

Protocol of Articulation Between Otorhinolaryngology and Speech Therapy in the Pre and Postoperative of Laryngeal Phonotraumatic Pathology

Protocolo de Articulação entre Otorrinolaringologia e Terapia da Fala no Pré- e Pós-Operatório de Patologia Laríngea Fonotraumática

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ABSTRACT

Introduction: The association of speech therapy (ST) with phonosurgery can improve vocal quality. Preoperative ST enhances treatment adherence and addresses factors contributing to vocal fold injury. Postoperative ST promotes healing and helps manage potential compensatory muscle tension.

Methods: Development of an intervention protocol between Otorhinolaryngology (ORL) and ST in the pre and postoperative management of phonotraumatic laryngeal pathology, based on a literature review and the experience of a Tertiary Hospital.

Results: The ORL assessment includes clinical history and audioperceptive evaluation - pitch, loudness and GR-BAS (Grade/Roughness/Breathiness/Asthenia/Strain) scale. Objective examination is complemented by videostroboscopy, assessing vocal fold vibration, mucosal wave propagation, and the presence of lesions or signs of supraglottic hyperfunction. In the preoperative ST consultation, the impact of dysphonia is assessed using the Voice Handicap Index-10; aerodynamic assessment - maximum phonation time and S/Z ratio - and acoustic analysis - fundamental frequency, jitter, shimmer, and harmonics-to-noise ratio - are also obtained. Patients receive vocal hygiene recommendations, semi-occluded vocal tract and relaxation exercises, and guidance on appropriate breathing techniques. Postoperatively, 3-5 days of voice rest are recommended, and patients are reassessed by ORL and ST. ORL repeats the audioperceptive assessment and videostroboscopy to assess healing. ST follow-up includes reinforcement of vocal hygiene recommendations, posture control exercises, postural and vibratory relaxation techniques, costodiaphragmatic breathing, and coordination of respiration and phonation.

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Conclusion: This protocol underscores the importance of coordinated ORL and ST intervention in the pre and postoperative periods to optimize surgical outcomes in patients with phonotraumatic laryngeal pathology.

KEYWORDS: Laryngeal Diseases; Postoperative Care; Preoperative Care; Vocal Cords; Voice Disorders; Voice Quality

RESUMO

Introdução: A associação da terapia da fala (TF) à fonocirurgia pode melhorar a qualidade vocal. A TF pré-operatória promove adesão terapêutica e corrige fatores promotores de lesão. A TF pós-operatória favorece a cicatrização e intervém numa eventual tensão muscular compensatória.

Métodos: Elaboração de um protocolo de intervenção por Otorrinolaringologia (ORL) e TF no pré e pós-operatório de patologia laríngea fonotraumática, baseado na revisão bibliográfica e experiência de um Hospital Terciário.

Resultados: ORL realiza a história clínica e avaliação audioperceptiva - *pitch*, *loudness* e escala GRBAS (*Grade/Roughness/Breathiness/Asthenia/Strain*). O exame objetivo é complementado pela videolaringoestroboscopia, onde se avaliam vibração das pregas vocais, progressão da onda mucosa, eventuais lesões ou sinais de hiperfunção supraglótica. Na consulta de TF pré-operatória analisa-se o impacto da disfonia com o *Voice Handicap Index-10*, realiza-se a avaliação aerodinâmica - tempo máximo de fonação e índice S/Z - e acústica - *frequência fundamental*, *jitter*, *shimmer* e *harmonics-to-noise ratio*. Transmitem-se recomendações de higiene vocal, exercícios do trato vocal semiocluido e relaxamento e técnicas respiratórias adequadas. No pós-operatório, recomendam-se 3-5 dias de repouso vocal, e o doente é reavaliado por ORL e TF. ORL repete a avaliação audioperceptiva e videolaringoestroboscopia para caracterizar a evolução cicatricial. Nas consultas de TF reforçam-se conselhos de higiene vocal, treinam-se exercícios de controlo postural, técnicas posturais e vibratórias de relaxamento, respiração costodiafragmática e coordenação respiração-fonação.

Conclusão: Este protocolo destaca a importância da articulação entre ORL e TF no pré- e pós-operatório para otimizar os resultados cirúrgicos na patologia laríngea fonotraumática.

PALAVRAS-CHAVE: Cordas Vocais; Cuidados Pós-Operatórios; Cuidados Pré-Operatórios; Distúrbios da Voz; Doenças Laríngeas; Qualidade da Voz

INTRODUCTION

Approximately 30% of the population will experience a voice disorder at some point in their lives, potentially leading to physical, emotional, and socioeconomic consequences.¹ Benign vocal fold lesions, often associated with behavioral factors, may result in dysphonia by disrupting regular vibration, limiting glottic closure, and increasing compensatory muscular tension. These changes can influence the perceptual and acoustic qualities of the voice, impair vocal function, and, in some cases, cause discomfort. Treatment may involve surgery, pharmacotherapy, speech therapy, or a combination thereof.²⁻⁴

Speech therapy (ST) plays a fundamental role in the rehabilitation of phonatory disorders, with the prognosis largely dependent on effective collaboration between Otorhinolaryngology (ORL) and ST. This mul-

tidisciplinary approach has an impact on vocal quality and quality of life and entails economic and professional implications.⁵ Several studies support the combination of pre and postoperative ST with phonomicrosurgery to optimize outcomes.^{2,5}

Preoperative ST may enhance therapeutic adherence and help address lesion-promoting behaviors. Postoperative ST, initiated after a brief period of vocal rest, aims to provide adequate mechanical stimulation during the early healing stages, supporting functional recovery; it may also help mitigate compensatory muscular tension that may arise postoperatively. A minimum of three days of vocal rest during the inflammatory phase of healing is often recommended to avoid further damage associated with oxidative stress, followed by controlled stimulation during the proliferative phase to support early vocal recovery.⁶

ST may be categorized as indirect or direct. Indirect therapy includes patient education regarding diagnosis, surgical procedure, expected recovery process, and contributing factors to vocal fold injury. It also encompasses vocal hygiene counseling aimed at vocal optimization, including vocal rest, adequate hydration, avoidance of coughing, reduced exposure to laryngeal irritants, and management of laryngopharyngeal reflux. Direct ST comprises exercises targeting respiration, phonation, and resonance, such as semi-occluded vocal tract exercises (to reduce glottal collision forces), relaxation techniques, respiratory training (with an emphasis on costodiaphragmatic breathing), resonance exercises, and vibratory techniques (to enhance vocal fold blood flow and mucosal vibration). These procedures must be individually tailored.²⁻⁴

Given the controversy regarding the integration of perioperative ST and phonosurgery, this study aims to propose a structured intervention protocol by ORL and ST for the pre and postoperative management of patients with laryngeal phonotraumatic pathology.

MATERIAL, METHODS & RESULTS

This protocol was based on a literature review and on the clinical experience acquired in the Voice Consultation of the Otorhinolaryngology Department of a Tertiary Hospital. The target population consisted of patients with phonotraumatic laryngeal pathology for whom phonosurgery was indicated. The protocol provided a structured and pragmatic description

of the preoperative assessment carried out jointly by ORL and ST, using validated and internationally recognized methods, as well as the postoperative follow-up performed by this multidisciplinary team.

PROTOCOL

Preoperative Assessment by Otorhinolaryngology

(Table 1): In the preoperative period, the Otorhinolaryngologist conducts a comprehensive clinical assessment. This includes the evaluation of symptoms such as dysphonia, vocal fatigue, globus sensation, odynophonia, choking, dysphagia, muscular tension and/or vocal tremor. The duration of symptoms and their impact on quality of life are also documented, particularly using validated questionnaires such as the Voice Handicap Index-10 (VHI-10). A detailed medical and surgical history is obtained, including current medications, any history of intubation and relevant comorbidities such as laryngopharyngeal reflux or other chronic conditions affecting vocal function. Additionally, alcohol and smoking habits, professional background, and vocal demands are explored to contextualize the vocal pathology. An audioperceptive assessment of voice^{7,8} is then carried out, focusing on pitch, loudness, and the GRBAS scale - Grade (G), Roughness (R), Breathiness (B), Asthenia (A) and Strain (S); each parameter is rated on a four-point scale: 0 (no deficit), 1 (mild), 2 (moderate), and 3 (severe). The objective examination includes anterior rhinoscopy, inspection of the oral cavity and oropharynx, and cervical palpation. Endoscopic evaluation, either rigid or flexible, is conducted to

TABLE 1. Preoperative assessment by Otorhinolaryngology and speech therapy

Preoperative assessment by Otorhinolaryngology	Preoperative assessment by speech therapy
Clinical history: symptoms, duration and impact on quality of life (VHI-10), medical-surgical history, profession, habits, vocal demands	Self-assessment: VHI-10 (Voice Handicap Index-10); "How do you feel about your voice today?"
Audioperceptive assessment of voice: pitch, loudness and GRBAS (Grade / Roughness / Breathiness / Asthenia / Strain) scale	Aerodynamic assessment: maximum phonation time (sustained vowels /a/ and /i/), S/Z ratio
Objective examination: anterior rhinoscopy, oral cavity, oropharynx and neck examination	Acoustic assessment: fundamental frequency (F0), Jitter, Shimmer, and Harmonics-to-Noise Ratio in the vowels /a/, /i/, /u/, automatic and spontaneous speech
Endoscopic evaluation: nasopharynx, tongue base, larynx (global), vocal folds and retrocricoid area. Signs of hyperfunctional supraglottic pattern (anteroposterior compression, ventricular folds hyperadduction, concentric supraglottic compression)	Vocal hygiene: e.g. avoid smoking, clearing the throat, shouting, whispering; regular hydration; vocal rest
Stroboscopy: vocal fold vibration (symmetry, amplitude and periodicity), glottic closure, mucosal wave propagation, lesions and defects of the epithelium and lamina propria	Semi-occluded vocal tract exercises, relaxation exercises, awareness of proper breathing technique - costodiaphragmatic breathing

examine the nasopharynx, tongue base, global laryngeal structure, and specifically the vocal folds, as well as to assess for signs of a hyperfunctional supraglottic pattern. This assessment is complemented by videostroboscopy, which is conducted systematically, assessing vocal fold vibration (symmetry, amplitude and periodicity), glottic closure pattern and duration, mucosal wave propagation, and the presence of lesions and defects of the epithelium and lamina propria. The vocal tract is evaluated at rest, during vegetative functions and during phonation at modal pitch, at low pitch (both soft and loud, to evaluate maximum pliability), and at high pitch with soft intensity.⁹ Recordings are archived to enable longitudinal comparison and support preoperative planning.

Preoperative Assessment by Speech Therapy (Table 1): Patients with surgical indication are referred to a preoperative ST consultation, during which the Speech Therapist prepares the patient for the surgical procedure, the recovery period, the need for postoperative therapy and potential vocal changes. The impact of dysphonia on quality of life is assessed using the self-assessment questionnaire VHI-10,¹⁰ along with the question “How do you feel about your voice today?” to compare the self-perception of the patient with that of the Therapist. Subsequently, an aerodynamic assessment^{7,8} is performed, including maximum phonation time on the sustained vowels /a/ and /i/, and the S/Z ratio. Acoustic analysis¹¹ involves measuring fundamental frequency (F0), jitter, shimmer, and harmonics-to-noise ratio for the vowels /a/, /i/, and /u/, automatic speech (counting from 0 to 10) and spontaneous

speech. Vocal hygiene recommendations are provided, including avoidance of smoking, coughing, shouting, whispering, speaking too quickly or during physical exertion, maintaining adequate hydration and regular periods of vocal rest. Semi-occluded vocal tract exercises (e.g., phonation into tubes, lip trills) and relaxation techniques (e.g., yawning, sighing) are introduced. Patients are also instructed in proper breathing techniques, with emphasis on costodiaphragmatic breathing as the optimal strategy for voice production. Information is delivered in both verbal and written formats.

Postoperative Assessment by Otorhinolaryngology (Table 2): In the postoperative period, absolute vocal rest is recommended for 3 to 5 days, followed by a period of relative vocal rest. The duration of this phase varies depending on factors such as the underlying pathology, the extent of surgical dissection, the vibratory pattern, mucosal wave restoration, and patient compliance. After this period, the patient is reassessed by both ORL and ST. At the ORL consultation, an audioperceptive assessment of the voice is repeated, including analysis of pitch, loudness, and the GRBAS scale. The objective examination includes anterior rhinoscopy, inspection of the oral cavity and oropharynx, and cervical palpation. Videostroboscopy is also performed to characterize the scarring evolution, assessing vibratory characteristics, mucosal wave integrity, glottic closure, and any compensatory hyperfunctional components that may develop. Furthermore, it serves as a crucial monitoring tool after phonomicrosurgery and should be used to guide and assist the gradual progression from total vocal rest to light voice use and eventually to full voice use.

TABLE 2. Postoperative assessment by Otorhinolaryngology and speech therapy

Postoperative assessment by Otorhinolaryngology	Postoperative assessment by speech therapy
Absolute vocal rest for 3 to 5 days, followed by relative vocal rest	Reinforcement of vocal hygiene
Audioperceptive assessment of voice: pitch, loudness and GRBAS (Grade / Roughness / Breathiness / Asthenia / Strain) scale	Postural control exercises (in standing and seated positions)
Objective examination: anterior rhinoscopy, oral cavity, oropharynx and neck examination	Postural relaxation techniques (e.g. shoulder rotation, head and trunk flexion)
Endoscopic evaluation complemented by videostroboscopy: characterization of cicatricial evolution (vibratory characteristics, mucosal wave, glottic gap, compensatory hyperfunctional component)	Vibratory relaxation techniques (e.g. lip, tongue, and laryngeal vibration)
	Semioccluded vocal tract exercises (e.g. phonation into straws or narrow tubes)
	Breathing techniques: costodiaaphragmatic breathing (e.g. inhalation/exhalation varying between voiceless and voiced sounds)
	Coordination of breathing and phonation (e.g. reading, automatic speech)

Postoperative Assessment by Speech Therapy (Table 2): The number of postoperative ST sessions is individualized based on the type of lesion, the extent of surgery, and the expectations, with the goal of achieving optimal vocal improvement. The first ST session should take place during the transition from absolute to relative vocal rest, typically three to five days after surgery. During postoperative ST consultations, the same parameters are reassessed, including the VHI-10, aerodynamic and acoustic parameters. Moreover, vocal hygiene recommendations are reinforced and the following exercises are trained:

- Postural control exercises, focusing on posture correction in both standing and sitting positions;
- Postural relaxation techniques, involving gentle and small-amplitude movements such as head repositioning on the horizontal plane, shoulder rotation, and flexion of the head and the trunk;
- Vibratory relaxation techniques, including lip, tongue, and laryngeal vibrations, which promote vocal warm-up and improve vocal performance;
- Semioccluded vocal tract exercises (e.g. phonation into straws, narrow tubes, or lip-rounded vowels), which modify acoustic impedance and generate retroflex resonance, increasing vocal fold separation during vibration, reducing the risk of trauma and balancing subglottic and supraglottic pressures;
- Breathing techniques, specifically costodiaphragmatic breathing with airflow control, incorporating both inspiration and expiration using voiceless (/s/) and voiced (/z/) sounds, aimed at activating the respiratory musculature;
- Coordination of respiration, phonation and articulation, through the production of prolonged and alternating vowels, reading tasks, conversational speech, automatic speech, and vocal projection.

DISCUSSION

A multidimensional assessment that integrates both objective and subjective measures - from the perspectives of both the clinician, the speech therapist and the patient - is essential for comprehensively evaluating the impact of voice disorders and identifying predisposing, precipitating, and perpetuating factors. This approach includes audioperceptive, acoustic, aerodynamic, endoscopic, and patient-reported evaluations. Although discrepancies may sometimes occur among these different assessment modalities, such incon-

sistencies reflect the complex and multifactorial nature of voice disorders. Rather than undermining the approach, they underscore the value of integrating multiple perspectives to ensure a more complete and individualized understanding of vocal function.^{3,12}

While some patients achieve favorable outcomes with behavioral therapy alone, persistent benign vocal fold lesions often require phonosurgery to restore vocal fold contour and improve vibratory properties.¹² Phonosurgery should aim to preserve the microstructure of the vocal folds as much as possible.^{10,13}

A combined approach involving ST and phonosurgery has been advocated, as benign lesions are frequently the result of tissue damage secondary to phonotrauma. Pre and postoperative ST appear to be the most effective strategy. Nevertheless, there is ongoing debate regarding the most effective exercises, optimal timing, intensity, and number of sessions.¹²

Preoperative ST serves to educate patients on the diagnosis, surgical procedure, recovery process (including the need for vocal rest and possible postoperative ST), and to set realistic expectations. It promotes healthy vocal behaviors, strengthens the therapeutic alliance, and improves patient adherence. It also enables early identification and correction of phonotraumatic behaviors, potentially enhancing patient satisfaction and subjective perception of functional outcomes. Postoperative ST primarily aims to optimize vocal efficiency with minimal effort. It contributes to the optimization of the healing process by promoting functional reorganization of the tissues, plays a role in the prevention or correction of compensatory patterns resulting from muscular tension, and facilitates the gradual oscillation of the vocal fold to restore mucosal wave flexibility. All of this requires careful balance between tissue healing and progressive mobilization, therefore exercises should be introduced gradually at different time points and the number of sessions tailored to the patient.^{2-4,12} Moreover, postoperative ST can correct maladaptive vocal behaviors, reduce recurrence rates, and improve vocal comfort, emotional responses, and self-perception in daily life.^{12,13} While physiotherapy, particularly laryngeal manual therapy, may benefit patients with increased muscle tension, it is not considered an essential component of ST programs.⁴

Vocal rest following phonosurgery is recommended to allow for tissue healing and to prevent further

injury. However, the optimal duration remains controversial. Recent studies support shorter periods of three rather than seven days, followed by appropriate mechanical stimulation via ST.^{6,14} Although the progression from absolute to relative vocal rest is commonly advocated, there is no consensus on the exact timing, type, or duration of rest or when to initiate postoperative ST. Absolute immobilization of vocal fold tissue is likely unachievable due to constant mechanical stress from non-phonatory laryngeal activities; although such forces are minimal compared to collision during phonation, passively applied force in the early stages of ligament healing may be more effective for functional recovery than active force. Nonetheless, prolonged vocal rest may negatively affect patient adherence.¹⁴

The efficacy of ST is closely linked to patient adherence and motivation, hospital context, and resource availability, which may influence the quality of care. In fact, ST is affected by pathophysiological factors, such as lesion type, surgical technique, wound healing, exposure to irritants, and compensatory muscle tension; patient-related factors, including motivation, adherence, vocal demands, general health, emotional and psychological status, and vocal skill; institutional factors, such as available staff, communication between the Otorhinolaryngologist and the Speech Therapist, and access to resources, which influence the timing, frequency and duration of sessions; and Therapist-related factors, including clinical knowledge, experience, and individual interpretation of patient assessment.^{1,2} Conversely, ongoing monitoring by the Otorhinolaryngologist helps to guide the content and progression of ST sessions.⁴

The integration of pre and postoperative ST can improve vocal quality and quality of life by enabling behavioral change and acquisition of new vocal techniques. Patient motivation is essential, and in-clinic sessions must be complemented by home-based practice. ST should conclude once the patient, the Speech Therapist, and the Otorhinolaryngologist agree that maximum vocal benefit has been achieved.³

This study is limited by its reliance on the experience of a single Hospital Center. However, our department is one of the largest voice-specialized units in the country and, to the best of our knowledge, this is the first national study to propose a structured protocol aimed at promoting an effective coordination between ORL

and ST in the pre and postoperative management of patients with laryngeal phonotraumatic pathology. Based on our experience, this protocol has resulted in substantial advantages. In addition to enabling the identification and correction of causal factors, preparing the patient for the surgery and the postoperative period - thereby fostering active therapeutic engagement - and maximizing surgical results through more appropriate postoperative follow-up, it also allows for more efficient use of resources. Specifically, it reduces the number of hospital visits, enhances coordination among members of the multidisciplinary team, and ultimately increases patient satisfaction. The implementation of this protocol in other Hospitals may contribute to greater standardization of care and improve postoperative results in these patients.

CONCLUSION

Although potentially limited by the resources available in each healthcare facility and by patient adherence to ST, the implementation of this protocol enables coordinated collaboration between the Otorhinolaryngologist and the Speech Therapist during both the preoperative and postoperative periods. This approach allows for systematic yet individualized management, aiming to optimize surgical outcomes in patients with laryngeal phonotraumatic pathology.

PRIZES AND PREVIOUS PRESENTATIONS

This work was presented at the 5th International Voice Symposium (Vila Nova de Gaia, 15th and 16th November 2024), where it was awarded the prize for Best Oral Communication.

CONTRIBUTORSHIP STATEMENT/ DECLARAÇÃO DE CONTRIBUIÇÃO

CGP, ACC and EC - Study design, writing and final approval.

RVO, NM, RG and PO - Writing and final approval.

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RESPONSABILIDADES ÉTICAS

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