



PUBERPHONIA: A NOVEL APPROACH FOR TREATMENT

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ABSTRACT

Puberphonia is inappropriate use of high pitched voice beyond pubertal age in males. Manifestation is less in women than men. Voice therapy is one of the modality of treatment. This study is to evaluate the efficacy of voice therapy in treatment approach of puberphonia and to document the effect of voice therapy on improvement of the quality of life of the patient. A Prospective study of twenty five cases with puberphonia. All cases were managed with various techniques of voice therapy. The subjective assessment of pre-voice therapy was done using GRBAS scale and objective assessment was done by acoustic analyses of vocal quality using Praat software. The psychosocial impact of puberphonia was assessed with the voice handicap index (VHI). All the twenty five patients achieved appropriate pitch range following voice therapy. All scores of the Voice Handicap Index of all patients showed significant improvements. The study concludes that voice therapy has proven to be one of the most effective in the management of puberphonia. The study showed that the voice therapy not only improves the voice quality of the patients, but also improves the quality of life of the patient.

KEY WORDS: puberphonia ; voice therapy; adolescent age.



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INTRODUCTION

Puberphonia or Mutational Falsetto is the failure to eliminate the higher pitched voice of pre-pubescence and to substitute the lower pitched voice of post pubescence and adulthood in the presence of a structurally normal larynx (Prater and Swift, 1984). The high voice may be produced at the top of the chest register or in falsetto; this high voice is sometimes called mutational falsetto. Persistence of adolescent voice after puberty is known as puberphonia, especially in absence of any organic causes. In infants, the laryngo-tracheal complex lies at a higher level than in adulthood. The laryngotracheal complex descends throughout the life, but at puberty there is rapid lowering of larynx relative to base of tongue.^[1] Normally adolescent males undergo voice changes due to a sudden increase in the length of the vocal cords due to the enlargement of the Adam's Apple.^[2] This is uncommon in females because their vocal cords do not show a sudden increase in length. This sudden increase in the length of the vocal cords is due to the sudden increase in testosterone levels found in pubescent males.^[2] This condition is seen common in male. This is uncommon in female as laryngeal growth spurt commonly occurs only in male. This disorder has also been observed in females, where the manifestation is very less, as females generally have a higher register voice. This condition female is known as "Juvenile Resonance Disorder" or "Little Girls' Voice". The voice of a person with puberphonia is high pitched, breathy, and hoarse. Pitch breaks are also present in most puberphonia patients. It may be associated with mild dysphonia and increased, effortful phonation. Vocal instability is often marked with an extensive frequency swing.

Aetiology of puberphonia include emotional stress, delayed development of secondary sexual characters, psychogenic, Increased laryngeal muscle tension causing laryngeal elevation, maternal protection etc. Puberphonia may be related to the larynx or an undeveloped natural tenor voice, changes in hormonal development, congenital anomalies of

the larynx and vocal fold asymmetries, minor structural changes (particularly the sulcus), unilateral vocal fold paralysis, laryngeal diaphragm, debilitating disease during puberty, neurological disease with hypotonia, incoordination of the vocal folds, deep breathing or hearing impairment (Anelli, 1999; Behlau & Bridges, 1995b). Puberphonia may also be because of non-fusion of thyroid laminae, in these cases hypogonadism may be the cause and it has to be ruled out.^[2] In men, organic causes are rare and often fits cases with a psycho-emotional etiology (Anelli, 1999; Behlau & Bridges, 1995b). Puberphonia has been treated by Voice Therapy, Laryngeal manipulation and Surgery. Present treatment for puberphonia is voice therapy and psychological counseling^[3]. Voice therapy for puberphonia is promising modality of treatment but not much reported in literature. This study was carried out with the goal of documenting the efficacy of voice therapy in terms of lowering pitch as well as documenting the effect of voice therapy on quality of life in persons with puberphonia.

Impact of voice disorder:

The impact of voice disorder varies greatly from person to person. Occupation, environment, family members and overall personality are all the variables that can affect the way the voice disorder affects a specific person. In general, people with puberphonia tend to encounter problems that include psychological, emotional, social and professional related difficulty^[4]. Recently there has been increased interest in the health-related quality of life (HRQOL), and a research conducted by Wilson et. al. has emphasized the importance of including quality of life (QOL) measure in an otolaryngologic and voice assessment^[5].

Voice Handicap Index

It was developed and validated by Jacobson, Johnson, Grgnalski, Silbergleit and Beginner in 1997. Initially it was developed to fill the requirement of patient's outcome with emphasis on patient's physical, emotional and functional

changes as the treatment progresses. First version of VHI had 85 items, which was then reduced to form 30 item scale as VHI-30, which is the most popular scale used in both clinical and research^[6] Each sub-section of VHI is weighing a score of 40, which gives total of 120. A VHI score 0 to 30 represents low scores indicating that there is a minimal amount of handicap associated with the voice disorder. A score of 31 to 60 denotes a moderate amount of handicap due to voice problem. A VHI score from 60 to 120 represents a significant and serious amount of handicap due to voice problem and are often seen in patients with new onset vocal fold paralysis or severe vocal fold scarring^[6]. Rosen et. al. (2000) reported that Voice Handicap Index as a useful instrument to monitor the treatment efficacy for a wide range of voice disorders^[7 & 8]. VHI is also used to assess the effect voice disorder has on patients' daily living^[6]. The overall VHI score, as well as the percentage change between VHI scores pre to post-intervention, and scores on the individual subscales of VHI can be important for assessing treatment option and

MATERIALS AND METHODS

A prospective study of 25 cases in the department of ENT and Head & Neck Surgery, Sree Balaji Medical College & Hospital, Chennai for a period of One year from July 2011 to July 2012. The male patients with Puberphonia without organic cause with structurally normal larynx were only included for this study. A detailed ENT evaluation was carried out and a direct laryngoscopic evaluation was done using a Hopkin's telescopic (70 degree rigid Endoscope) examination in the ENT clinic. Laryngeal examination revealed a structurally normal larynx in all selected cases. The perceptual assessment of voice involves describing the voice solely by listening. Voice assessment may be informal or formal. Formal perceptual evaluation typically uses a published protocol to systematically describe characteristics of voice disorder. It involves describing the voice solely by listening to it, i.e. using auditory perception. The Speech

therapist will ideally work directly with the patient by teaching them voice exercises encouraged to lower their pitch to accommodate a more natural sounding voice.

GRBAS scale

GRBAS scale (Hirano M, 1981) was used to assess the voice, perceptually. This scale evaluates voice on five scales - Grade (G), Roughness (R), Breathiness (B), Asthenia (A), and Strain (S). Each parameter is rated on a 4-point rating scale ranging from 0 (normal), 1 (slight), 2 (moderate), and 3 (extreme).

Praat software

Praat (the Dutch word for "talk") is a scientific computer software package for the analysis of speech in phonetics. Praat software was used for acoustic assessment of voice. Praat is a software tool used to analyze, synthesize, and manipulate speech and has an built-in voice report tool. In this study the male patients with puberphonia showed high fundamental frequency (F0) on Praat software

Voice Handicap Index

The psychosocial impact of puberphonia was assessed with the Voice Handicap Index (VHI) (Jacobson, Johnson, Grgnalski, et al., 1997). It is a 30 item, 5 point (0 to 4) scale, where 0 denotes "never" and 4 denotes "always", which is the most popular scale used in both clinical and research^[6]. Each sub-section of VHI weighs a score of 40, which gives total of 120. From the scores, the impact of the voice disorder may be classified as mild, moderate or severe. A VHI score 0 to 30 represents low scores indicating that there is a minimal amount of handicap associated with the voice disorder^[6]. A score of 31 to 60 denotes a moderate amount of handicap due to voice problem^[6]. A score of 31 to 60 denotes a moderate amount of handicap due to a voice problem^[6]. A VHI score from 60 to 120 represents significant and serious amount of handicap due to voice problem and are often seen in patient with new onset vocal fold paralysis or severe vocal fold scarring^[6]. Rosen et. al. (2000) reported that Voice Handicap Index as a useful instrument to monitor the

treatment efficacy for wide range of voice disorders [7 & 8]. VHI is also used to assess the effect voice disorder has on patients' daily living [6]. Voice Handicap Index as a useful instrument to monitor the treatment efficacy for wide range of voice disorders [7 & 8]. Pre and post therapy testing was performed using VHI administration and perceptual and acoustic analyses.

Voice Therapy

All patients underwent a voice therapy schedule with the following techniques: counseling regarding the basics of patient anatomy, physiology and human growth to understand what is happening. It aims to alleviate anxiety, depression and other psychosocial impacts of puberphonia. The patient is counseled about the effects of childish voice communication and the likely positive changes resulting from the use of a new voice.

Therapy techniques included

- Humming while gliding down the pitch scale ,i.e., Humming while gliding from a higher note to a lower note.
- Phonation of vowels sounds with glottal attack ,i.e., forceful initiation of voice during the production of vowels
- Use of vegetative sounds like cough or throat clear to initiate voicing.
- Production of glottal fry(,i.e., the lowest possible pitch which the patient can produce).
- Confidential voice therapy – patient is asked to use a breathy, soft, gentle speech.
- Yawning technique
- Inspiratory phonation (Anelli, 1999, Boone & McFarlane, 2003)
- Incomplete swallowing sonorous (Anelli, 1999, Boone & McFarlane, 2003)
- Use of nasal sounds

Voice therapy consisted of two sessions per week. The patients were made aware of their newly acquired low-pitched voice and were counseled to accept it as their own voice. Simultaneously all the patients practiced relaxation exercises to reduce compensatory laryngeal tension. When the patient was able to produce the low-pitched vowel, the same was

used to produce nonsense syllables, words, phrases and sentences in a hierarchical manner. At the end of therapy, both the perceptual and acoustic assessment was carried out using GRBAS scoring and Praat software. The quality of life post voice therapy was evaluated using VHI.

RESULTS

A total of 25 patients formed the sample size during the study period of one year duration. The male patients were in the age group range of 14 to 19 years diagnosed with puberphonia by perceptual and acoustic analyses .The number of sessions of voice therapy required to achieve the desired results varied depending upon the pre- therapy F0(fundamental frequency), patients compliance and motivation during therapy and implementation of technique outside the therapy situation.The duration of follow up varied among the patients from one session (one week) to a maximum of four session (4 weeks).Majority of the patients required four session to achieve the expected results.

Perceptual Analysis

Before voice therapy scoring on the GRBAS scale, was abnormal in all the patients .After voice therapy scoring became normal in all the patients,that is G0R0B0A0S0

Acoustic analysis

On Praat, the Pre Voice Therapy average f0 was 233.85 Hz (SD 14.90) while Post Voice Therapy average f0 reduced to 129.28 Hz (SD 8.09).

Psychosocial impact analysis

Following voice therapy, all scores of the VHI showed significant improvements ($p=0.001$). All patients obtained better score on the overall scale as well as on each subsets of the VHI. The efficacy of voice therapy for puberphonics showed to be effective both in term of validity and Evidence Based Practice (EBP).

DISCUSSION

This study was carried out to evaluate the efficacy of voice therapy to treat puberphonia. All of male 25 patients who were in the age group range of 14 to 19 years showed improvement. This study showed that the mean fundamental frequency of the persons with puberphonia was reduced significantly by voice therapy. The psychosocial impact of puberphonia plays an important role in this self-perceived handicap. Voice therapy aims, not only to reduce the pitch, but also to normalize the self image of the speaker. A careful case history is needed to obtain data on the picture of the patient's childhood, family environment and personality. The higher scores on the overall and each subsection of the VHI conclusively prove that voice disorder affects the person's psycho-social life as well as his quality of life. The study also opened the door to another aspect of viewing puberphonic as; the maximum impact is seen on the emotional aspect of the VHI, which imposes that the management should aim more at the emotional aspect of the patient. Change in the scores from pre to post therapy indicates that voice therapy is the effective tool for management of puberphonics, which is supported by the studies from the past.^[9 & 10] Earlier researches have equivocally stated the benefit as well as shortcoming of voice therapy for dysphonics, as MacKenzie et. Al^[10] has concluded, in a longitudinal study, that

voice therapy improves voice; but no improvement on QOL. Other studies as Rosen et. al. (1995 and 2005) indicated that there is improvement of QOL based on HR-QOL scales. Adolescence is a period of conflict, an age of transition between childhood and adulthood, a stage of search for identity, the most critical in human life. Thus, the adolescent voice altered by functional etiology needs guidance and family support in the course of speech therapy (Anelli, 1999).

CONCLUSION

The study concludes that the voice therapy not only improves the voice quality of the patient, but also improves the quality of life of the patient. On successful completion of voice therapy, the patients' psychosocial level also gets improved; which in turn improves the quality of life. This study showed that voice therapy is one of the most effective treatment modality of puberphonia

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