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Editorial Review

The role of the speech and language therapist in voice restoration after laryngectomy

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Introduction

The method(s) of speech rehabilitation used after total laryngectomy should, most clinicians* would agree, be the informed choice of the patient himself/herself. However, how is that choice to be made if the clinician who is advising the patient is ill-informed and/or has a bias towards only one method of rehabilitation? How do these biases arise and what influences their continuance?

Before the development of surgical-prosthetic forms of speech restoration, many practising surgeons and speech therapists had strongly expressed biases towards oesophageal speech as the 'chosen mode of communication' post-laryngectomy, despite evidence that only approximately 30 per cent laryngectomees (Lauder, 1969; Salmon, 1979; Kawasaki *et al.*, 1983) had the necessary pre-requisites to acquire such skills.

Grunwell (1983) described therapeutic intervention as consisting of three levels: premises, principles and procedures. Premises, it is stated, are 'primary, in that they state the fundamental theoretical framework underlying a therapeutic approach; it is from premises that a strategy of intervention is derived'.

In applying this model to laryngectomy, during the 70s the (false) premise underlying much of the teaching in this field of laryngectomy rehabilitation was that 'all laryngectomees . . . could develop oseophageal speech'.

Among the number of (false) principles which necessarily followed this was: firstly, that artificial larynges 'hindered' the development of this goal and should only be considered as a last resort. Secondly, it was held true that any laryngectomee who practised 'hard enough' would achieve oesophageal speech. Thirdly, there was a tendency to assume that psychological factors were the paramount reason for failure to achieve oesophageal speech. Consequently, clinicians at this time were reluctant to examine anatomical/physiological barriers to speech acquisition and failed to perceive that psychological problems often masked underlying anatomical/physiological problems.

Much misery and frustration existed during these years, for both the patient (who often felt overly-responsible for his own 'failure') and therapist (who felt inadequate when the patient did not succeed in speaking). Only the surgeons seemed oblivious to this unhappy state of affairs. However, during that period, the emphasis was on the surgeon to 'cure' the patient of his cancer, and there was little feeling of responsibility for subsequent rehabilitation at this time: this, after all, was the job of the speech and language therapist!

Surgical voice restoration

Surgical voice restoration (SVR) after total laryngectomy is not a new idea. Indeed, it has been attempted since the time of Billroth (1873) and the interested reader is directed to the excellent review by Edwards of historical attempts at surgical voice restoration in Edels (1983).

It was not until Singer and Blom in 1979 incorporated into a surgically-created tracheo-oesophageal fistula a small, unobtrusive and relatively inexpensive silicon voice prosthesis that the modern era of surgical-prosthetic voice restoration began. It was, curiously, this development of the Blom-Singer (tracheo-oesophageal 'puncture' or TEP) procedure which also led to the questioning of hitherto firmly-held beliefs that oesophageal speech was achievable for all laryngectomees.

The reason for research by speech therapists and surgeons into good functional outcomes after laryngectomy is easy to understand: briefly, the surgical/prosthetic approach to voice restoration seemed an ideal option: why, then, did it not work for all patients? Some patients, with apparently good potential, did not succeed with TEP, despite developments in improved design of prostheses (Blom *et al.*, 1982; Blom, 1988).

Speech therapists began to examine the pre-requisites for voice restoration (Edels, 1983). Table I simplifies this.

It can be seen in Table I (after Edels) that, although the TEP procedure offers a step nearer 'normal' – i.e. laryngeal speech, as the lungs are once more connected to form the driving source for voice,

*For ease of style, I have used 'clinicians' throughout this text to apply to both ENT surgeons and speech and language therapists.

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TABLE I
A COMPARISON OF LARYNGEAL, OESOPHAGEAL AND TRACHEO-OESOPHAGEAL VOICE

Physical requirements	Laryngeal voice	Oesophageal voice	Tracheo-oesophageal voice
1. Initiator	Moving column of air fom the lungs	Moving column of air from the oesophagus	Moving column of air from the lungs
2. Vibrator	Vocal folds	Pharyngo-oesophageal segment	Pharyngo-oesophageal segment
3. Resonator	Vocal tract, i.e. pharynx, nose and mouth	Vocal tract, i.e. pharynx, nose and mouth	Vocal tract, i.e. pharynx, nose and mouth
4. Articulators	Tongue, teeth, lips, soft palate	Tongue, teeth, lips, soft palate	Tongue, teeth, lips, soft palate

giving louder voice and speech of longer duration, the vibratory source (vocal folds) cannot be replaced, and there is, therefore, a continued need for a viable P-E segment to vibrate and produce voice, as with oesophageal speech.

The P-E segment is not synonymous with the cricopharyngeus muscle. Rather, the P-E segment has long been known to consist of a blend of the inferior constrictor and cricopharyngeus muscles together with the upper portion of the oesophagus (Deidrich, 1968; Zwitman, 1979). This sphincter acts as a neo-glottis or new vibratory source for voice post-laryngectomy and had been recorded as such (Damste, 1958; Decroix *et al.*, 1958; Diedrich, 1968) but descriptions in the literature until the 1980s had focused on the importance of the site and length of the segment (Benzen *et al.*, 1976; Novak *et al.*, 1982), rather than the tonicity therein.

Research work at Charing Cross Hospital, London, through the 1980s (Perry and Edels, 1985; Cheesman *et al.*, 1986; Perry *et al.*, 1987; McIvor *et al.*, 1990) showed conclusively the influence of P-E segment tonicity on the outcome of speech success after total laryngectomy and, specifically, the influence of surgical procedures on the acquisition of voice. This work was replicated and validated in Holland and in the USA (Mahieu *et al.*, 1987; Mahieu, 1988; Baugh *et al.*, 1987).

By 1989, the paramount importance of surgical reconstruction to speech outcome, after total laryngectomy, had been conclusively demonstrated (Perry, unpublished PhD thesis) and Cheesman *et al.* (1987) was the first ENT surgeon in the UK to publicly articulate a belief that 'the surgeon has a responsibility, not just to remove the (patient's) cancer, but to ensure the optimum surgical results for rehabilitation of speech'.

Optimum surgery

By the mid-1990s, with many papers reiterating the importance of creating optimum P-E segment tonicity for speech, the optimum or 'gold standard' surgical techniques necessary for speech restoration (whether oesophageal and/or TEP) were well-established. The problem of creating the physiological, rather than anatomical, pre-requisites for speech after laryngectomy seemed 'solved'. The guideposts had been given to surgeons . . . but were they ready to listen and adopt these?

There are still a number of surgeons who think in terms of form, rather than function (i.e. anatomically rather than physiologically), when operating on laryngectomy subjects. These same surgeons have reported that they have 'tried surgical speech restoration . . . and (it) doesn't work'. Often the vocally 'failed' patients from these centres present for assessment for (secondary) surgical voice restoration and are seen, on videofluoroscopy, not to have the tonicity in the P-E segment which is a necessary precursor to TEP speech (see Table I). They then need secondary surgery (usually in the form of inferior constrictor myotomy to relieve P-E segment hypertonicity as well as a secondary TEP).

At the time of initial laryngectomy, it has been shown conclusively that the combination of pharyngeal constrictor myotomy together with primary tracheo-oesophageal 'puncture' for rapid voice restoration offers the optimum mode of alaryngeal speech (Singer and Blom, 1981; Hamaker *et al.*, 1985; Blom and Hamaker, 1996). This practice does not de-bar the laryngectomee from using oesophageal speech nor artificial larynx speech; it simply opens another communication option.

Yet, there are still clinicians who are confused about the pre-requisites for post-laryngectomy speech and, in these days when the NHS is being driven by evidence-based practice, it is perhaps worrying that these well-founded principles are not always understood or, if understood, are not always followed.

It is possible, even in patients who have undergone myotomy at the time of initial laryngectomy, if speech is not developed immediately post-laryngectomy, for spasm to re-develop. The upper circular fibres of the oesophagus may re-form and inferior constrictor muscle spasm develops – almost as if the initial myotomy has not occurred. The natural tendency of the 'normal' (i.e. non-laryngectomized) upper sphincter to constrict when air entered the upper oesophagus was noted by Weinberg and Moon (1985) who suggested that the myotomy was creating an 'abnormality' in the P-E segment if this resting tone was altered.

In Europe, the European Study Group on Functional Outcomes after Laryngectomy (EGFL) was formed in 1990 and the objective of this group has been to evaluate and study 'best practice' in laryngeal cancer treatments, looking at functional outcomes from eight different centres in Europe. This large scale, three year-funded, project has been supported by a generous BIOMED (European Union (EU) grant since 1994.

Researchers in France, Italy, Spain, UK and Netherlands are currently involved in data collection and compilation and the results of this may be ready for publication in 1997. The initial study is to prospectively assess speech, voice and psychological recovery in all laryngeal cancer patients treated at participating centres, who have undergone total, near-total and partial laryngectomy, with and without adjunctive radiotherapy.

Already from this study, it is evident that many practices which are vehemently defended in different countries on the basis of 'science' in fact offer no better outcomes of mortality, and the morbidity in terms of speech and swallowing may be unacceptable. It may well be that differences in treatment modalities are, therefore, influenced much more by cultural bias (Payer, 1986) rather than being influenced by research and objective data.

Psychological/social impact

It is certainly true that many laryngectomees may present with psychological and social problems, but many of these problems may be reactive and be explained by the process which these people have undergone.

Currently, work is being directed towards examining the psycho-social impact of treatments for laryngeal cancer and the effect of expectancy value on outcome for patients. In taking a qualitative methodological approach, the study, which is part of the BIOMED project, is assessing the beliefs and evaluations of a large group of post-laryngectomy subjects by extensive interview, transcription of their discourse(s) and then 'mapping' the recurring themes, attitudes and beliefs in this population. It is hoped from this work that, once themes are evaluated, then explicit, directed, counselling and therapy may be used (possibly pre-intervention) to target beliefs and change attitudes; hopefully this will gain better psycho-social outcomes.

Outcome measures

Enderby (1992) has written extensively on measuring and relating outcome to health care provision, specifically in speech and language therapy. Hitherto, most emphasis has been placed on the somewhat limited medical model of illness, which presents disease and its process in terms of aetiology, pathology and manifestation (Badley *et al.*, 1979).

A more helpful model, specifically in laryngectomy rehabilitation, might consider the sequence underlying health phenomena; this model defines the relationship between impairment, disability and handicap (ICIDH-WHO, 1980).

Impairments are concerned with loss or abnormality of anatomical, physiological or psychological structures or functions resulting from any cause.
Disabilities reflect the consequences of impairments in terms of functional performance or activity levels by the individual, and represent disturbances at a personal level.

Handicaps are concerned with the disadvantages experienced by the individual as a result of impairments and disabilities. Such handicaps reflect interaction with, and adaptation to, the individual's surroundings. Therefore, handicaps can only be classified in terms of the circumstances in which disabled people find themselves in relation to peers and society, and not according to the individual alone (Enderby, 1992).

A fourth dimension might be added to this: *distress*. A global model was developed (Rosser and Watts, 1972) which looked at outcome of patients using the dimensions of disability and distress. This model was primarily used to survey large groups of surgical patients but this dimension of distress was rightly identified as having a key role in health care. In applying this model to laryngectomy, it can be seen that there is no linear relationship; e.g. a person may be impaired, but not handicapped, as in the case of a fluent oesophageal speaker who has a profound impairment (removal of the larynx) but no disability. The degree to which he is handicapped will depend on his working environment, family and peer group.

In measuring change as a result of intervention, whether surgical or therapeutic, there may be a benefit in defining rehabilitation goals in terms of impairment, disability, handicap and distress. The goal for treatment of an individual would be clarified by looking at how much change one would predict, using a severity rating score for each of these aspects. In this way, it can be seen that change in impairment might not mean change in disability nor handicap. Thus, eventual patient outcome may not be directly related to degree of impairment.

In real terms, this might mean that *less* concern, surgically, is directed towards minimizing the impairment (e.g. undertaking partial or near-total, instead of total laryngectomy) and *more* towards minimizing the disability (for example, by use of primary TEP as a mode of vocal rehabilitation) and in then harnessing the resources of the impaired individuals to attain a satisfactory life by realizing achievable goals. Thus, we begin to think in terms of ultimate function, rather than just form: physiologically, rather than anatomically.

This proposal may seem self-evident, but we are in danger of doctrinaire approaches and 'blanket' beliefs. In health care, there are phases and vogues almost in every field, but if I had one wish it would be that we could all, at last, think, more broadly and searchingly, to achieve best functional outcomes in terms of speech, swallowing and improved life-quality for each individual laryngeal cancer patient.

I hope in this review to have provoked some considerations and thoughts. My comments in this Editorial may be seen to be harsh, but I believe most strongly that we need to challenge health paradigms, and recognize them as such, rather than accept them as 'truths'. I would welcome other views on this.

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