



RESEARCH

ACOUSTIC DIFFERENCE IN VOICE OF THE PATIENTS WITH AND WITHOUT ORGANIC LESION IN FUNCTIONAL VOICE DISORDERS

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SUMMARY

In this article, the objective and subjective differences of voices in functional voice disorders with and without organic lesion were discussed. 72 functional voice disorders without any organic lesion and 77 functional voice disorders with an organic lesion were included to this study. Organic lesions were 25 kissing nodules, 29 vocal cord polyp, 15 Reinke edema and 8 vocal cord cyst. Control group consist of 74 nondysphonic volunteers. The diagnosis of voice disorders was established by videolaryngoscopy using a 70° rigid scope. Auditive and acoustic analysis, voice range profile, maximum phonation time and the Disphonia Severity Index (DSI) were measured. Statistical analysis was performed using paired sample T-Test and ANOVA. There was a statistically significant difference in RBH, jitter% and DSI scores of the 3 groups. The voice quality of the FVD without any organic lesion was relatively better than FVD with any organic lesion group. A mass lesion over the vocal folds makes the voices worsen in functional voice disorders.

Keywords: Functional voice disorders, vocal fold lesion, acoustic analysis

ORGANİK SES TELİ LEZYONU OLAN VE OLMAYAN FONKSİYONEL DİSFONİLİ HASTALARIN SESLERİNİN AKUSTİK FARKLILIKLARI

ÖZET

Bu makalede organik ses teli lezyonu olan ve olmayan fonksiyonel disfonili hastaların seslerinin akustik farklılıkları tartışılmıştır. Bu çalışmaya ses telinde organik bir lezyonu olmayan 72 fonksiyonel disfonili hasta ile organik bir lezyonu olan 77 fonksiyonel disfonili hasta dahil edilmiştir. Organik lezyonlar, 25 ses teli nodülü, 29 vokal polip, 15 Reinke ödemi ve 8 kord vokal kistinden meydana gelmektedir. Kontrol grubunu ise herhangi bir ses bozukluğu olmayan 74 gönüllü oluşturmaktaydı. Ses bozukluklarının teşhisinde 70° rijit videolaringoskop kullanılmıştır. İşitsel ve akustik analizler, ses alanı, maksimum fonasyon süresi ve disfoni şiddet indeksi hesaplanmıştır. İstatistiksel analizde T testinden ve ANOVA'dan faydalanılmıştır. Her 3 grubun RBH, Jitter% ve DSI skorları arasında istatistiksel olarak anlamlı farklar vardır. Ses telinde organik bir lezyonu olmayan fonksiyonel disfonili hastaların sesleri olan hastalara göre daha iyidir. Fonksiyonel disfonilerde, ses tellerinin üzerinde organik bir lezyonun bulunması sesi daha da bozmaktadır.

Anahtar Sözcükler: Fonksiyonel ses bozuklukları, vokal kord lezyonları, akustik analiz

INTRODUCTION

Functional dysphonia refers to impairment of voice production in the absence of mucosal or neurogenic disease of the larynx¹. Vocal misuse and abuse are frequently claimed to be causes of voice problems. If left untreated, and the vocal hygiene guidelines were not followed, they are thought to contribute to the laryngeal tissue changes, such as localized or diffuse mucosal thickening, submucosal edema, ulceration, cyst formation etc..

In this article, the objective and subjective differences of voices in functional voice disorders with and without organic lesion were discussed.

MATERIAL and METHODS

72 functional voice disorders without any organic lesion patients, 28 males and 44 females, aged between 19 and 58 years old were included to

the study. The mean age was 38 years. 77 functional voice disorders with an organic lesion patients were included to the study. They consist of 25 kissing nodules, 29 vocal cord polyp, 15 Reinke edema and 8 vocal cord cyst. 46 males and 31 females, aged between 18 and 61, mean age was 44. The diagnosis of voice disorders was established by videolaryngoscopy using a 70° rigid scope (Karl Storz, Tuttlingen, Germany). Control group consist of 74 nondysphonic volunteers, 67 males and 7 females, aged between 19 and 67 years. The mean age was 41 years.

RBH (Auditive analysis)

Roughness(R), breathiness(B), and hoarseness(H) were estimated by the author with the patients reading a passage from the Turkish text "Kasagi" by Omer Seyfettin. These parameters are estimated as 0 = normal or absent deviance, 1 = slight deviance, 2 = moderate deviance, 3 = severe deviance.

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Acoustic analysis

Analysis of jitter (%) allows the relative evaluation of the period-to-period variability of the pitch within the analyzed voice sample. These parameter were analyzed on a sustained /a:/ using the Multi Dimensional Voice Program (MDVP) with the Computerized Speech Lab CSL 4300B (Kay Elemetrics Ltd., Lincoln Park, NJ, USA).

Voice Range Profile (VRP)

Voice range profile identifies the minimal I(low) and maximal amplitude and the lowest and highest frequency F0(high) of the voice range. Measured with Computerized Speech Lab CSL 4300B (Kay Elemetrics Ltd., Lincoln Park, NJ, USA)

Maximum Phonation Time (MPT)

MPT is the simplest aerodynamic parameter of phonation in seconds. This parameter was measured on a sustained /a:/ after full inspiration in a comfortable loudness.

Disphonia Severity Index (DSI)

In assessing the dysphonia severity, the formula

$$[DSI = 0.13 \times MPT + 0.0053 \times F0(\text{high}) - 0.26 \times I(\text{low}) - 1.18 \times \text{jitter}(\%) + 12.4] \text{ is used}^2.$$

These examinations were performed as recommended by the Union of European Phoniaticians (UEP)³. Statistical analysis was performed using paired sample T-Test and analysis of variance (ANOVA).

RESULTS

There was a statistically significant difference (p=0) in RBH, jitter% and DSI scores of the 3 groups. (Table 1, 2 and 3)

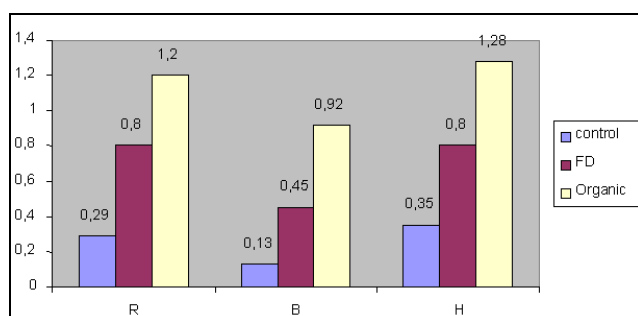


Table 1. The comparison of the mean values of RBH auditory analysis scores in control, functional dysphonia and in functional dysphonia with an organic lesion group.

DISCUSSION

The diagnosis of a voice disorder can be established only after a complete history, visualisation of the vocal folds, and objective and

subjective assessment of voice. Measurements of acoustic, aerodynamic, and perceptual voice parameters are essential in the management of voice disorders. Laryngeal stroboscopic evaluation may be useful in cases where there is a suspicion in vocal folds' vibratory patterns. But, first of all, when the larynx appears normal or relatively normal on mirror examination and the voice is poor, that is when the voice is disproportionately poor compared to laryngeal findings, a functional voice disorder should be suspected⁴.

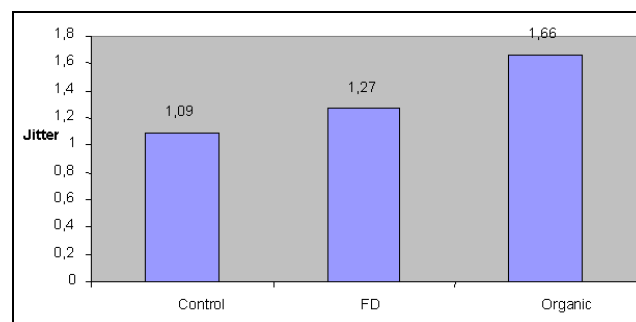


Table 2. Comparison of the mean values of jitter in control, functional dysphonia and functional dysphonia with an organic lesion.

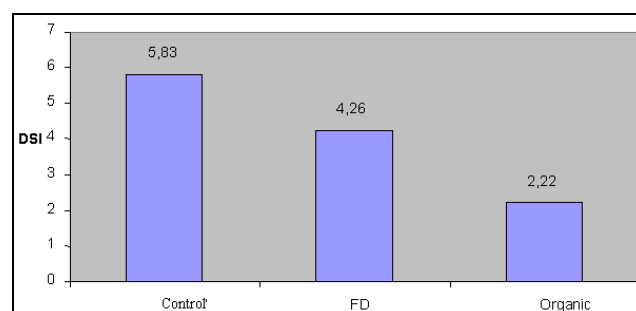


Table 3. Comparison of the mean values of DSI in control, functional dysphonia and functional dysphonia with an organic lesion group.

By definition, a functional voice disorder is the result of misuse or abuse of the anatomically and physiologically intact vocal apparatus but also may result from maladaptive compensatory maneuvers as a consequence of an organic condition⁴. Misuse suggests voice production behaviors that distort the normal propensity of the phonatory mechanism to work effectively and efficiently. Abusive behaviors are harsher than misuse and it will cause trauma to the laryngeal mucosa with a great likelihood. The line between misuse and abuse is a very thin one, and perhaps rather than there being a division between the two, the behaviors might be thought of as existing along a continuum⁵.

Vocal fold nodules, polyps, some kind of cysts and Reinke edema are usually thought to be the result of vocal abuse. They are a reaction of the tissue to the constant stress induced by frequent, hard



oppositional movement of the vocal folds⁵. Hoarseness and breathiness are the major perceptual signs of the vocal fold organic lesions.

Acoustically, a patient with a vocal fold mass will exhibit increased (frequency perturbation) jitter. Phonational range may be markedly reduced, especially at the upper end. The patient may also show reduced dynamic range, with an inability to produce high sound pressure levels. The fundamental frequency may be within normal limits or decreased. The extra mass along the medial edge of the vibrating vocal folds results in increased aperiodicity of vibration, and greater hoarseness. Depending on the on the size of the mass, glottal closure will be affected. Incomplete closure results in the perception of breathiness⁵.

In our study it came out that the voices of the FVD with/without any organic lesion were statistically significant different from the control group.

In the subjective evaluation of voice of FVD patients without any organic lesion, eg. RBH system, the mean values are (0,8), (0,45) and (0,8) respectively. As mentioned in the material and method section, these parameters are estimated as 0 = normal or absent deviance, 1 = slight deviance, 2 = moderate deviance, 3 = severe deviance. So the FVD without any organic lesion groups voices are between 0 and 1, close to slight deviance. Their mean DSI score was in accordance with RBH score, eg. 4,26. The voices of the FVD patients with any organic lesion; in RBH system, are (1,2), (0,92) and (1,28) respectively. So the FVD with any organic lesion groups voices are between 1 and 2, worsen than the FVD without any organic lesion group. Their mean DSI score was also in accordance with RBH score, eg. 2,22.

According to this findings, it could be said, that the voice qualities of the FVD with/without any organic lesion group was not normal, slight to moderate deviated from normal. Also, objectively and subjectively, the voices with a mass lesion of the vocal folds are worsen than others in functional voice disorders.

CONCLUSION

The voice quality of the FVD without any organic lesion was relatively better than FVD with any organic lesion group. A mass lesion over the vocal folds makes the voices worsen in functional voice disorders.

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