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MEDIALIZATION THYROPLASTY FOR SURGICAL TREATMENT OF UNILATERAL VOCAL FOLD PARALYSIS

Thesis

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To My Family

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INTRODUCTION

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Dysphonias resulting from incomplete glottic closure or inadequate vocal fold tension are eligible for phonosurgical correction. Many different phonosurgical techniques have been used for these indications[1-4].

A still frequently applied method to achieve medialization in cases of incomplete glottic closure is the endolaryngeal injection of soluble substances, such as teflon, silicon, or collagen and more recently autologous fat. Such treatments with injectable substances are quick and apparently simple procedure, however they are associated with considerable disadvantages and risks [5-11].

1. The mass, volume, and stiffness of the injected vocal fold is influenced by the injected substances. Such changes in vocal fold mass, volume, and stiffness negatively influences the vibratory properties of the vocal fold, which can result in a poor voice.
2. Distribution of the injected substance is difficult to control. The substance will spread according to the path of least resistance, rather than to the area requiring augmentation.
3. The treatment is irreversible. Overinjection is difficult to correct and generally requires partial resection of the vocal fold resulting in severe dysphonia.
4. If performed under general anesthesia, as many endolaryngeal injection procedures are, voice monitoring during the procedure is not possible. Consequently it is difficult to estimate the proper amount of substance to be injected.

5. Some materials (collagen, fat) are subject to partial absorption so that initial overcorrection is required and repeated injections may be necessary. Other materials (silicon, teflon) are known to have a tendency towards migration, which may also require repeated injection.
6. Often vocal fold palsy is associated with a level difference of both vocal folds (vertical shift), which may be difficult to detect. During video-stroposcopic examiantion, special attension is required to detect asymmetry in the level of the vocal folds and the position of the vocal processes. Such a level difference usually cannot be corrected by vocal fold injection.
7. Last but not least, a considerable number of complications and local tissue reactions attributable to the injected substances have been published. The injection of autologous fat seems to present less complications[12].

Laryngeal framework surgical techniques are therefore rapidly gaining popularity as treatment of choice for dysphonias resulting from incomplete glottic closure or inadequate vocal fold tension[13,14]. The main reason for this increasing popularity is the physiological concept on which laryngeal framework surgical correction is based, which is demonstrated by the fact that the voice could be monitored during the surgical procedure in order to obtain the optimal result[15]. Although some types of laryngeal framework surgery had already been suggested decades ago[16-18], the concept remained fragmentary until Isshiki modified some of these procedures, introduced some others and integrated them all into the functionally oriented set of phonosurgical techniques which is available to us today.[19-25]

Two different categories of laryngeal framework surgeries can be distinguished [25].

1) With the objective to correct incomplete glottic closure by medialization of one or both vocal folds.
2) With the objective to adjust the tension of one or both vocal folds.

Sometimes a single modality laryngeal framework surgical technique sufficiently improves the voice, but often a better voice can be obtained by combining different techniques in one stage. This is not always predictable Pre-operatively, so that voice and functional fiberoptic endolaryngeal monitoring are essential during the procedure, not only to determine the required degree of medialization and exchange of vocal fold tension, but also to decide whether or not to continue with a combination of other laryngeal surgical procedures. Such combination usually includes medialization largngoplasty together with arytenoid adduction which is used when there is a wide posterior glottic chink or there is a level difference between the two folds[26,27]. To enable this monitoring, the laryngeal framework surgical techniques are performed under local anesthesia [1,15].

Tucker et al.[27-29] have suggested a reinnervation procedure (nerve-muscle pedicle) in addition to medialization laryngeal framework surgery, however Pre-operative laryngeal EMG-studies showed that most of the "unilateral laryngeal palsy" patients do not have a lack of innervation of the laryngeal musculature, but they have an inappropriate reinnervation leading to synkinesia, tension dysbalance and sometimes even a tendency towards paradoxal laryngeal mobility[30]. Since hyperinnervation of an, albeit subclinicaly, innervated muscle is physiologically impossible, the

effectiveness of these additional reinnervation procedures is questionable[31-33].

Several surgical procedures other than laryngeal framework technique have been described to modify the tension of the vocal folds, usually aimed at elevation of the vocal pitch[34]. Some authors advocate the creation of a web in the anterior commissure to elevate vocal pitch. The general idea of this procedure is that the length over which the vocal folds can vibrate is reduced. By reducing the vibratory length of the vocal folds and increasing the tension of the vocal folds by scar formation, the pitch will rise. It however proves difficult to control the length over which the vocal folds will form a web[35,36]. Furthermore mass reduction of the vocal folds by CO_2 laser vaporization, corticosteroid injection and scarification of the vocal fold mucosa have been described as methods to raise the vocal fold pitch. Clearly all of these procedures will have more or less severe negative consequences on voice quality [1].

In most cases vocal pitch elevation can safely be achieved by cricothyroid approximation, sometimes in combination with an anterior commissure advancement [1].