Voice therapy and dentistry

Peter Variey BDS, FDS RCS, DDFHom is chairman of the British Homeopath/c Dental Association and a holistic dental practitioner in central London.

Angela Caine LRAM, AGSM has lectured internationally on voice therapy and Is a member of the Cranio Group, an organisation for the study of cranio-mandibular disorders. Angela runs The Voice and Body Centre in Southampton.

CONTINUING HIS SERIES ON COMPLEMENTARY THERAPIES, PETER VARLEY JOINS WITH ANGELA CAINE TO INVESTIGATE THE WAY IN WHICH VOICE EXERCISES CAN BE USED TO SUPPLEMENT DENTAL TREATMENT

it is unlikely that most dentists have considered the voice to be within the realm of dental treatment, and it is even more unlikely that someone who sings out of tune or suffers recurring voice loss would think of consulting a dentist. But there is a significant relationship between temporomandibular dysfunction and voice dysfunction (Amorino and Taddey, 1993). Many of the ligaments and muscles responsible for voice production also move the jaw.

It is important that dentists understand the connections between voice and musculo-skeletal dysfunction. They should recognise dentally related voice problems and when undertaking dental procedures should not interfere with the patient's vocal skills. A treatment plan that considers voice function may provide the means to access what every clinician aims to work with – the patient's own self-righting mechanism.

Within dental practice the voice can be used as:

- A diagnostic tool for balanced posture
- A tool to prevent orthodontic regression
- A developmental tool for posture
- A developmental tool for growth of the dentition.

It is generally believed that some people are born with a 'good' voice. This is thought to be coincidental and to run in the family. The voice can only be used in assessment and diagnosis, however, if we step away from this concept.

Muscle spasm in the supra hyoid system can limit vocal pitch, and interfere with articulation and resonance, resulting in a seriously 'out of tune' voice. Similarly, in a pelvic distortion as defined by chiropractors, compensatory muscle spasm can be expected in the sterno-cleido-mastoid and the supra hyoid systems.

This voice will only improve when the dental and skeletal clinicians discover a combined order of treatment which releases the spasm in both the supra hyoids and the psoas/iliac systems.

Everyone has the physical means to talk and sing. It is not because the organ of phonation is missing that people cannot sing, but that the natural inborn facility is being obstructed or interfered with potential for sophisticated articulation of language and pitch, in speech and singing, is responsible for all significant modifications to the head and neck over the last 500,000 years.

The vocal model to consider as a diagnostic tool is based on the biomechanics of all functions of the larynx, acknowledging that its primary function is to breathe.

The primary functions of the larynx are:

- Breathing (inspiration and expiration)
- Swallowing
- Effort closure (bracing in physical strength)
- Phonation (singing and speech).

Breathing, swallowing and physical strength are already part of an assessment and diagnosis of musculoskeletal

Figure 1: The connection *between structural* problems and voice *problems can* be traced in stammerers

Stammering

- If a stammer is observed the dentist can assume there will be particular problems of skeletal misalignment and function.
- Where speech problems exist, the child needs to be recommended not just for orthodontic treatment, but cranial correction as well.

Caine A, Cardew E, Stimson N. Structural Predispositions in the Etiology of Stammering. *Proc IFA World Congress on Fluency Disorders.* Munich, August 1994.

Structural Dysfunction

Voice function can be affected by dysfunction in any of the structures which provide attachment for the extrinsic laryngeal frame such as:

- Malocclusion of the teeth.
- Lack of molar support.
- Tongue thrust.
- Temporo-mandibular joint dysfunction.
- Cranial torque.

Figure 2: Dental conditions can have knock-on effects for the voice

efficiency The following issues appear regularly on Introductory questionnaires for patients: 'Is the patient a mouth breather or a nose breather?' and 'Is there a natural swallow, or a deviate swallow?' Applied kinesiology is used to test the strength of different muscular pathways by resisting force (see ***Dentistry Monthly,*** April 1998 page 12). This indirectly tests the efficiency of effort closure. If three out of four laryngeal functions affect and are affected by musculoskeletal dysfunction, it would appear illogical that the fourth function is independent of it.

FACIAL MUSCLES

Breathing. speech. singing, chewing and swallowing all move the face. but the primary function of the face musculature is nose breathmg. If the face and tongue muscles are developed with this priority of nose breathing. then facial muscle balance will also develop naturally for speech, chewing, swallowing, facial expression and. as a result of this. beauty.

TONGUE POSTURE

As Garliner (1974) has shown. tongue posture is central to both nose breathing and facial balance. There are two basic postures of the tongue:

. Suspended against the back of the hard palate

. Lying in the floor of the mouth against the lower teeth.

These divide the facial muscles into two groups. Group A facial muscles are associated with a backward position of the tongue against the hard palate and nasal breathing. These muscles radiate from the centre of the face. Group B facial muscles are associated with a forward positioning of the tongue in the floor of the mouth and the chewing of food, and act in the vertical plane to chew. They originate in bone and insert into bone, and they have more bulk and less delicacy than group A.

THE EXTRINSIC FRAME

The extrinsic muscles of the larynx function as a coordinated system of strap muscles. The extrinsic frame supports and stabilises the hyoid bone, and through it, acts to balance and coordinate any movement of the vocal tract which is in opposition to movement of the mandible and of the head and neck. The extrinsic frame is connected to bony attachments on the mandible, the scapula, the sternum and the cranium. An active pathway can be traced from the vocal fold to these bony attachments.

THE ALEXANDER TECHNIQUE

Evidence for the influence of the extrinsic frame on voice function comes from a variety of disciplines. FM Alexander (1932) discovered that the relationship of his head and neck affected his voice. He went on to improve his voice and his whole quality of life by attending to the balance of the head at the atlanto-occipital joint, and from that developed the Alexander Technique. He probably made the first connection between skeletal structure and laryngeal function Various studies (Sonninen, 1968; Zenker and Zenker, 1960) have proposed that 'the strap muscles (the extrinsic frame of the larynx) also assist in regulating the tension in the vocal folds'.

STAMMERING

Further connections between structure and voice did not appear again until Caine et al (1994) examined 36 stammerers and found that they all had severe structural problems. Any successful treatment plan for stammering must include assessment for structural correction as well as help with changes of attitude and self image. If a stammer is observed the dentist can assume there will be particular problems of skeletal misalignment and function.

STRUCTURAL DYSFUNCTION

Many distinguished clinicians (Selye, 1974; Gelb, 1985; Fonder, 1990; Rocabado, 1991) have linked structural dysfunction with collapse of the posture of the cervical vertebrae and the concomitant problems of forward head posture, forward shoulder posture, collapsed tongue and facial muscle function.

Voice function can be affected by dysfunction in any of the structures which provide attachment for the extrinsic laryngeal frame. such as:

. Malocclusion of the teeth
. Lack of molar support
. Tongue thrust
. Temporomandibular joint dysfunction
. Cranial torque.

If the voice is used as a diagnostic tool, potential pathological systems affecting laryngeal function can be diagnosed and maintained in a healthy state by preventive clinical treatment. These systems include:

. Temporomandibular joint function
. Cranial torque
. Postural balance
. Breathing
. Swallowing
. Eustachian tube evacuation
. Facial function
. Tongue posture
. Coordination
. Potential voice skills.

THE VOICE IN ASSESSMENT

Dentistry is generally considered to be mechanical and devoid of self-expression. Singing, on the other hand, is

Figure 3: Fun exercises can reprogramme muscles such as the tongue

The Voice as a Tool to Reprogramme Muscles

- As the extrinsic frame realigns with correction of the cranium or mandible.
- The hyoid bone will be released and its excursion extended.
- The voice will then respond better to the rhythm of singing and language patterns.

Figure 4a: Learning how to balance

Figure 4b: Nose breathing with **the mouth** *open to reposition the tongue*

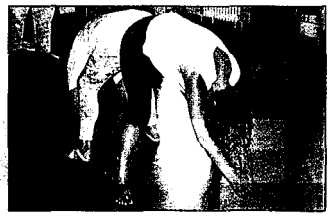

Figure 4c: Reciting **arid** *sInging upside down to stretch mandibular ligaments and reduce overbreathing*

Figure 4d: Shouting AAGH! while punching the ceiling to reposition the hyoid and tongue and increase **excursion of the larynx**

seen as a means of self-expression and nothing to do with mechanics! Dentists must encourage their patient to sing, using whatever guile they may and if necessary, enlisting the help of other members of staff. When the patient does sing it is easy to see the following problems if they exist:

. The tongue flat in the mouth for 'EE' and 'EH' vowels
. The cheeks shaping the vowels '00' and 'OH'
. Tongue and jaw functioning together
. Priority for facial muscle group B
. A deviating mandible
. Limited excursion of the mandible
. Postural instability.

Other problems can easily be heard:

. Sharp intakes of breath
. A shrill, high pitched voice
. Articulation problems – a stammer, hesitation, difficulty with some sounds.

BALANCE BOARD

A balance board exposes our natural ability to cope with being upright in a situation which changes moment by moment. When the patient combines balancing with reading a poem or singing, this moment by moment coordination exposes any inefficiency of the extrinsic frame.

THE VOICE AS A TOOL TO REPROGRAMME MUSCLES

Reprogramming would involve singing and reciting while using body balls, therabands and balance boards to introduce rhythm and stretch into the body and into the whole vocaiirespiratory tract. The tongue can be repositioned by reading and singing in dialect and foreign languages and by learning to understand recognise and use facial muscle group A. All this can be made fun, as well as giving the patient a measure of control in the treatment.

VOICE AND BODY EXERCISES

Caine (1993) has developed a programme of exercises for voice and body to correct tongue thrust (Figure 4a-f) A natural tongue position is one in which sufficient permanent tone is maintained on the styloglossus muscle to allow all vowels to be articulated in the pharynx, and nose breathing to be maintained as a fundamental system. Mouth breathing should always be a supplementary system.

Many dentists and orthodontists only class a tongue protruding between the teeth as 'tongue thrust'. A tongue which is not striking the maxilla with its total width or which articulates generally forward of the alveolar ridge will allow relapse of good functional orthodontic work.

The patient is given exercises which use the voice and body together, maybe using equipment such as a physio ball or a balance board. This encourages the patient to take responsibility for bringing about his or her own share of musculoskeletal correction and opens a dialogue with the clinician for reporting and discussing progress.

CONCLUSION

Parents need to be made aware of the connections between voice, posture and developing dentition. They can then encourage activities in which the voice and body act together to develop good tongue posture, an expansive palate and a dentition that naturally occludes. They also need to be made aware of the importance of singing throughout school life, and especially singing with the tongue suspended where it can spring backwards as well as forwards. Nose breathing efficiency and facial muscle balance will then be encouraged.

A balanced tongue that articulates against a fully developed palate, which it has shaped for such a purpose between the ages of two to six, facilitates efficient nose breathing and good vocal mechanics for life, if the nusculoskeletal system naintains its symmetry.

We must come to accept hat the mandible is undergoing a change in unction. It is no longer Iesigned for chewing, but to support a system of sophisticated articulated speech Speech has, during the ast 500,000 years, superseded chewing Simpson (1968) states: 'Language has become far more than a means of communication in man. It is also one of the principal means of thought, memory problem solving and other nental activities.'

Crelin (1987) argues that: Ultimately, articulate speech ed to a complicated spoken and written language, abstract hought, the fifth symphony and the theory of relativity.' If his view of evolutionary progress is acceptable, it would indicate that any

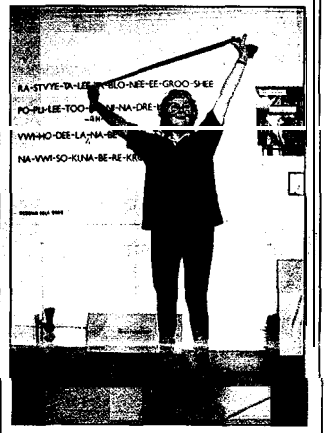

figure 4e: Reprogramming **upright** *posture after structural realignment*

Figure 4f: Knocking **out** *masseter and encouraging anterior temporal/s to stabilise* **the** *TMJ for speech and* **singing**

orthodontic treatment should take account of the long term effects on the voice.

The value of a beautiful smile is somewhat lost if the voice or temporomandibular joint are affected through the early extraction of teeth for overcrowding. On the other hand, if a system as powerful as the voice exists within the musculoskeletal structure of the head and neck, it seems sensible to access that power for development, corrective treatment and subsequent stability of that structure. ■

REFERENCES

Alexander FM (1932) *The Use of the Self* 1988 edition, Victor Gollanz, London

Amorino S, Taddey JJ (1993) Temporo mandibular Disorders and the Singing Voice. *The National Association of Singing Teachers Journal* 50(1): 3-14

Caine A (1993) Lost Your Tongue: a Voice and Body Exercise Programme with Audio Tapes to Reposition the Tongue. *The Voice Workshop,* Southampton

Caine A (I998) Voice loss in performers: a pilot treatment programme to test the effect on the voice of correcting structural misalignment. *Logopedics, Phoniatrics and Vocology 23:* (in press)

Caine A, Cardew E and Stimson N (1994) Structural Predispositions in the Etiology of Stammering. Proc. IFA World Congress on Fluency Disorders August

Grelin ES (1987) *The Human Vocal Tract, Anatomy, Development and Evolution.* Vantage Press, Atlanta

Fonder AC (1990) Dental Distress Syndrome. Medical-Dental Arts, Rock Falls, Illinois

Garliner D (1974) *Myofunctional THerapy in Dental Practice* 3rd edition. Coral Gables, Florida

Gelb H (1985) *Clinical Management of Head Neck and TMJ Pain and Dysfuction* 2nd edition. WB Saunders & Co, Philadelphia

Rocabado M and Annette Z (1991) *Musculoskeletal Approach to Maxillofacial Pain.* Lippincott, Philadelphia

Selye H (1974) *Stress without Distress.* Lippincott, New York

Simpson GG (1968) The biological nature of man. In: Washbume SL, Jaye PC, eds. *Perspective on Human Evolution.* Rinehart and Winston, New York

Sonninen A (1968) The External Frame Function in the Control of Pitch in the Human Voice. *Ann NY Acad. of Sci* 155: 68-90

Zenker W and Zenker A (1960) Uber d Regelung der Stimmlippenanspannun durch von Aussem Eingreifende Mechanismen (On the Regulation of the Vocal Folds through the Extrinsic Suspension Mechanism). *Folia Phoniatrica 12:* l-36

Peter Varley is the editor of *Complementary Therapies in Dental Practice.* Copies of the book can be obtained by sending a cheque for £27 (inc p&p) to: Peter Varley, Poland Street Dental Practice. 30 Poland Street. London W1V 3DA

In the final article in the complementary therapy series Stuart Ferraris will summarise the unique aspects of running a holistic practice