

Successful management of functional aphonia using a modified voice therapy technique: a case series

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Objective

The aim of the present study was to report the experience of a tertiary-care center in Makkah, Saudi Arabia in managing cases of functional aphonia.

Study settings and design

A case series study was conducted at the Phoniatrics Outpatient Clinics of King Abdullah Medical City in Holy Makkah, Saudi Arabia.

Materials and methods

Cases with functional aphonia managed by modified voice therapy technique in the period from March 2011 to January 2016 at the Phoniatrics Outpatient Clinics were recruited. Management consisted of auditory perceptual assessment, acoustic analysis, laryngeal examination, and voice handicap index measurement. All these parameters were recorded for each case before and after management.

Statistical analysis

Data were analyzed using statistical package for the social sciences version 16, and data were subjected to descriptive as well as inferential analyses.

Results

A total of 15 patients with functional aphonia were managed. One female patient had an exceptionally long period of aphonia, and her case is presented separately. The success rate of the procedure used for management was 100%.

Conclusion

Using the nonphonatory function of vocal folds in a modified manner by experienced therapists leads to recovery of voice regardless of the period of aphonia.

Keywords:

functional aphonia, phonation, speech, voice therapy

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Introduction

Functional aphonia is a condition of acute voice loss. There are two types of functional aphonia – habitual aphonia and psychogenic aphonia – which may be a presentation of a specific underlying psychiatric ailment [1]. Habitual aphonia can be caused by any factor and may continue after the etiological basis disappears. Patients continue to be aphonic because of lack of secondary gain of impaired voice or because of lack of appropriate proprioceptive feedback from vocal fold contact during the aphonia. This lack of proprioceptive feedback perpetuates the condition [2]. It is a rather rare disorder with a point prevalence of 0.4% [3,4]. It appears about eight times more frequently in females than in males. When the patient tries to phonate, the vocal folds approximate, but remain open. The patient whispers only either entirely without sound or with short insertions of extremely high-pitched phonations, which sound breathy or strained [5]. The criterion for functional aphonia that has been reported by a number of clinicians and reiterated is that phonations

of a nonverbal type, such as coughing, throat clearing, and crying, usually remain intact, whereas all voluntary speech trials are characterized by a whispering voice [6]. These nonverbal phonations are of value to the clinician diagnostically as well as clinically. The ability of the patient to produce an audible cough is considered one of the most significant signs diagnosing the functional nature of the disorder [7]. Diagnosis of functional aphonia is usually confirmed on the basis of the patients' history of sudden voice loss. In addition, there is discrepancy between the normal aspect of the larynx on one hand and severe dysphonia with reduced adduction of the vocal folds during phonation and complete closure during coughing on the other [8]. Acute laryngitis, acute vocal abuse (trauma), postoperative status (such as after extensive extirpation of the vocal fold mucosa), and sudden

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psychogenic stress were common predisposing factors [2]. Although no definite etiology is known for functional aphonia, it may occur because of a severe emotional disturbance or severe stress. In addition, it is mentioned that patients with recurrent aphonia exhibit a significantly higher level of anxiety and significantly more respect for social norms and codes of propriety. Their coping is also characterized by a higher escape tendency. Patients with recurring aphonia also report a significantly higher number of problems in their private lives [9]. It is recommended, although not essential, to attempt voice restoration at the first session of therapy [2,10,11]. Behavior re-adjustment voice therapy may be used to stabilize the regained voice. Therapy should be started immediately and it is mostly focused on correcting symptoms. Prompt therapy is very important to avoid a supposed serious risk that the aphonia will become permanent if the patient gets used to it. The 'immediate' initiation of therapeutic intervention using voice therapy is thought to be very important because as aphonia continues the disorder is likely to become more and more fixed [12–14]. Different methods have been suggested and used by many authors for the management of functional aphonia. Old methods such as surprising the patient with brutal force methods such as the 'Muck ball' method and sudden obstruction of the laryngeal inlet until suffocation leading to a reflex cry have been used. Others have mentioned methods including the application of an electromagnet to the tongue, grasping the tongue and larynx with both hands, irritation by dripping water, blowing powder into the larynx, or by brushing the mucosa with cocaine [13,15]. Over time, the techniques have become more sophisticated with phoniatrics therapy using the general idea of shaping the nonphonatory function of the vocal folds such as coughing for regaining the lost voice [7,16].

The aim of this study was to report the experience of the Phoniatrics Unit at a Tertiary-Care Center in Makkah, Saudi Arabia in managing cases of functional aphonia to regain patients' lost voice on the first day of diagnosis using a new modified technique of voice therapy.

Materials and methods

A case series study was conducted at the Phoniatrics Outpatient Clinics of King Abdullah Medical City (KAMC) in Holy Makkah, Saudi Arabia. This report included all cases with functional aphonia that were managed during the period from March 2011 to January 2016 at the Phoniatrics Outpatient Clinics of

KAMC. The institutional review board of KAMC, Makkah, Saudi Arabia granted us approval to conduct this study. All patients were subjected to the following:

- (1) Review of personal data such as age, sex, occupation, and onset of aphonia.
- (2) History taking regarding the possible etiological factors for voice disorders such as the degree of vocal demand, smoking, consumption of spicy foods, and temperament of the patient or associated psychological background.
- (3) Auditory perceptual assessment: this was performed using the GRBAS (grade, roughness, breathiness, asthenia, and strain) scale through a conversation with the patient. Voice assessment was carried out by a consultant phoniatrician (A.I.A.).
- (4) Acoustic analysis using CSL KayPENTAX model 4500 (KayPENTAX, New Jersey, USA), as every patient sustained the vowel /a/ to determine the perturbation values including jitter, shimmer, and harmonic-to-noise ratio.
- (5) Laryngeal examination using telescopic rigid fiber orolaryngoscopy 70° or flexible nasofibrolaryngoscopy along with KAY Digital Video Stroboscopic System, Model 9100B (KayPENTAX, New Jersey, USA).
- (6) The voice handicap index (VHI), which is a questionnaire to quantify the functional, physical, and emotional impacts of a voice disorder on a patient's quality of life, was administered. It captures the patient's subjective rating of a series of questions. We used the Arabic version used by Malki *et al.* [17]. There were 30 questions with ten in each subgroup (E: emotional, P: physical, and F: functional). We summed the scores of the ten questions for every subgroup (E, P, and F), which ranged from 0 to 40. Next, all three scores were added to obtain a total score. A change of 18 points in a total score or eight points on any subscale (emotional, functional, or physical) is considered statistically significant. Once the patient is diagnosed, voice therapy is started immediately, and the number of sessions is variable from one to even four sessions on the same day with a rest period in between each session of 20 min. All sessions were performed by a single phoniatrics consultant – the main author.

The idea of the therapeutic method was to depend on the fact that the nonphonation functions of the vocal folds are commonly used to regain the lost voice. The patient is encouraged to phonate indirectly using the nasal sound production /m/ with his or her mouth closed. As the patient relates phonation and speech to mouth opening, distraction of the patient's attention

relieves stress, tension, and resistance. This could indirectly help the patient in easily regaining voice. This method has not been described earlier.

Steps of treatment

Re-assurance is given to the patient with hope to regain his or her voice on the same day to gain his or her familiarity and trust on the therapist. The patient was informed that some vocal exercises will be started before the start of formal therapy to distract and relax the patient. With the patient's mouth closed, a trial for producing the nasal sound 'mmmmmmmmmm' was performed by following the instructions of the speech therapist. Upon succeeding, this was repeated several times.

Once patients could produce this sound, they were asked to open their mouth while producing the sound to connect the /m/ sound to /a/ to produce 'maaaaaaaaaaaaa'. This was repeated several times with other vowels such as /i/ and /o/. This was continued until the patient could pronounce words followed by reading and normal speaking.

Longstanding chronic cases

A combination of the cough method for glottal approximation and the previously described method to regain the lost voice was used. The patient followed the therapist in repeated trials to produce a loud and maintained cough until the cough sound was of acceptable intensity. The patient was asked to stop coughing by closing his or her mouth to produce /m/ sound to be similar with /mmmm/ and to repeat it until mastering it. This step may require several sessions with a lot of effort, patience, and encouragement. During this, the patient is asked to open his or her mouth again to connect the vowel /a/ to produce 'himaaaaaaaa'. This was followed by changing to different vowels and syllables and progressed to words and normal speaking. Once the patient regained his or voice, he or she was directed to attend regular voice therapy sessions twice per week for 12 sessions using the Smith Accent method. The therapy methods used to correct defective voice function should adopt a holistic approach for resorting the balance of the respiratory, phonatory, and articulatory motor activities. One example of voice therapy methods that may fall under this category is the Accent Method of Smith aiming to support the patient psychologically and recommendations about vocal hygiene and correction of faulty vocal techniques [18]. Re-evaluation was performed at the end of the voice therapy program.

Data were analyzed using statistical package for the social sciences, version 16 (SPSS Inc., Chicago, Illinois, USA) and subjected to descriptive analysis,

that is, numbers and percentage for qualitative data and mean±SD along with medians and interquartile ranges for quantitative data. Comparisons were made using Student's *t*-test. A *P* value less than 0.05 was considered as significant.

Results

Totally, 15 aphonic patients were managed at the Phoniatics Unit from March 2011 to January 2016. One female patient had an exceptionally long period of aphonia and presented separately. It was noted that females outnumbered males. Patients' age varied widely from 12 to 42 years, with a mean of 27.4 years (Table 1).

All patients included in this study successfully regained their voices on the day of diagnosis. There was variation in the number of therapy sessions they required. Some patients required only one session, whereas others required up to four sessions. However, all of them were given therapy on the same day with rest periods between each session. Stroboscopic examination of patients during aphonia revealed the presence of lack of proper vocal fold adduction in spite of bilateral normal mobility leading to the presence of glottis gap during phonation that varied from 2–4 mm with a median of 3 mm subjectively. This significantly improved after management, and the glottic gap ranged from 0 to 1 mm with a median of 0.25 mm (Fig. 1a and b).

In addition, all the parameters of acoustic analysis including jitter, shimmer, and harmonic-to-noise ratio significantly improved after voice regain ($P=0.001$, 0.001 , and 0.04 , respectively). VHI showed highly significant improvement in the results as the mean total score in aphonic patients was 53.57 and was significantly reduced to 19 after the patients regained their voices ($P=0.001$) (Table 2).

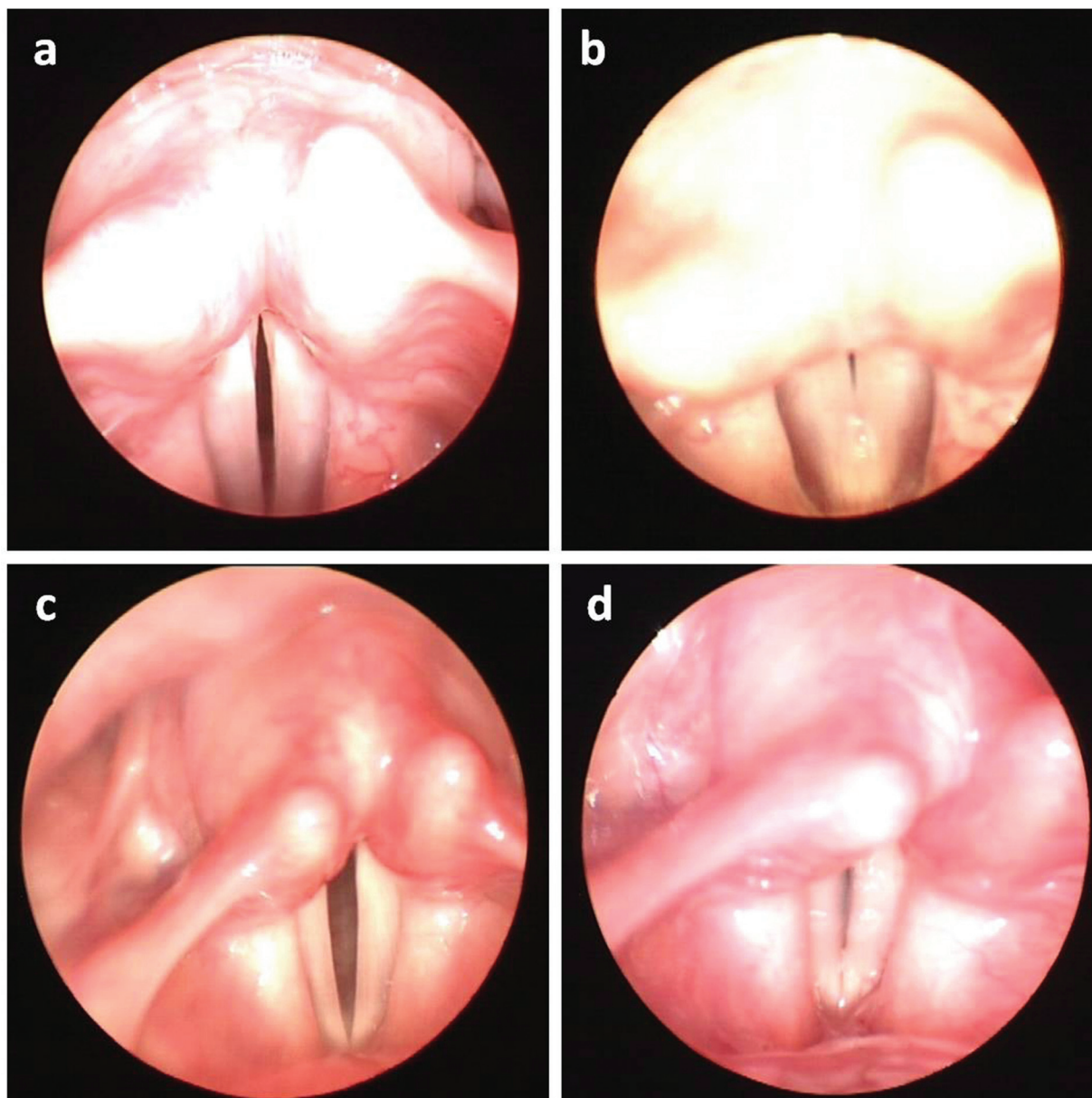
Description of a case with exceptionally longstanding functional aphonia

A single, 28-year-old woman attended our voice clinic on 4 January 2016 complaining of voice loss over 5 years'

Table 1 Patients' demographic information

	<i>n</i> (%)
Sex	
Male	2 (14.3)
Female	12 (85.7)
Age (years)	
Mean±SD	27.4±9.3
Median (minimum–maximum)	25.5 (12–42)
Duration from onset of aphonia to presentation (days)	
Median (minimum–maximum)	10.5 (4–180)

Figure 1



(a) Phonatory gap during phonation in aphononia; (b) closed gap after management; (c) phonatory gap during phonation in the case with an exceptionally longstanding functional aphononia; (d) minimal gap after management in the case with exceptionally longstanding functional aphononia

Table 2 Comparison between premanagement and postmanagement voice parameters (n=14)

	Premanagement voice parameters		Postmanagement voice parameters		P value
	Mean±SD	Median (IQR)	Mean±SD	Median (IQR)	
Glottal Gap	2.7±0.6	3.0 (2.0–3.0)	0.3±0.4	0.3 (0.0–0.5)	0.002
Jitter	5.0±2.8	3.6 (2.8–7.3)	0.7±0.1	0.7 (0.6–0.8)	0.001
Shimmer	8.2±2.7	7.4 (7.4–9.1)	1.7±0.5	1.9 (1.6–2)	0.001
NHR	0.9±0.9	0.3 (0.2–1.9)	0.1±0.02	0.1 (0.1–0.1)	0.04
VHI	53.6±11.8	56.5 (43.8–62.8)	19±6.8	18.5 (14.3–25.3)	0.001

IQR, interquartile range; NHR, noise-related parameters; VHI, voice handicap index.

duration. The onset of voice loss was sudden, following an upper respiratory tract infection. The course was stationary with no remission. She sought medical advice for management during this long period

elsewhere reachable to her in Makkah, Jeddah, and Madinah. During these multiple visits to hospitals and clinics, she received multiple opinions from physicians and speech language pathologists with

different diagnosis such as malignancy, tuberculosis, and vocal fold paralysis. In addition, she also got an advice to accept herself as disabled and use writing for communication. During the fifth year, she visited our Phoniatics Clinic, and after full documented evaluation she was diagnosed as a case of neglected or longstanding functional aphonia. She was assured and told that she will start to speak again as soon as possible and it may be even today. This sentence was key for the patient to respond to voice therapy, as she mentioned later. Stroboscopic examination of the patient revealed the presence of a 4 mm glottic gap during phonation with normal vocal fold mobility that was markedly reduced to 1 mm glottic gap after management. VHI also revealed marked improvement of the results as the total score of the patient was 89, which dramatically reduced to 30 after the patient regained her voice. We spent 4 days on her with sessions throughout the working day using our modified voice therapy technique through which she could finally phonate and speak normally to her pleasure and our team (Fig. 1c and d).

Discussion

Functional aphonia is an uncommon functional voice disorder. In our study, although the KAMC Phoniatics Unit is the only center in the whole Makkah region that receives such cases, in more than 2.5 years, the total cases were 13 females and two males. This was nearly identical to other previous studies that mentioned that this was a rare disorder with eight times more prevalence in females [3,4]. In our study, we depended for diagnosis of our patients on symptoms, which always were in the form of sudden loss of voice with whispering in spite of intact nonverbal use, such as coughing, throat clearing, and crying. After stroboscopic examination and documentation, definite diagnosis became clear. There was always glottic gap subjectively about 2–4 mm with lack of proper vocal fold adduction, which either completely disappeared or markedly diminished to less than 1 mm after management and regain of normal vocal fold function. Acoustic analysis for perturbation values, jitter, shimmer, and harmonic-to-noise ratio also significantly improved after regaining voice. The VHI results significantly improved in all patients after management, and this reflects how much the patients were disappointed upon loss of their voices and became clearly satisfied and happy when they found themselves capable of speaking normally again. As soon as each patient was diagnosed, our main target was to regain the patient's voice on the same day

without the least delay with variable number of voice therapy sessions using our method of voice therapy to avoid habituation of aphonia. It was very important to gain patients' confidence on the clinician, and reassure them that they will regain their voice on the same day to avoid further frustration and to prevent chronicity of the condition.

This target was the same for other authors, whose aim of intervention was to re-establish voice production in a single session lasting between a few seconds up to several hours during the first day of vocal exercises [12,16,19]. The aim of others was to reset the voice mechanism by means of voice therapy, also suggesting the possibility of using repetitive transcranial magnetic stimulation to the right motor cortex in the future [20,21].

The method of management described in the present study depends on that same idea in modified manner. In recent-onset cases, the patient was directed to produce the nasal sound /m/ while the mouth was closed. It was noticed that the patient by this method was indirectly more relaxed and cooperative with rapid response. In resistant and longstanding cases, not responding to this method directly, the cough method as a trigger for voice production was used, extended with the nasal sound production followed by phonation and speaking. Closing the mouth at the end of a cough preserved air in the oral cavity that helped in producing /m/ sound extending to the vowel preparatory for phonation. It is well established in the clinical literature that for the treatment of functional aphonia, coughing is one of the most successful therapeutic techniques for eliciting phonation. The patient following demonstration by the clinician coughing can be automatically followed by the vowel /a/ at its offset ending with phonation [22]. The experience of the therapist allows him to modify the procedure according to the patient's response; sometimes we used rhythmic musical syllables after /m/ sound production, as this obviously helps in patient relaxation and voice production. After regaining voice, recurrent aphonia may occur, and therefore many authors suggest supportive management. For this reason, for our cases, we continue management after regaining voice with a short program of voice therapy - regular voice therapy sessions twice per week for 12 sessions using the Smith Accent method. Some authors suggest psychotherapy, suggesting a concurrent treatment program of voice therapy in conjunction with ongoing psychotherapy [23].

Conclusion

Functional aphonia is often missed or misdiagnosed by many clinicians. This study highlights the importance of proper diagnosis and prompt, nondelayed management of the condition. The psychological management by reassuring the patient that his voice will be regained is an important and integral part of the management plan. The nonphonatory functions of the vocal folds are commonly used in variable setups to regain the lost voice by regaining the proprioceptive feedback necessary for sustained phonation.

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Conflicts of interest

There are no conflicts of interest.

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