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Review Article

Management of the transgender voice

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Abstract

Transsexualism is a condition involving a paradoxical feeling of belonging to the opposite sex. Acquiring a sex-appropriate voice is a crucial part of the patient gaining acceptance in their new gender. Speech and language therapists and otolaryngologists play an important role in influencing communication behaviour in transgender patients by altering the fundamental frequency of speech to one acceptable for the patient's sex.

Review of the literature suggests that speech and language therapy is successful at creating an acceptable fundamental frequency in transgender patients, as well as influencing other communication behaviours. Laryngeal surgery, such as cricothyroid approximation, has an important role in raising the fundamental frequency in those who do not achieve acceptable voice via non-surgical means. There is little information on patient satisfaction and quality of life measures. Research is currently underway to explore this aspect further.

Key words: Transsexualism; Voice Disorders; Voice Quality

Introduction

Transsexualism is a complex condition involving a paradoxical feeling of belonging to the opposite sex. Prevalence is estimated at one in 54 000, and over 75 per cent of cases are males wishing to be recognised as females.[1] Acquiring a sex-appropriate voice is a fundamental part of the patient gaining acceptance in their new gender. Female-to-male transsexuals, as a result of hormone therapy, achieve the desired voice with relative ease, but the same does not apply to male-to-female transsexuals.[1] Speech and language therapists and otolaryngologists play an important role in influencing communication behaviour in transgender patients. Treatment is aimed towards developing a healthy voice within the frequency ranges for the appropriate sex, along with the development of appropriate paralinguistic behaviours. Specialist voice training and laryngeal surgery aims to alter the fundamental frequency (F_0) of speech to one acceptable for the patient's sex. An F_0 of 155–160 Hz represents the borderline frequency above which a voice is perceived as female.[2] The aesthetics of the laryngeal cartilage can also be improved surgically.

This review evaluates the literature available on voice quality in transgender patients. Medline was searched for articles containing the keywords 'transsexual' and 'transgender' and combined with articles referring to 'voice', 'voice quality' and 'voice disorders'. The search was limited to articles with human subjects, abstracts and those published from 1985 to date. The vast majority of information was on male-to-female transsexuals.

Discussion of the literature

Soderpalm *et al*. retrospectively analysed 25 consecutive transsexual individuals referred for voice therapy and/or phonosurgery.[2] Only 12 patients had vocal findings documented at initial assessment and follow up. The patients were at varying stages of gender reassignment. The 10 patients who received only speech therapy demonstrated an improvement in F_0 of > 20 Hz ($p < 0.01$). A lengthier period of therapy (more than 14 sessions) was associated with a satisfactory F_0 of more than 165 Hz. Both patients undergoing cricothyroid approximation achieved an increase in F_0 to more than 165 Hz. The authors conclude that speech therapy is important in achieving a desirable F_0.

The interaction between physical appearance and voice in transgender patients was explored by Van Borsel.[1] They hypothesised that if the voice of a transsexual could betray their biological gender, 'femaleness' would be judged higher in a visual-only presentation. Fourteen male-to-female transsexuals were evaluated reading a passage of text by 22 laypersons and 22 speech therapy students. Each patient was assessed in a 'visual-only' 'auditory-only' and 'audiovisual' presentation. 'Femaleness' was graded on a visual analogue scale and the judges

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were blinded to the subjects' history. Scores were comparable between the speech pathologists and the naive observers. A positive correlation ($p = 0.049$) was found between speech frequency and perception of the voice as female, and the majority of subjects scored higher in the visual format. A poor visual score tended to be corrected by a high voice score, although in one subject, a low visual score resulted in a reasonable voice score being perceived negatively. The authors conclude that visual appearance and 'femaleness' of voice interact in the perception of femininity, and a less-than-acceptable physical appearance can be compensated for by attention to voice quality, and vice versa.

Phonosurgery is considered if the patient is unable to maintain a feminine voice with adequate speech therapy. The majority of articles concentrate on cricothyroid approximation. Thyroid chondroplasty has also been commonly performed. Studies of phonosurgery have been of similar design: retrospective analyses of male-to-female transsexuals, the majority of whom had speech therapy and documentation of speech variables prior to surgery. Voice parameters were re-assessed post-operatively, with the patients' subjective opinions also recorded.

Brown *et al*. report the post-operative results of 14 male-to-female transsexuals undergoing cricothyroid approximation.[3] They found that modal pitch, judged to be the measurement correlating most strongly with gender, was significantly increased by surgery. This was reinforced by a further study from the same department, demonstrating an average gain of modal frequency of 71.05 Hz.[4] Yang reported a series of 20 similar patients.[5] Fifty per cent of subjects felt their post-operative voice now fitted with their self-perception, with 20 per cent feeling neutral about their new voice and the remaining 29 per cent responding negatively. However, subjective responses did not correlate with objective measurements. It was noted that subjects who received speech therapy achieved a lower F_0, with a reduced pitch range, although this was thought to be due to selection bias.

Between 1993 and 2002, Neumann *et al*. evaluated 67 transsexuals following cricothyropexy with or without chondroplasty.[6] All patients received a phoniatric and endoscopic examination before and after surgery, with a computerised tomography (CT) evaluation of the cricothyroid distance. Sixty-three patients achieved a rise in F_0, 73 per cent of whom found their F_0 increase satisfactory. Twenty-one per cent achieved a non-significant rise in F_0, 3 per cent observed no change, and 3 per cent noted a decreased pitch. Forty-five patients were reviewed one year following surgery, at which time 14 had a satisfactory pitch and 21 demonstrated a further increase in F_0. The 26 patients who received further speech therapy maintained their F_0 increase and a more feminine timbre. All post-surgery patients had a reduced vocal range, with restriction of voice intensity. A CT evaluation demonstrated satisfactory reduction in cricothyroid distance in all patients, but this did not correlate with changes in voice parameters. However, these results contradicted the findings of Pikuth *et al*., that spiral CT findings seemed to correlate well with post-operative pitch.[7]

Fourteen male-to-female transsexuals who underwent cricothyropexy with or without anterior commissure advancement were described by Wagner *et al*. in 2003.[8] Voice parameters were assessed using electroglottography and speech therapy evaluation. Eleven patients experienced an improvement in F_0 (range, 9–114 Hz) and 11 patients expressed satisfaction with the results. Again, the measured improvement in F_0 did not always correspond with patient satisfaction.

Matai *et al*. report the results of a patient satisfaction questionnaire from 42 transsexuals undergoing cricothyroid approximation and/or chondroplasty.[9] Thirty of 35 patients who underwent thyroid chondroplasty noticed an improvement in their appearance, the remainder noticing no change. Twenty-four of 34 patients felt their voice had improved following surgery, nine felt their voice had remained unchanged and one felt their voice had deteriorated. Other techniques, such as combined vocal fold shortening with reduction of the laryngeal cartilage, have also been reported, with successful outcomes.[10]

Some complications were common to these studies. Cricothyropexy disruption was noted in three papers and cosmetic problems related to scarring were also described. Revision surgery was universally unsuccessful.

It is becoming apparent in the field of sex reassignment surgery (SRS) that subjective criteria may provide a more useful measure of success than objective measures. Kuiper and Cohen-Kettenis were of the opinion '…that an evaluation of SRS can only be made on the basis of subjective data, because SRS is intended to solve a problem that cannot be determined objectively'.[11] To date, there appears to be little information relating to the subjective success of voice therapy and/or surgery in transgender patients. The majority of published studies have concentrated on changes in fundamental frequency as a measure of success. However, these studies have taken little account of either the patient's or voice therapist's opinion on the success of treatment. As the main aim of treatment is to help the patient achieve the voice that they feel reflects the person they are, the most important outcome measure should, therefore, be patient satisfaction.

With regards to outcome predictors for the success of gender reassignment, a number of factors have been identified. Increased patient satisfaction has been reported in patients younger than 30 years at initiation of treatment and in those with gender nonconformity in childhood.[12] Conversely, an increased likelihood of dissatisfaction has been reported with older age and late onset of desire for SRS,[11] previous marriage and biological parenthood (Muir-Allwood *et al.* 1999, personal communication).[13] Identifying patients who are likely to respond well to voice therapy or surgery early on in their management would enable refining of techniques and realistic expectation of achievable outcomes.

In 2005, Lee *et al*. evaluated the reliability and validity of dysphonic patients rating their own voice quality.[13] They found that patients had a reliable and valid perception of their own voice quality when assessed using the GRBAS scale–'The GRBAS scale is used for evaluating hoarseness on five scales–grade (degree of voice abnormality), roughness, breathness, asthenic (weakness) and strained.' Naive listeners also perceive the normal voice reliably. However, patient–clinician inter-rater reliability appeared to be no better than chance.

It is important that the voice of the transgender patient is appropriate to their perceived gender. Achieving an acceptable F_0 is undoubtedly necessary, but may not be as relevant with regards to patient satisfaction as the patient's subjective opinion of their voice.

The future of transgender voice management

There is little existing demographic data on transgender patients in the United Kingdom. Currently, research is being carried out into voice therapy in such patients, with the aim of establishing relationships between certain demographic features and outcome measures. As some of the above studies demonstrate, success as measured by a change in fundamental frequency may not reflect patient satisfaction with their voice. Assessment of patient satisfaction and quality of life may allow the identification of scenarios in which voice therapy can be more successfully directed. Finally, patients' and treating voice professionals' perceptions of the success of voice therapy or surgery need to be analysed more formally. This will ensure that treatment is directed towards providing a healthy voice with a satisfactory outcome for the patient.

References

1 Van Borsel J, De Cuypere G, Van den Berghe H. Physical appearance and voice in male-to-female transsexuals. *J Voice* 2001;**15**:570–5
2 Soderpalm E, Larsson A, Almquist SA. Evaluation of a consecutive group of transsexual individuals referred for vocal intervention in the west of Sweden. *Log Phon Vocol* 2004;**29**:18–30
3 Brown M, Perry A, Cheeseman AD, Pring T. Pitch change in male-to-female transsexuals: has phonosurgery a role to play? *Int J Lang Comm Dis* 2000;**35**:129–36
4 Kanagalingham J, Georgalas C, Wood G, Ahluwalla S, Sandhu G, Cheeseman A. Cricothyroid approximation and subluxation in 21 male-to-female transsexuals. *Laryngoscope* 2005;**115**:611–18
5 Yang CY, Palmer AD, Murray KD, Meltzer TR, Cohen JI. Cricothyroid approximation to elevate vocal pitch in male-to-female transsexuals: results of surgery. *Ann Otol Rhinol Laryngol* 2002;**111**:477–85
6 Neumann K, Welzel C. The importance of the voice in male-to-female transsexualism. *J Voice* 2004;**18**:153–67
7 Pickuth D, Brandt S, Neumann K, Berghaus A, Spielman R, Heywang-Kobrunner S. Spiral computed tomography before and after cricothyroid approximation. *Clin Otol All Sci* 2000;**25**:311–14
8 Wagner I, Fugain C, Monneron-Girard L, Cordier B, Chabolle F. Pitch-raising surgery in fourteen male-to-female transsexuals. *Laryngoscope* 2003;**113**:1157–65
9 Matai V, Cheeseman AD, Clarke PM. Cricothyroid approximation and thyroid chondroplasty: a patient survey. *Otol Head Neck Surg* 2003;**128**:841–7
10 Kunachak K, Prakunhungsit K, Sujjalak K. Thyroid cartilage and vocal fold reduction: a new phonosurgical method for male-to-female transsexuals. *Ann Otol Rhinol Laryngol* 2000;**109**:1082–6
11 Kuiper B, Cohen-Kettenis PT. Sex reassignment surgery: a study of 141 Dutch transsexuals. *Arch Sex Behav* 1988;**17**: 439–57
12 Rubin SO. Sex reassignment surgery male to female. *Scand J Urol Nephrol Suppl* 1993;**154**:1–28
13 Lee M, Drinnan M, Carding P. The reliability and validity of patient self-rating of their own voice quality. *Clin Otol* 2005;**30**:357–61

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