±4.52	11.07±3.50	0.003
2000 Hz	7.06±4.70	14.29±8.96	0.017	7.65±4.72	13.57±6.91	0.012
4000 Hz	7.65±7.52	17.50±13.27	0.011	7.06±7.51	17.86±15.28	0.002
6000 Hz	7.35±6.64	19.64±10.46	0.001	7.06±5.88	20.36±11.51	<0.001
Bone Conduction Thresholds						
500Hz	2.94±3.56	8.21±7.75	0.046	3.82±4.52	5.36±4.58	0.311
1000Hz	2.19±3.15	9.29±6.75	0.001	2.65±3.59	6.43±3.06	0.005
2000Hz	2.94±3.56	10.36±10.09	0.039	4.12±3.64	7.86±8.48	0.293
4000Hz	4.41±6.82	13.93±13.61	0.014	5.59±6.09	12.86±14.77	0.119

Table 3: Comparison of vHIT semicircular canal gain in patients with celiac disease and healthy controls.

		Patient group		Control group		
		n	%	n	%	p
RA	Normal	20	64.5	27	90.0	0.018
	Low	11	35.5	3	10.0	
LA	Normal	26	83.9	30	100	0.053
	Low	5	16.1	0	0.0	
RP	Normal	31	100.0	27	90.0	0.113
	Low	0	0.0	3	10.0	
LP	Normal	30	96.8	28	96.6	1.000
	Low	1	3.2	1	3.4	
RL	Normal	29	96.7	28	93.3	1.000
	Low	1	3.3	2	6.7	
LL	Normal	29	100	30	100	-

RA: right anterior; LA: left anterior; RP: right posterior; LP: left posterior; RL: right lateral; LL: left lateral

Table 4: Comparison of VEMP quantitative values in patients with celiac disease and healthy controls.

	Patient group	Control group	p
	Mean±SD	Mean±SD	
Right p1 latency	14.16±2.01	14.82±2.67	0.658
Right n1 latency	20.80±3.43	21.03±1.86	0.744
Right p1 amplitude	32.82±3.30	34.66±4.94	0.093
Right n1 amplitude	43.29±3.70	44.68±5.72	0.064
Left p1 latency	14.03±2.67	14.59±2.48	0.649
Left n1 latency	21.00±3.81	20.61±2.48	0.640
Left p1 amplitude	34.44±3.37	35.62±5.17	0.650
Left n1 amplitude	43.46±3.30	44.90±5.76	0.051

An important point to note is that autoimmune diseases cause inner ear involvement through autoimmune mediators, and this situation will affect the vestibular system in addition to the hearing system. In their immune-mediated inner ear disease review, Bovo et al. concluded that the vestibular system was affected in 50% of autoimmune inner ear patients, and that these vestibular system symptoms include imbalance, ataxia, positional vertigo, and episodic vertigo (8).

In a case study presenting Behçet's disease manifesting with peripheral vestibulopathy, Alison et al. reported that a 66-year-old male patient being followed up with hearing and vestibular system complaints was diagnosed with Behçet's disease as mouth and genital ulcers developed approximately ten years after the initial complaints (14). An evaluation of the vestibular system of this patient using ice-water caloric stimulation revealed permanent right canal paralysis and low amplitude response in both ears. His vHIT test revealed catch-up saccades in right side rotation, fewer saccades in left side rotation, and a significant decrease in VOR gain, while his VEMP test showed a lack of right ear stimulation, suggesting weakness in the right otolith organs. In that case study, the authors emphasized that

patients who were referred to a clinic with peripheral vestibular system pathologies and SNHL should be evaluated in detail and investigated for the presence of an underlying autoimmune disease (14).

Nahid et al. used VEMP to evaluate the vestibular system in patients with rheumatoid arthritis, another commonly observed autoimmune disease (15). The cVEMP measurements of 25 rheumatoid arthritis patients and 20 healthy controls with a stimulus intensity of 95 dBnHL at 500 Hz turn-burst stimulation revealed no significant difference in absolute or interaural amplitudes between the two groups. However, prolonged latency was detected in the patient group. Prolonged latency is an abnormal characteristic finding of central vestibulopathy and has been reported to indicate vestibulospinal path lesions; therefore, the authors suggested that vestibular rehabilitation may be useful in early diagnosis.

Pawlak-Oniskia et al. evaluated the vestibular system in a pediatric celiac patient group using ENG and VEMP test batteries but found no significant difference in VEMP results between the patients and healthy controls (16). However, the ENG results frequently indicated gaze nystagmus, disordered eye-tracking, and optokinetic nystagmus, and the authors argued that these findings support the hypothesis that neurological findings may be observed early in patients with celiac disease. In our study, we evaluated the vestibular system in patients with celiac disease using vHIT and VEMP test batteries. The VEMP test results did not differ significantly between the patient and control groups. However, the vHIT results revealed a greater frequency of low right anterior semicircular canal gain in the celiac patient group. This observation could be a finding of subclinical vestibular pathology; therefore, we believe it is important that these patients be followed up for vestibular pathologies as well.

The small sample size in the present study and the use of vHIT and VEMP test batteries alone for vestibular evaluation are the most significant limitations of this study. Therefore, we suggest that a need exists for the evaluation of the vestibular systems of large groups of patients with celiac disease using additional test batteries.

CONCLUSION

The effects of systemic autoimmune diseases on the audiovestibular system necessitate the screening of patients with appropriate test batteries for early diagnosis, as this will enable early detection of potential inner ear damage. Audiovestibular rehabilitation can then prevent the increase in morbidity in these patients. Our data showed that subclinical audiovestibular pathologies may occur in patients with celiac disease, another autoimmune disease. We believe that periodic follow-up of these patients with audiovestibular test batteries may reduce patient morbidity by providing patients with early diagnosis and timely implementation of rehabilitation programs.

Ethics Committee Approval: The study was approved by the Istanbul University Cerrahpaşa Medical Faculty Ethics Committee (approval ID: 02/16-47473).

Informed Consent: Written informed consent was obtained from all patients included in the study after detailed information about the study was given.

Peer-Review: Externally peer-reviewed.

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REFERENCES

1. McCabe BF. Autoimmune sensorineural hearing loss. Ann Otol Rhinol Laryngol 1979;88:585-9.
2. Harris J, Ryan A. Fundamental immune mechanisms of the brain and inner ear. Otolaryngol - Head Neck Surg 1995;112:639-53.
3. Öztürk A, Yalçin Ş, Kaygusuz I, Şahin S, Gök Ü, Karlidağ T, Ardıçoğlu Ö. High-frequency hearing loss and middle ear involvement in rheumatoid arthritis. Am J Otolaryngol 2004;25:411-7.
4. Farrell RJ, Kelly CP. Diagnosis of celiac sprue. Am J Gastroenterol 2001;96:3237-46.
5. Briani C, Zara G, Alaedini A, Grassivaro F, Ruggero S, Toffanin E, et al. Neurological complications of celiac disease and autoimmune mechanisms: a prospective study. J Neuroimmunol 2008;195:171-5.
6. Alaedini A, Green PH. Narrative review: celiac disease: understanding a complex autoimmune disorder. Ann Intern Med 2005;142:289-98.
7. Green PH, Jabri B. Celiac disease. Annu Rev Med 2006;57:207-21.
8. Bovo R, Aimoni C, Martini A. Immune-mediated inner ear disease. Acta Otolaryngol 2006;126:1012-21.
9. Amor-Dorado JC, Barreira-Fernandez MP, Pina T, Vázquez-Rodríguez TR, Llorca J, González-Gay MA. Investigations into audiovestibular manifestations in patients with psoriatic arthritis. J Rheumatol 2014;41:2018-26.
10. Leggio L, Cadoni G, D'Angelo C, Mirijello A, Scipione S, Ferrulli A, et al. Coeliac disease and hearing loss: preliminary data on a new possible association. Scand J Gastroenterol 2007;42:1209-13.
11. Volta U, Ferri GG, De Giorgio R, Fabbri A, Parisi C, Sciajno L, et al. Sensorineural hearing loss and celiac disease: a coincidental finding. Can J Gastroenterol 2009;23:531-5.
12. Urganci N, Kalyoncu D, Calis AB. Sensorineural hearing loss in pediatric patients with celiac disease. Eur Arch Otorhinolaryngol 2015;272:2149-51.
13. Karabulut H, Hizli S, Dagli M, Karabulut I, Acar B, Celik E, et al. Audiological findings in celiac disease. ORL J Otorhinolaryngol Relat Spec 2011;73:82-7.
14. White AS, Taylor RL, McNeill C, Garsia R, Welgampola MS. Behçet's disease presenting as a peripheral vestibulopathy. J Clin Neurosci 2014;21:1060-3.
15. Heydari N, Hajiabolhassan F, Fatahi J, Movaseghi S, Jalaie S. Vestibular function can be affected by autoimmune processes in rheumatoid arthritis. Aud Vest Res 2015;24:193-200.
16. P Pawlak-Osińska K, Kaźmierczak H, Kuczyńska R, Szaflarska-Popławska. Looking for the auditory and vestibular pathology in celiac disease [in Polish]. Otolaryngol Pol 2007;61:178-83.

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Do Tumor Board Recommendations Influence the Decisions of Clinicians in Planning the Treatment of Head and Neck Cancers?

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ABSTRACT

Objective: The aim of this study is to compare the decisions made at established tumor board meetings for planning the treatment of head and neck cancer patients with the individual treatment decisions of clinicians who attended the meetings.
Material and Methods: A total of 188 patients with head and neck tumors were included in this study, all of whom had been evaluated at weekly tumor board meetings at our clinic. The tumor board consisted of otolaryngologists, radiation oncologists, medical oncologists, pathologists, and radiologists. Before the board meetings, all data belonging to the patients were given to the otolaryngology surgeons and radiation oncologists who were to attend. Their treatment preferences were asked of them individually. The treatment options that clinicians recommended individually prior to board meetings were compared with the decisions made by the tumor board.
Results: It was observed that 34% (64 cases out of 188) of the individual decisions made by ENT surgeons and 34.6% (65 cases out of 188) of those made by radiation oncologists changed following tumor board meetings. There was a statistically significant difference between the treatment options offered individually by both ENT surgeons and radiation oncologists and the treatment recommendations made by the tumor board.
Conclusion: According to the data we obtained, the recommendations for treating patients with head and neck cancers made by the tumor boards may differ from the personal decisions of attending clinicians. Therefore, to make decisions that ensure the highest quality patient care, we believe it is necessary to evaluate all patients with head and neck tumors at multidisciplinary tumor board meetings regardless of cancer stage.

Keywords: Head and neck cancer, multidisciplinary team, tumor board

INTRODUCTION

Head and neck cancers are among the most common malignancies in the world and encompass the lips, oral cavity, salivary glands, oropharynx, nasopharynx, larynx, hypopharynx, and skin. According to a 2018 report by the International Agency for Research on Cancer, head and neck cancers comprise the seventh most common types of cancer with 890,000 new cases per year (1). Many factors, such as tumor stage, pathology evaluation, and patient comorbidity, are taken into account during cancer treatment. However, the differences in medical branches' clinical approaches and the varying clinical experience of doctors can impact treatment preferences, even when patient criteria are the same. As for all other malignancies for the last 30 years, tumor boards have played an important role in determining treatment

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modalities for head and neck malignancies (2). The diversity and experience of tumor board members, who come from many different disciplines, have proven to be more efficient in evaluating and managing disease (3).

In the past, tumor patients were referred to the relevant surgical branch and passed on to oncology departments only if necessary (4). In addition, for patients who were considered inoperable, an oncologist's opinion was often requested regarding palliative treatment (4-6). Today, legal procedures and technological advancements in the field of chemotherapy and radiotherapy have increased the importance of a multidisciplinary approach in planning cancer patient treatment, encouraging joint decisions rather than relying solely on individual ones made by single practitioners (3, 5, 7).

St. Thomas Aquinas said, "Quia parvus error in principio magnus est in fine" (A small error at the outset is a large one in the end) (8). Given that cancer treatment is long-term, choosing an appropriate first step in the treatment process is of paramount importance. To avoid adverse conditions during treatment, it is essential to get opinions from clinicians with different specialties and to identify all relevant care opportunities before planning treatment (9). For this reason, most cancer centers decide on patient treatment at tumor board meetings, although there is no legal requirement to do this in most countries. At our tertiary center, medical specialists dealing with cancer surgery organize tumor board meetings, where clinicians share their knowledge and experience with other professionals. In this study, the effectiveness of tumor boards was investigated by comparing the individual treatment preferences of ENT surgeons and radiation oncologists with the recommendations given by tumor boards for patients diagnosed with head and neck cancers.

MATERIALS AND METHODS

This study obtained the approval of the Samsun Research and Training Hospital Ethics committee (approval ID: 2020/0213) and evaluated the treatment modalities of patients diagnosed with head and neck cancers at our otolaryngology clinic. These cases were discussed at tumor board meetings held between January 2018 and January 2020.

At our hospital, tumor board meetings are held weekly. Board members consist of otolaryngologists, radiation oncologists, medical oncologists, radiologists, pathologists, and psychiatrists, as well as swallowing therapists, speech therapists, respiration therapists, and psychologists. Clinicians from different specialties are also invited to meetings when necessary. All patients diagnosed with head and neck cancers are discussed at the tumor board meetings regardless of cancer stage. Treatment plans are made in line with the decisions made at the meetings.

In this study, the files of all patients to be discussed at tumor board meetings containing test results, age, and gender information were provided to ENT surgeons and radiation oncologists who regularly attended tumor board meetings. Patient names were removed from the files to avoid influencing the opinions of clinicians regarding treatment. These clinicians were then asked to choose a treatment modality for the given patient from various options, such as surgery, radiotherapy (RT), chemotherapy (CT), chemoradiotherapy (CRT), follow-ups, and additional examinations/tests (such as radiological imaging, nuclear imaging, clinical assessment, and re-biopsy). The initial treatment modalities as suggested by clinicians were compared with treatment recommendations decided by the board. The differences between these decisions were also evaluated according to tumor stage.

Patients who were to be operated on in the first tumor board were evaluated as new patients in the postoperative tumor board. Therefore, surgery and adjuvant CRT were classified separately for the same patient. However, patients who were discussed at tumor board meetings after they had completed additional tests were excluded from the study, since a consensus on their treatment was previously reached.

In statistical comparisons between groups, a t-test was used for continuously changing data, while a chi-squared test was used for discontinuous data. In all measurements, a p-value < 0.05 was considered statistically significant. All statistical analyses were conducted using SPSS Statistics 24.0 (IBM SPSS Statistics for Windows, NY, USA).

RESULTS

In the 188 cases of head and neck tumors included in the study, the mean participant age was 62±11.16 years (between 25–95). 161 (85%) of the patients were male and 27 (15%) were female. The histology, regions, and stages of the evaluated tumors are outlined in Table 1.

In comparing the treatment decisions suggested by the tumor board with the individual clinician decisions, it was observed that individual ENT surgeon decisions changed in 64 cases (34%) and those of radiation oncologists changed in 65 cases (34.6%). When the rate of change according to the stages was compared, the highest was seen in stage 3 (44,4%) in ENT surgeons and in stage 2 (43,5%) in radiation oncologists (Figure 1).

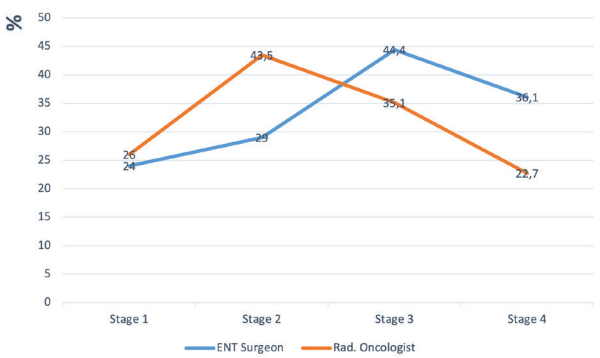

Figure 1: The rates of change of the decisions of radiation oncologists and ent surgeons according to stages.

Table 1: Information regarding histology, region and stage of the tumors evaluated.

	Number of tumors evaluated (n)	Percentage (%)
A. Histology		
Squamous Cell Carcinoma	163	86.7
Adenocarcinoma	1	0.5
Mucoepidermoid Carcinoma	3	1.6
Neuroendocrine Tumor	2	1.1
Adenoid Cystic Carcinoma	3	1.6
Spindle Cell Carcinoma	3	1.6
Basosquamous Carcinoma	4	2.1
Carcinoma Ex Pleomorphic Adenom	1	0.5
Undifferentiated Carcinoma	4	2.1
Oncocytoma	1	0.5
Chondrosarcoma	2	1.1
Lymph Epidermal Tumor	1	0.5
B. Tumor Region		
Larynx	115	61.2
Hypopharynx	3	1.6
Oropharynx	6	3.2
Oral Cavity	28	14.9
Paranasal Sinuses	5	2.7
Skin	12	6.4
Nasopharynx	7	3.7
Salivary Glands	7	3.7
Neck Metastasis of Unknown Origin	5	2.7
C. Tumor Stage		
Stage 1	50	26.5
Stage 2	62	32.9
Stage 3	54	28.7
Stage 4	22	11.7

A comparison of the initial treatment preferences of ENT surgeons with the recommendations given by the tumor board according to tumor stage is detailed in Table 2. The rate of change in the decisions of ENT surgeons at all tumor stages was statistically significant (p-value at Stage 4=0.011, p-value at other stages <0.001).

Comparisons of the initial treatment preferences of radiation oncologists with those recommended by the tumor board based on tumor stage are provided in detail in Table 3. Similarly, the rate of change in the decisions of radiation oncologists at all tumor stages was found to be statistically significant (p-value at Stage 4 = 0.011, p-value at other stages <0.001).

DISCUSSION

Treating head and neck cancers is a complex process that can be affected by the tumor pathology, cancer stage, and the patient's general condition (3, 7, 10). Given the diversity of treatment options, such as surgery, radiotherapy, chemotherapy or combined therapy, the role of the multidisciplinary approach in this process is significant (9, 11). In addition, after the treatment of the primary disease, the opinions of speech therapists, nutritionists, dentists, and psychologists about treating potential comorbidities are invaluable (11). For this reason, tumor boards, which enable a more practical application of the multidisciplinary approach by gathering clinicians of different specialties and allow a rapid exchange of ideas, lead to more efficient treatment decisions. It is also known that tumor boards can influence the decisions of individual specialists (4).

The compliance of decisions made at tumor board meetings with treatment preferences of individual specialists has been studied before, but research is limited about treatment decision compliance according to tumor stage in head and neck cancers. In their study, Markus et al. (2) compared tumor board decisions with the pre-meeting decisions of surgeons and oncologists about 172 head and neck cancer patients and observed changes in pre-meeting preferences for 52 patients (30%). In another study evaluating pediatric cancer patients discussed at tumor board meetings, it was shown that proposed treatment options changed following meetings in 35% of cases (12). Similar to the studies in the literature, a 34% change in proposed treatment decisions following board meetings was observed in the current study. A change over 30 percent is a significant difference. Specialists tend to prefer treatment procedures in their field of expertise. In this study, oncologists emphasized the rt option more frequently in their first choice at all stages and it was observed that surgeons preferred the ct and crt option less in their first choice. In our study, these decisions come to the fore especially at stage 2 for radiation oncologists and at stage 3 for ENT surgeons.

In Markus et al. (2), it was observed that the treatment preferences of medical or radiation oncologists were more likely to change after board meetings than those of oncology surgeons. In addition, regardless of squamous cell carcinoma or skin malignancies, the initial treatment choices of medical or radiation oncologists did not include surgical intervention, and the rate of change in their decisions after board meetings was statistically significant. The findings of the current study demonstrate that radiation oncologists initially preferred radiotherapy for early disease stages, but the rate of change in their decisions after tumor board meetings was found statistically significant.

Although the influence of tumor boards' recommendations on the individual preferences of clinicians is known, there is limited evidence for the effectiveness of these decisions on treatment outcomes (10, 13, 14). A meta-analysis in the

Table 2: The comparison of initial treatment preferences of ENT surgeons with tumor board decisions according to tumor stage.

Stage			Total	Tumor board recommendation					Change rates n (%)
				Surgery	RT	CRT	Follow-up	Additional test	
Stage 1	ENT surgeon preference	Surgery	11	8	3	0	0	0	3 (27.2)
		RT	28	3	22	2	0	1	6 (21.4)
		CRT	1	1	0	0	0	0	1 (100)
		Follow-up	9	2	0	0	7	0	2 (22.2)
		Additional test	1	0	0	0	0	1	0 (0)
	Total		50	14	25	2	7	2	12 (24)
Stage 2	ENT surgeon preference	Surgery	33	28	4	1	0	0	5 (15.1)
		RT	6	0	3	2	0	1	3 (50)
		CRT	3	2	0	0	0	1	3 (100)
		Follow-up	17	1	5	0	9	2	8 (47)
		Additional test	3	1	0	0	0	2	1 (33.3)
	Total		62	32	12	3	9	6	18 (29)
Stage 3	ENT surgeon preference	Surgery	28	17	2	7	0	2	11 (39.2)
		RT	13	3	7	3	0	0	6 (46.1)
		CRT	6	1	1	4	0	0	2 (33.3)
		Follow-up	5	0	4	0	1	0	4 (80)
		Additional test	2	0	1	0	0	1	1 (50)
	Total		54	21	15	14	1	3	24 (44.4)
Stage 4	ENT surgeon preference	Surgery	6	4	0	2	0	0	2 (33.3)
		RT	7	0	4	3	0	0	3 (42.8)
		CRT	8	0	2	6	0	0	2 (25)
		Additional test	1	0	0	1	0	0	1 (100)
	Total		22	4	6	12	0	0	8 (36.1)
Total	ENT surgeon preference	Surgery	78	57	9	10	0	2	21 (26.9)
		RT	54	6	36	10	0	2	18 (33.3)
		CRT	18	4	3	10	0	1	8 (44.4)
		Follow-up	31	3	9	0	17	2	14 (45.1)
		Additional test	7	1	1	1	0	4	3 (42.8)
	Total		188	71	58	31	17	11	64 (34)

The initial preferences of ENT surgeons have changed in 64 patients (34%). (p=0.011 in Stage 4, p<0.001 in other stages)

literature investigating tumor board decisions over a span of approximately 20 years emphasized that the rate of change in decisions was between 4% and 45% after tumor board meetings, but there was not enough evidence to substantiate that the revised decisions led to better treatment (14). In this meta-analysis, only one study about head and neck tumors was examined, and the rate of change was reported as 27% (15). In their study, Boxer et al. (13) reviewed the outcomes of 504 lung cancer patients discussed at tumor board meetings, out of 988 patients referred to their clinic. They concluded that tumor board decisions provided treatment modalities that increased quality of life but did not alter life expectancy. Large patient cohorts and attentive planning are required to evaluate the long-term effects of individual treatment approaches and recommendations given by tumor boards for patients with head and neck cancers.

Considering cost and treatment effectiveness, some authors argue that only advanced head and neck cancers should be discussed at tumor board meetings. In addition, they also suggest that the board recommendations for early-stage malignancies do not have significant superiority over individual clinician decisions (7, 10). Contrary to these views, the findings obtained in this study suggest that there was a statistically significant difference between the treatment approaches of tumor boards and individual specialists, including those for early-stage head and neck cancer patients.

Table 3: The comparison of initial treatment preferences of radiation oncologists with tumor board decisions according to tumor stage.

Stage			Total	Tumor board recommendation					Change rates n (%)
				Surgery	RT	CRT	Follow-up	Additional test	
Stage 1	Radiation oncologist preference	Surgery	10	7	3	0	0	0	3 (30)
		RT	28	5	21	1	0	1	7 (25)
		CRT	1	0	0	1	0	0	0 (0)
		Follow-up	10	2	1	0	7	0	3 (30)
		Additional test	1	0	0	0	0	1	0 (0)
	Total		50	14	25	2	7	2	13 (26)
Stage 2	Radiation oncologist preference	Surgery	14	14	0	0	0	0	0 (0)
		RT	32	16	11	2	1	2	21 (65.6)
		CRT	4	2	0	1	0	1	2 (50)
		Follow-up	12	0	1	0	8	3	4 (33.3)
	Total		62	32	12	3	9	6	27 (43.5)
Stage 3	Radiation oncologist preference	Surgery	21	15	0	5	0	1	6 (28.5)
		RT	15	3	11	1	0	0	4 (26.6)
		CRT	14	3	1	8	1	1	6 (42.8)
		Follow-up	3	0	3	0	0	0	3 (100)
		Additional test	1	0	0	0	0	1	0 (0)
	Total		54	21	15	14	1	3	19 (35.1)
Stage 4	Radiation oncologist preference	Surgery	3	2	0	1	0	0	1 (33.3)
		RT	8	0	6	2	0	0	2 (25)
		CRT	11	2	0	9	0	0	2 (18.1)
	Total		22	4	6	12	0	0	5 (22.7)
Total	Radiation oncologist preference	Surgery	48	38	3	6	0	1	10 (20.8)
		RT	83	24	49	6	1	3	34 (40.9)
		CRT	30	7	1	19	1	2	11 (36.6)
		Follow-up	25	2	5	0	15	3	10 (40)
		Additional test	2	0	0	0	0	2	0 (0)
	Total		188	71	58	31	17	11	65 (34.6)

The initial preferences of radiation oncologists have changed in 65 patients (34,6%). (p=0.001 in Stage 4, p<0.001 in other stages)

CONCLUSION

This study investigated the effectiveness of tumor boards by comparing individual treatment preferences of ENT surgeons and radiation oncologists with the recommendations made in tumor boards for patients diagnosed with head and neck cancers. The aim of this study was not to evaluate the outcomes of doctors' treatment decisions, but rather to investigate the compatibility of their preferred treatment options with those of the tumor board as a whole. It should be noted that results may vary depending on individual treatment centers according to clinician experience and the clinics' technical allowances. In light of our findings, we emphasize the importance of tumor boards in practicing a multidisciplinary clinical approach and evaluating all cancer patients, including early-stage patients.

Ethics Committee Approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee (University of Health Sciences Samsun Education and Research Hospital Clinical Research Ethics Committee dated 13.02.2020 and numbered 2020/0213) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent: Informed consent was obtained from all individual participants included in the study.

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REFERENCES

1. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin 2018;68:394-424.
2. Brunner M, Gore SM, Read RL, Alexander A, Mehta A, Elliot M, et. al. Head and Neck Multidisciplinary Team Meetings: Effect on Patient Management. Head Neck 2015;37(7):1046-50.
3. Eskander A, Irish J, Groome PA, Freeman J, Gullane P, Gilbert R, et al. Volume-outcome relationships for head and neck cancer surgery in a universal health care system. Laryngoscope 2014;124:2081-8.
4. Bozec A, Culi e D, Poissonnet G, Dassonville O. Current role of primary surgical treatment in patients with head and neck squamous cell carcinoma. Curr Opin Oncol 2019;31(3):138e145.
5. Lee VHF, Chan JYW, Vardhanabhuti V, Kwong DLW, Leung TW, Chan SY, et al. Advancing Care for Head and Neck Cancers in a Multidisciplinary Tumour Board in the East. Clin Oncol (R Coll Radiol) 2019;31(8):549-59.
6. Guy JB, Benna M, Xia Y, Daguenet E, Ben Mrad M, Jmour O, et al. Quality Insurance in Head and Neck Cancer Multidisciplinary Team Meetings: A Watchful Eye on Real-Life Experience. Oral Oncol 2019;91:35-8.
7. Nguyen NP, Vos P, Lee H, Borok TL, Karlsson U, Martinez T, et al. Impact of Tumor Board Recommendations on Treatment Outcome for Locally Advanced Head and Neck Cancer. Oncology 2008;75(3-4):186-91.
8. Aquinas T. Prologue. In: On being and essence. Pontifical Institute on Mediaeval Studies; 1968. p.1. Translated by Armand Maurer.
9. Westin T, Stalfors J. Tumour boards/multidisciplinary Head and Neck Cancer Meetings: Are They of Value to Patients, Treating Staff or a Political Additional Drain on Healthcare Resources? Curr Opin Otolaryngol Head Neck Surg 2008;16(2):103-7.
10. Mullan BJ, Brown JS, Lowe D, Rogers SN, Shaw RJ. Analysis of Time Taken to Discuss New Patients With Head and Neck Cancer in Multidisciplinary Team Meetings. Br J Oral Maxillofac Surg 2014;52(2):128-33.
11. Haddad R, Annino D, Tishler RB. Multidisciplinary approach to cancer treatment: focus on head and neck cancer. Dent Clin North Am 2008;52(1):1-17.
12. Thenappan A, Halaweish I, Mody RJ, Smith EA, Geiger JD, Ehrlich PF, et.al. Review at a Multidisciplinary Tumor Board Impacts Critical Management Decisions of Pediatric Patients With Cancer. Pediatr Blood Cancer 2017;64(2):254-8.
13. Boxer MM, Vinod SK, Shafiq J, Duggan KJ. Do Multidisciplinary Team Meetings Make a Difference in the Management of Lung Cancer? Cancer 2011;117(22):5112-20.
14. Pillay B, Wootten AC, Crowe H, Corcoran N, Tran B, Bowden P, et. al. The impact of multidisciplinary team meetings on patient assessment, management and outcomes in oncology settings: A systematic review of the literature. Cancer Treat Rev 2016;42:56-72.
15. Wheless SA, McKinney KA, Zanation AM. A prospective study of the clinical impact of a multidisciplinary head and neck tumor board. Otolaryngol Head Neck Surg 2010;143(5):650-4.

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Validation of the Turkish Translation of the Facial Clinimetric Evaluation Scale in Patients with Peripheral Facial Paralysis

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ABSTRACT

Objective: To transcribe and validate the Facial Clinimetric Evaluation (FaCE) scale to be able to use it in a Turkish-speaking patient population with peripheral facial paralysis (PFP).
Material and Methods: The original English FaCE scale was translated according to international guidelines. Then a validation study was conducted on 37 patients with facial paralysis. The patients completed the scale twice at a 1-week interval. Internal consistency was evaluated with the Cronbach alpha coefficient. The correlations between the FaCE scale and the House-Brackmann Grading System (HBGS), the Sunnybrook Grading System (SBGS), and the Facial Disability Index (FDI) scores and structure validity were evaluated by calculating the Spearman rho correlation coefficient.
Results: The FaCE scale showed internal consistency with an excellent Cronbach α value of 0.828. Test-retest reliability was shown with an Intraclass Correlation Coefficient (ICC) in the range of 0.51-0.95. The FaCE scale was determined to be well correlated with the HBGS and SBGS points (r=-0.51, r=0.65, respectively). The FaCE scale face movement score showed the highest correlation with HBGS (r=-0.61). SBGS had the highest correlation with the oral function score (r=0.61). The study determined there to be a good correlation between the FaCE scale and the social/well-being function and physical function of the FDI (r=0.69, r=0.66, respectively).
Conclusion: The FaCE scale is a reliable and valid tool for assessing the quality of life of PFP patients. The Turkısh version of the FaCE Scale showed good psychometric properties. By showing high validity and reliability, the Turkish FaCE scale can be used in Turkish-speaking patients with peripheral facial paralysis.

Keywords: Translation, facial clinimetric evaluation scale, validation, quality of life, facial paralysis

INTRODUCTION

Peripheral facial paralysis (PFP), most frequently seen as idiopathic, is paralysis of the facial nerve that develops associated with infection, trauma, malignancy and iatrogenic etiological causes (1). The annual incidence of PFP in the general population varies between 20 and 32 per 100.000 (2). Different treatment methods can be used for the elimination of functional problems in PFP, primarily corticosteroids, antivirals (ac iclovir) and surgery (1, 2).

Patients with facial paralysis may have symptoms such as facial asymmetry, weakness of facial muscles, inability to fully close the eyes with associated ophthalmic injuries, difficulties in eating, drinking, and talking, reduced sense of taste, and synkinesis. In addition to these functional problems, a series of psychosocial outcomes such as social isolation and depression can emerge with PFP (3). Therefore, to be able to comprehensively evaluate patients with facial paralysis, the psychosocial status and the effect of that on quality of life (QoL) must be taken into consideration together with functional problems.

It is difficult to evaluate QoL in PFP patients. Currently, there is confusion related to clinician-based scales evaluating QoL

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and several patient-based evaluation scales. Of these, the House-Brackmann Grading System (HBGS) and the Sunnybrook Facial Grading System (SBGS) are the most used clinician-based evaluation systems (4, 5). Although these determine the anatomic and physiological severity of facial paralysis (3), they do not consider the effect of PFP on QoL. The Facial Clinimetric Evaluation Scale (FaCE) (6) and the Facial Disability Index (FDI) (7), which are used for the evaluation of QoL in PFP patients, are patient-based QoL scales which are well known by clinicians, easy to use, and have proven validity and reliability (8, 9). Since they were first created, these scales have been used in many international clinical studies (3, 8-10).

The FDI provides an evaluation of the feelings about the mouth, eyes and other facial features, and the effects of these on QoL (7). The FaCE scale includes 15 questions. The 6 sub-dimensions comprise facial movements, social function, facial comfort, lacrimal control, eye comfort, and oral function. The total points and affected area points range from 0 (worst) to 100 (best) (6).

Following use of the original English versions, the FaCE and FDI scales have been translated and approved for use in several languages, such as French, Spanish, Italian, German, Chinese, Dutch, and Swedish (11-17). Only the FDI has been translated and approved in the Turkish language (18). The purpose of this study was to form and validate the Turkish model of the FaCE scale for a Turkish-speaking population.

MATERIALS AND METHODS

Ethics

The study was approved by the Ethics Working Group for Scale Evaluation of Gazi University (Approval no: 2019-361). We obtained permission for this study by interviewing the authors of the English original of the FaCE scale. This study was conducted in two stages, first as a pilot study with the translation of the FaCE scale from English to Turkish, then in the second stage as validation in a PFP patient community.

Translation

The translation process was implemented according to the internationally accepted recommendations for the translation and cross-cultural adaptation of health-related quality of life scales (19, 20). The original English FaCE scale was translated into Turkish independently by two ear, nose, and throat specialists, both of whom were native Turkish speakers and had an excellent level of English. Then the two versions were examined by a committee that was participating in the study, and consensus was reached. The Turkish model was then independently translated back into English by two English native-speaker translators, both of whom had an excellent level of Turkish. The aim of this back-translation was to determine any differences in consistency and context between the original model and the back-translated Turkish version. A professional medical translator then compared the back translations with the original English FaCE. As a result of this, there were no differences in meaning or any inconsistency detected, and the Turkish version of the FaCE was approved. Finally, a pilot test was conducted on 5 patients with PFP and 5 healthy individuals, all of whom were native Turkish speakers. These 10 subjects completed the Turkish version of FaCE under the supervision of one of the researchers. No differences or problems were determined in respect of reading, understanding or responding to the scale items, and so no changes were made to the Turkish version of the FaCE scale.

Questionnaires

The FDI, developed by Van Swearingen et al in 1996, is a QoL scale (7), which was translated into Turkish in 2020 (18). It consists of two areas, social/well-being function and physical function. It contains 10 Likert type questions in total. The social/well-being function points interval from 0 (worst) to 100 (best) and the physical function points interval from -25 (worst) to 100 (best).

The FaCE scale, developed by Khan et al in 2001, is a PFP-related QoL scale (6). It includes 15 items with responses on a 5-point Likert scale, in 6 sub-dimensions: facial movements, social function, facial comfort, lacrimal control, eye comfort, and oral function. The total points and affected area points range from 0 (worst) to 100 (best) (6).

Validation

This study was conducted with 37 patients with PFP in the Ear, Nose, and Throat (ENT) Clinic of Gazi University Medical Faculty Hospital between November 2019 and June 2020. The patients included were aged >18 years, were able to read and write in Turkish, and had a diagnosis of unilateral PFP ongoing for at least 3 months. Patients were not included from the study if they had poor cognitive functions, were illiterate, had temporary PFP (Bell's Palsy), bilateral facial paralysis or if they refused to sign the consent form.

Demographic data of the patients such as age, gender, etiology, and duration of paralysis were obtained from the patient and hospital medical records. The severity of PFP was evaluated with the HBGS and SBGS (4, 5). HBGS is a clinician-based system that evaluates facial function, in which PFP is graded from I (normal) to IV (total paralysis) (4). The SBGS is a system which evaluates symmetry at rest, involuntary movement symmetry, and synkinesis. At the end of the evaluation, a total point is determined through comparison with the normal side, ranging from 0 (total paralysis) to 100 (normal function) (5).

All the patients included in the study provided signed informed consent. The patients completed the Turkish FaCE scale and FDI. For test-re test reliability, the same patients completed the FaCE scale again after a 1-week interval. During that period of one week, no treatment was applied to the patients.

Statistical analysis

Statistical analysis was performed using the software program SPSS version 22.0 for Windows (IBM Corp. Armonk, NY). Descriptive statistics were analyzed to identify patient characteristics. Correlations between the Turkish FaCE scale

Table 1: Patient Characteristics.

Patient Characteristic		N	%	Mean	SD	Median	Range
Gender	Female	13	35.1				
	Male	24	64.9				
Age (years)				47.35	16.104	52	18-70
Side	Left	18	48.6				
	Right	19	51.4				
Duration of PFP (months)				85.84	105.812	60	3-480
Etiology	Acoustic neuroma	10	27.0				
	Trauma	5	13.6				
	Iatrogenic	6	16.2				
	Tumors	6	16.2				
	Other	10	27.0				
HBGS				4.16	1.191	5	2-6
SBGS				35.84	18.811	30	9-91

SD: Standard Deviation, HBGS: House-Brackmann Grading System, SBGS: Sunnybrook Grading System

points and the HBGS, SBGS, and FDI scores, and the internal consistency were evaluated by calculating the Spearman's Rho Correlation coefficient (r value). Cronbach's α coefficient was calculated to evaluate the internal consistency of the items in the FaCE scale. A Cronbach α worth of >0.8 is recommended but α >0.7 is acceptable (21). The test-re test reliability was analyzed with the Intraclass Correlation Coefficient (ICC). A worth of $p<0.05$ was admitted as statistically significant.

RESULTS

Validation

This prospective study, conducted between November 2019 and June 2020, included a total of 37 patients comprising 13 (35%) females and 24 (65%) males, with an average age of 47.35±16.1 years (range, 18-70 years). All the patients completed the Turkish versions of the FaCE and FDI. Unilateral PFP was determined on the right side in 19 (51.4%) patients and on the left side in 18 (48.6%). The mean duration of PFP was 85.8±105.8 months (range, 3-480 months). The most common etiological cause was acoustic neuroma at the rate of 27%. The mean SBGS points were determined to be 35.84±18.8 (median:30) and the mean HBGS points to be 4.16±1.19 (median:5) (Table 1).

The baseline (D0) and 7th day (D7) total and sub-domain scores of the FaCE and the FDI scores of the patients are shown in Table 2.

Internal consistency and reliability

Internal consistency was tested with the Cronbach α coefficient, which was calculated to show an excellent value at 0.828. Points in the range of 0.67 to 0.81 were calculated for the sub-domains of the FaCE scale. The test-re test reliability was shown with ICC values ranging from 0.51 to 0.95 (Table 3).

Correlations between the FaCE scale and the HBGS, SBGS, and FDI points were calculated with the Spearman coefficient. A good correlation was determined between FaCE and the HBGS and SBGS points (r=-0.51, r=0.65, respectively). The correlation with

Table 2: Facial Clinimetric Evaluation (FaCE) scale and Facial Disability Index (FDI) scores.

D0 (n=37)	Mean	SD	Median	Range
FDI				
Physical function	68.11	19.38	70	30-95
Social/Well-being function	74.59	19.65	80	16-100
FaCE Scale				
Facial movement	21.82	24.71	8.3	0-91.6
Facial comfort	66.87	26.1	58.3	0-100
Oral function	68.58	29.41	75	0-100
Eye comfort	51.12	35.20	50	0-100
Lacrimal control	66.35	32.65	75	0-100
Social function	77.03	24.65	87.5	6.25-100
Total	58.97	17.22	60	16.6-95
D7 (n=37)				
FaCE Scale				
Facial movement	28.11	23.11	16.6	0-83.3
Facial comfort	63.93	24.13	58.3	25-100
Oral function	66.22	29.59	62.5	0-100
Eye comfort	52.70	35.00	50	0-100
Lacrimal control	65.74	32.06	75	0-100
Social function	81.42	22.70	87.5	12.5-100
Total	60.56	17.43	60	15-96.6

SD: Standard Deviation, D0: Day 0, D7: Day 7

Table 3: Test-Re test Reliability and Internal Consistency of the FaCE scale.

	Internal consistency Cronbach's α		Test - Retest	
	Test	Retest	ICC	%95 CI
Total	0.828	0.836	0.950	0.903 – 0.974
Facial movement score	0.800	0.709	0.862	0.719 – 0.931
Facial comfort score	0.812	0.775	0.905	0.817 – 0.951
Oral function score	0.673	0.726	0.953	0.909 – 0.976
Eye comfort score	0.672	0.671	0.939	0.881 – 0.968
Lacrimal control	*	*	0.519	0.054 – 0.754
Social function	0.769	0.832	0.816	0.645 – 0.905

CI: confidence interval, ICC: intraclass correlation coefficient, *Cronbach's α could not be calculated for only one item on the scale

Table 4: Correlations between the FaCE scale scores and the House-Brackmann, Sunnybrook, and FDI scores.

FaCE	HBGS (n=37)	SBGS (n=37)	FDI Physical function (n=37)	FDI Social/Well-being function (n=37)
Facial movement score	-0.612**	0.508**	0.287	0.410*
Facial comfort score	-0.274	0.293	0.455**	0.310
Oral function score	-0.461**	0.613**	0.839**	0.428**
Eye comfort score	-0.242	0.291	0.369*	0.373*
Lacrimal control	-0.116	0.225	0.251	-0.066
Social function	-0.242	0.410*	0.379*	0.696**
Total	-0.510**	0.651**	0.692**	0.663**

*p<0.05, **p<0.01

HBGS was negative due to the design of the HBGS. The facial movement score of the FaCE scale showed the highest correlation with HBGS (r=-0.61). The SBGS had the highest correlation with the oral function score of the FaCE scale (r=0.61). There was a good correlation between the FaCE scale and the social/well-being function and physical function of the FDI (r=0.66, r=0.69, respectively). The FDI physical function had the highest correlation with the oral function score of the FaCE (r=0.83) and the FDI social/well-being function had the highest correlation with the social function score of the FaCE (r=0.69) (Table 4).

DISCUSSION

This study was conducted for validation of the FaCE scale, the Turkish version of which was created. The translation into Turkish and inter-cultural adaptation was performed in accordance with international literature (19). No difficulties were encountered in the translation and adaptation process. As far as we know, our study is the first study to have translated the FaCE scale into Turkish and provided validation. Patients with temporary PFP, which can recover rapidly, primarily Bell's palsy, were excluded from the study.

PFP has a negative effect on the psychosocial status of patients, communication, and quality of life. Patients with severe PFP may show more severe physical disability, but may not experience more social disabilities or psychological problems (22). The effect of PFP on the QoL of the patient cannot be estimated by the level of the facial paralysis (23-25). In a systematic examination of the results of patient-based scales, Ho et al reported that the inclusion and exclusion criteria of 3 scales corresponded specifically to facial paralysis. Of these, the FaCE scale and FDI were accepted as valid for peripheral facial paralysis patients, and the FaCe scale was seen to meet all psychometric standards (23).

The Turkish FaCE scale had Cronbach α values of 0.828 and 0.836 (test and re test) for internal consistency. These values showed excellent internal consistency, which was in accordance with findings in literature when compared with German, Chinese, Dutch, French, and Spanish versions (11-14, 17). The only item for which Cronbach α could not be calculated was lacrimal control. All the patients completed the questionnaire on D7, so there was no loss to follow-up in the study. The ICC value for the Turkish FaCE scale showed good reliability with sub-domain and total points of 0.95-0.52.

A good correlation was determined between the Turkish FaCE scale and SBGS and HBGS (r=0.65, r=-0.510, respectively). The FaCE scale facial movement score had the highest correlation with HBGS (r=0.612). These results were consistent with the original English FaCE scale results, developed by Khan et al (r=0.55, r=0.69, respectively). There was a good correlation between the facial movement score of the FaCE and the SBGS (r=0.508). However, in contrast to findings in the literature, the highest correlation was seen to be with oral function (6, 12, 15).

The correlations between the FaCE scale and the FDI social function and physical function were determined to be at a good level (r=0.66, r=0.69, respectively). The highest correlation was seen between the oral function score of the FaCE scale and the FDI physical function score (r=0.839), which was consistent with the results of the original English version (6). This correlation could be due to the fact that 4 of the 5 questions in the FDI physical function domain are related to oral function (15). The FaCE scale social function score showed the highest correlation with the FDI social function score (r=0.696), consistent with the literature (6, 13-15).

The mean values of the total and sub domain scores of the Turkish FaCE scale were determined to be higher compared to values in the literature (12, 13, 26). The reason for this could be attributed to the long duration of PFP (mean: 85.5 months, range: 3-480 months) and patients accepting their current status as etiologically permanent facial paralysis, which enabled adaptation and better tolerance of the psychosocial effects of PFP.

FaCE is the most widely used and most important of the QoL scales in patients with peripheral facial paralysis. It has also been used for various international academic studies (9, 23, 27). The FDI only evaluates two areas, the social function and physical function (7), whereas the FaCE scale evaluates a much broader area in which there could be negative effects of PFP (6). Therefore, in addition to QoL evaluation, the FaCE scale is of guidance in determining the problems of the patient. For example, a patient with a low oral function score can be referred to a clinician for precautions to be taken on this subject in the future. The reliable and valid Turkish FaCE scale will fill the gap that has been felt in the Turkish-speaking PFP patient population in respect to the evaluation and follow up of patients and referral to clinicians.

A limitation of this study was the relatively low number of patients in the study population compared to the literature (6, 11-13). This was due to the exclusion of patients who could show rapid healing, such as those with Bell's palsy, as this could have created great differences in the scale scores.

CONCLUSION

The FaCE scale is a patient-based, reliable and valid tool which evaluates quality of life. The Turkish FaCE scale, showing high validity and reliability, can be used for Turkish-speaking patients with facial paralysis. Therefore, this study can be considered to have paved the way for the use of FaCE not only for patient evaluation and follow up but also in Turkish clinical studies.

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Ethics Committee Approval: The study was approved by the Ethics Working Group for Scale Evaluation of Gazi University (Approval no: 2019-361).

Informed Consent: We obtained permission for this study by interviewing the authors of the English original of the FaCE scale.

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REFERENCES

1. Owusu JA, Stewart CM, Boahene K. Facial Nerve Paralysis. Med Clin North Am 2018;102(6):1135-43.
2. Lorch M, Teach SJ. Facial nerve palsy: etiology and approach to diagnosis and treatment. Pediatr Emerg Care 2010;26(10):763-9; quiz 70-3.
3. Luijmes RE, Pouwels S, Beurskens CH, Kleiss IJ, Siemann I, et al. Quality of life before and after different treatment modalities in peripheral facial palsy: A systematic review. Laryngoscope 2017;127(5):1044-51.
4. House JW, Brackmann DE. Facial nerve grading system. Otolaryngol Head Neck Surg 1985;93(2):146-7.
5. Ross BG, Fradet G, Nedzelski JM. Development of a sensitive clinical facial grading system. Otolaryngol Head Neck Surg 1996;114(3):380-6.
6. Kahn JB, Gliklich RE, Boyev KP, Stewart MG, Metson RB, et al. Validation of a patient-graded instrument for facial nerve paralysis: the FaCE scale. Laryngoscope 2001;111(3):387-98.
7. VanSwearingen JM, Brach JS. The Facial Disability Index: reliability and validity of a disability assessment instrument for disorders of the facial neuromuscular system. Phys Ther 1996;76(12):1288-98; discussion 98-300.
8. Györi E, Przestrzelski C, Pona I, Hagmann M, Rath T, et al. Quality of life and functional assessment of facial palsy patients: A questionnaire study. Int J Surg 2018;55:92-7.
9. Tavares-Brito J, van Veen MM, Dusseldorp JR, Bahmad F, Jr., Hadlock TA. Facial Palsy-Specific Quality of Life in 920 Patients: Correlation With Clinician-Graded Severity and Predicting Factors. Laryngoscope 2019;129(1):100-4.
10. Bruins TE, van Veen MM, Mooibroek-Leeuwerke T, Werker PMN, Broekstra DC, et al. Association of Socioeconomic, Personality, and Mental Health Factors With Health-Related Quality of Life in Patients With Facial Palsy. JAMA Otolaryngol Head Neck Surg 2020;146(4):331-7.
11. Garcia-Iza L, Chiesa-Estomba CM, Rosell-Romero N, Ibarguren-Esnal E, Soriano-Reixach M, et al. Translation and Validation of the Facial Clinimetric Evaluation Scale to Spanish. Otolaryngol Head Neck Surg 2020:194599820969622.
12. Barry P, Mancini J, Alshukry A, Salburgo F, Lavieille JP, et al. Validation of French versions of the Facial Disability Index and the Facial Clinimetric Evaluation Scale, specific quality of life scales for peripheral facial palsy patients. Clin Otolaryngol 2019;44(3):313-22.
13. Kleiss IJ, Beurskens CH, Stalmeier PF, Ingels KJ, Marres HA. Quality of life assessment in facial palsy: validation of the Dutch Facial Clinimetric Evaluation Scale. Eur Arch Otorhinolaryngol 2015;272(8):2055-61.

14. Volk GF, Steigerwald F, Vitek P, Finkensieper M, Kreysa H, et al. [Facial Disability Index and Facial Clinimetric Evaluation Scale: validation of the German versions]. Laryngorhinootologie 2015;94(3):163-8.
15. Marsk E, Hammarstedt-Nordenvall L, Engström M, Jonsson L, Hultcrantz M. Validation of a Swedish version of the Facial Disability Index (FDI) and the Facial Clinimetric Evaluation (FaCE) scale. Acta Otolaryngol 2013;133(6):662-9.
16. Pavese C, Cecini M, Camerino N, De Silvestri A, Tinelli C, et al. Functional and social limitations after facial palsy: expanded and independent validation of the Italian version of the facial disability index. Phys Ther 2014;94(9):1327-36.
17. Li Y, Jiang H, Wang K, Feng GD, Ding XY, et al. [Quality of life survey on patients with peripheral facial paralysis by using Chinese version of the FaCE scale]. Zhonghua Er Bi Yan Hou Tou Jing Wai Ke Za Zhi 2013;48(1):11-6
18. Özden F, Karaman ÖN, Tuğay N, Savaş Ö, Sözen T, et al. The reliability and validity of the Turkish version of the Facial Disability Index. Disabil Rehabil 2020:1-10.
19. Guillemin F, Bombardier C, Beaton D. Cross-cultural adaptation of health-related quality of life measures: literature review and proposed guidelines. J Clin Epidemiol 1993;46(12):1417-32.
20. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine (Phila Pa 1976) 2000;25(24):3186-91.
21. Field A. Discovering statistics using IBM SPSS statistics: sage; 2013
22. Díaz-Aristizabal U, Valdés-Vilches M, Fernández-Ferreras TR, Calero-Muñoz E, Bienzobas-Allué E, et al. Correlations between impairment, psychological distress, disability, and quality of life in peripheral facial palsy. Neurologia 2019;34(7):423-8.
23. Ho AL, Scott AM, Klassen AF, Cano SJ, Pusic AL, Laeken NV. Measuring quality of life and patient satisfaction in facial paralysis patients: a systematic review of patient-reported outcome measures. Plast Recons Surg 2012;130(1):91-9.
24. Cross T, E. Sheard C, Garrud P, Nikolopoulos TP, O'Donoghue GM. Impact of facial paralysis on patients with acoustic neuroma. Laryngoscope 2000;110(9):1539-42.
25. Lee J, Fung K, Lownie SP, Parnes LS. Assessing impairment and disability of facial paralysis in patients with vestibular schwannoma. Arch Otolaryngol Head Neck Surg 2007;133(1):56-60.
26. Tavares-Brito J, Fonseca ACO, Torres RP, van Veen MM, Greene J, et al. Facial Clinimetric Evaluation Scale and Synkinesis Assessment Questionnaire Translation into Brazilian Portuguese: A Validation Study. Int Arch Otorhinolaryngol 2020;24(1):e24-30.
27. Ng JH, Ngo RY. The use of the facial clinimetric evaluation scale as a patient-based grading system in Bell's palsy. Laryngoscope. 2013;123(5):1256-60.

CASE REPORT
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Nasal Reconstruction Using Tissue Expander and Modified Paramedian Forehead Flap Supported by Cartilage Graft

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ABSTRACT

This is an interesting case of a male patient with traumatic nasal injury with partial nasal amputation who was referred to our centre 3 months after the initial trauma. The wound was complicated with necrosis, the amputated nose had fallen off and a scar had formed at the wound bed. The nasal defect was greater than 2.5cm in length. More than 50% of the nose had fallen off including the bilateral alar lobule, the tip and the dorsal part of the nose. We utilized a tissue expander to create more tissue on the forehead in view of the patient's short forehead, for donor site closure and to lengthen our flap. We performed a modified paramedian forehead flap with a widened distal portion of flap, in a two-staged nasal reconstruction surgery supported by L-strut cartilage graft harvested from the 7th rib. In this report we provide an illustrative description of the procedure, its cosmetic and functional outcome and we also share the challenges we faced.

Keywords: Nasal reconstruction, traumatic nasal injury, rhinoplasty

INTRODUCTION

The human nose which is situated at the centre of the face in a prominent form makes it vulnerable to trauma and cutaneous malignancy. These conditions often result in a distorted facial appearance that requires nasal reconstruction. The aesthetic and functional results of a nasal reconstruction depends on a surgeon's ability to imagine the nasal structural defect in a three-dimensional figure. This is important for the proper assessment of the defect and subsequently reconstruct the nasal deformit. The aim was to minimize deformities, scarring, and obtain good functional aesthetic outcomes based on 3 components: lining, support, and coverage.

Nasal reconstruction can be achieved with different surgical methods depending on the degree of tissue loss and the affected nasal subunits, though out of all of these methods, the forehead flap is the gold standard. The first person who described the traditional median forehead flap was Sushruta Samhita, an ayurvedic physician from ancient India 600 B.C. (1). Later, Millard designed the paramedian forehead flap, excluding the central glabellar skin with the advantage of reduced morbidity and maintained viability (2). In our case, we described a two-staged nasal reconstruction with a modified paramedian forehead flap and used a tissue expander to create a longer and wider flap for closing both donor site and nasal defect.

CASE REPORT

A 23-year-old gentleman was involved in a road traffic accident. He sustained partial nasal amputation. The laceration was closed primarily. However, the partially amputated nose was complicated with necrosis and treated conservatively. The amputated nose had fallen off and a scar had formed at the

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wound bed which caused nasal valve contracture and partial stenosis. He underwent nasal dilatation and was on a nasal stent.

The nasal defect was greater than 2.5cm in length. There was >50% of nasal tissue loss involving bilateral alar lobule, soft triangles, tip of nose complete loss, and the dorsum. Nasal lining and columella were not injured (Figure 1A). His forehead skin was expanded using a tissue expander. The tissue expander was filled until 300cc progressively prior to his first stage surgery. The amount of water injected was based on pain and capillary refilling time. It took 3 months to achieve adequate forehead expansion.

SURGICAL TECHNIQUE

Nasal subunits were drawn on the defect and the shape of the new nose was drawn using a sterile paper based on the size of the defect. Incision was made at the superior edge of the scar tissue along the bilateral alar rim to facilitate folding of lining component over the alar rim cartilage graft by turning down the flap to form inner lining of the nostril (Figure 1C). The paramedian forehead flap was based on the right supratrochlear artery. The artery and two branches were identified by doppler at the superior orbital rim, also the pivot point, to provide accuracy. Based on the location of the perforator, a seagull-shape forehead flap was designed. The flap was drawn with its base over the neck of the seagull and gradually widened to the distal part, resembling a seagull's body (Figure 1C,1D). The pedicle was centred on the flap to minimize post-operative flap congestion. Incision was made to remove the tissue expander (Figure 1D). The flap was raised distally. Subgaleal dissection was proceeded until the flap was raised 3 cm from the supraorbital rim. Subsequently, subperiosteal elevation was done to incorporate the periosteal branch of the supratrochlear artery in the pedicle.

L-shaped cartilage was harvested from the 7th rib. It was cut into a L-strut 4(L) x 2.5(H) cm for dorsal support and 3cm thin slits cartilage for bilateral alar support. They were sutured into place with Prolene® 6-0. The flap was rotated laterally without tension and sutured to the defect refashioned contour with Nylon 6-0 (Figure 1B). We moulded the flap on the drawing on the paper and resurfaced the nose from nasal tip to the dorsum and left alar lobule. The donor site was closed primarily with the laxed skin created by the tissue expander. Additionally, adequate full-thickness skin graft (FTSG) was obtained from the excess skin on the forehead to cover the raw area over the flap's pedicle.

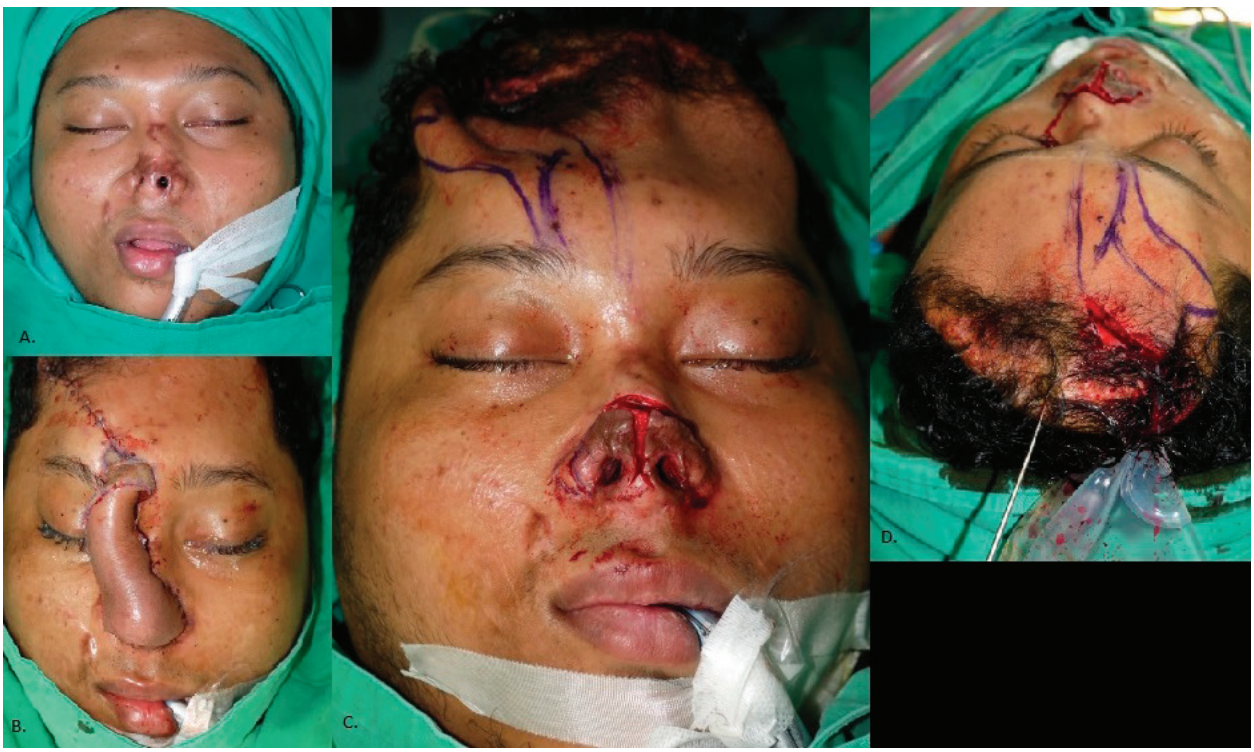

Figure 1. The process of nasal reconstruction. A. The initial nasal defect was greater than 2.5cm in length. There was >50% of nasal tissue loss involving bilateral alar lobule, soft triangles, tip of nose and dorsum complete loss. The nasal lining and columella remained intact. B. The flap was rotated laterally without tension and sutured to the defect refashioned contour. C. Incision was made at the superior edge of the scar tissue along the bilateral alar rim to facilitate folding of lining component over the alar rim cartilage graft by turning down the flap to form inner lining of the nostril. D. A seagull-shape forehead flap was designed. The flap was drawn with its base over the neck of the seagull and gradually widened to the distal part, resembling a seagull's body. Incision was made to remove the tissue expander.

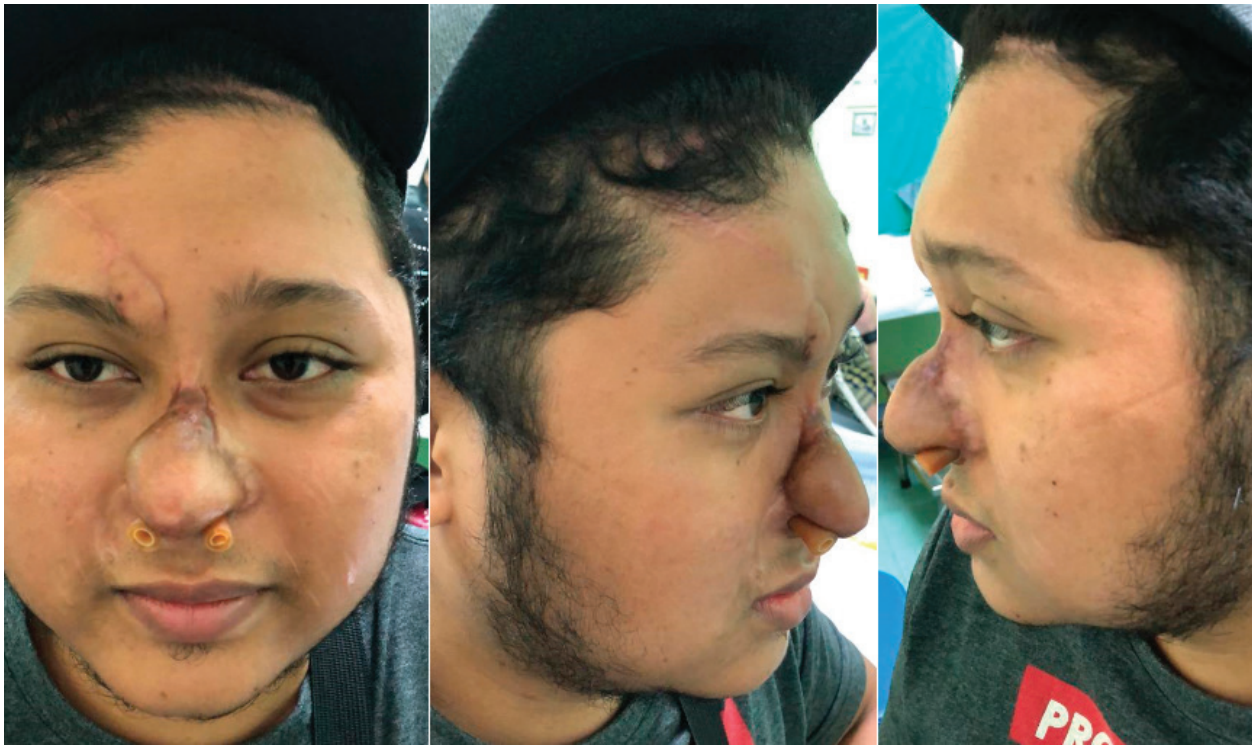

Figure 2. After 2 months, the pedicle was divided creating an inverted-V at the base. The edge of the flap was refashioned. Small portion of the superior flap edge was complicated with necrosis. There was contracture over right alar lobule. The patient underwent refashioning of flap edge and FTSG.

After two months, the pedicle was divided creating an inverted-V at the base. The edge of the flap was refashioned. Small portion of the superior flap edge was complicated with necrosis, which was treated by refashioning of the flap edge and FTSG three weeks later. One month after the flap refashioning, the flap edges were healed (Figure 2). The right side of the flap was slightly bulky. There was contracture over the right alar lobule. The patient would be subjected to further surgery to reconstruct the right alar lobule. Overall, the shape of the reconstructed nose is satisfactory.

DISCUSSION

Nasal reconstruction is one of the most complex types of reconstruction surgery of the face. The nose, as a three-dimensional structure at the centre of the face means that it is often the main focus of attention for the patient and also the public (3). Therefore, it is difficult to achieve patient's satisfactory on aesthetic outcome. Correa et al. stated that a defect size more than 2 cm wide in the horizontal plane or with exposed bone and/or cartilage were best repaired with paramedian forehead flap (3). Therefore, the gold standard paramedian forehead flap was the most suitable choice of nasal reconstruction in our case. The defect size was great and the forehead skin provided the closest texture to nasal tissue. The only pitfall the surgeon should carefully handle is the approximation of the vertical wound over the forehead caused by the secondary defect. A meticulous would closure technique is crucial to minimize wound tension that cause scarring (4).

In patients with shortened vertical forehead height, the inclusion of scalp skin in the flap should be avoided due to the difference of texture and colour of the nasal skin (5,6). Our patient had a short forehead. The use of a tissue expander gave several advantages. It provided sufficient hairless length for the flap, enabled primary closure at the donor site without tension, provided extra tissue for FTSG and left an inconspicuous scar on the forehead. In addition, the expanded flap has the advantage of decreased thickness in which accurate reconstruction in two stages was permissible. Therefore, the three stage reconstruction is reserved to more complex cases that require lining repair (5). Although our nasal reconstruction with modified paramedian forehead flap had minor flap edge necrosis and contracture developed over the right alar, the major aims of the surgery were met. Further revision of the right alar region and continuing nasal dilatation is required for the long term.

CONCLUSION

Forehead flap is the best method for the repair of extensive nasal defects. Extraordinary cosmetic and near-normal functional results can be achieved. However, this method requires patience and time. Careful use of forehead tissue expander has provided great benefit for short forehead patients.

Informed Consent: Informed consent for the patient has been obtained.

Peer-Review: Externally peer-reviewed.

Author Contributions: Conception/Design of Study- A.Z.M.S.; Data Acquisition- P.Y.; Data Analysis/Interpretation- P.Y., W.A.W.S., S.F.N.M.J.; Drafting Manuscript- P.Y.; Critical Revision of Manuscript- N.S.M.S., A.Z.M.S.; Final Approval and Accountability- N.S.M.S.

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REFERENCES

1. Menick FJ – Nasal Reconstruction Art and Practice. New York: Mosby/Elsevier, 2009.
2. Menick FJ. Aesthetic refinements in use of forehead for nasal reconstruction: the paramedian forehead flap. Clin Plast Surg 1990;17(4):607-22.
3. Correa BJ, Weathers WM, Wolfswinkel EM, Thornton JF. The forehead flap: the gold standard of nasal soft tissue reconstruction. Semin Plast Surg 2013;27(2):96-103.
4. Boyd CM, Baker SR, Fader DJ, Wang TS, Johnson TM. The forehead flap for nasal reconstruction. Arch Dermatol 2000;136(11):1365-70.
5. Pochat VD, Oliveira FC, Mata FS, Cunha MS, Alonso N, Meneses JV. Preliminary stages before nasal reconstruction using forehead flap: restoring perinasal subunits and nostril patency. Plast Aesthet Res 2015;2:34-7.
6. Weng R, Li Q, Gu B, Liu K, Shen G, Xie F. Extended forehead skin expansion and single-stage nasal subunit plasty for nasal reconstruction. Plast Reconstr Surg 2010;125:1119-28.

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