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Original Communications

Long-term voice quality outcomes after total thyroidectomy: a prospective multicenter study

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ABSTRACT

Background. Postthyroidectomy voice disorders can occur without any recurrent laryngeal nerve injury, and probably are the most frequent complication after thyroidectomy. We report the long-term voice quality outcomes after total thyroidectomy without vocal cord palsy using a simple self-assessment tool: the voice handicap index self-questionnaire.

Methods. This observational prospective multicenter study included 203 patients from the “ThyrQoL” study (ClinicalTrial NCT02167529), who underwent total thyroidectomy between October 2014 and August 2015 in 3 French Hospitals (Nantes, La Roche-sur-Yon, and Limoges). Exclusion criteria included confirmed malignant disease, age <18 years, and preoperative voice troubles with confirmed vocal cord palsy. Direct flexible laryngoscopy was performed after surgery. Nineteen patients with a postoperative vocal cord palsy were excluded from analysis.

Results. One hundred and seventy-six patients with no vocal cord palsy were analyzed. Voice handicap index scores were significantly altered on postoperative month 2 compared with preoperative values (7.02 ± 11.56 vs 14.41 ± 19.44 ; $P < .0001$). Voice handicap index scores were not significantly different on postoperative month 6 compared with preoperative values (7.02 ± 11.56 vs 7.61 ± 14.02 ; $P = .381$). Thirty-six patients (20.5%) described significant voice impairment 2 months after total thyroidectomy. Nine patients (5.7%) still experienced significant discomfort at 6 months.

Conclusion. Twenty percent of patients had initial voice impairment at 2 months postthyroidectomy, with a progressive recovery to preoperative levels at 6 months with <6% with persistent voice complaints. (Surgery 2017;160:XXX-XXX.)

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Thyroidectomy is the most frequently performed endocrine surgery worldwide.¹ Vocal cord palsy (VCP) due to recurrent laryngeal nerve (RLN) injury remains the most feared complication of thyroidectomy, and is the first cause of medicolegal litigation after thyroid surgery.² Postoperative VCP rate varies from 0.5% to 20% and was considered to be the main cause of postoperative dysphonia.³⁻⁷ This has led to increased concern for RLN preservation and voice outcomes. The latest guidelines of the American Thyroid Association recommend preoperative and postoperative voice assessments including the patient’s description of vocal changes and the physician’s assessment of voice.⁸ This may be further completed through

use of laryngoscopy and/or validated quality of life and auditory perceptual assessment voice instruments.⁸

Though, studies have shown that 25% to 87% of patients complain about voice impairment after thyroidectomy, probably making postthyroidectomy voice disorders (PTVD) the most frequent complication following thyroidectomy.⁹⁻¹⁴ VCP may result in voice changes including breathy voice, hoarseness, or dysphonia. However, PTVD often occur in the absence of RLN lesion, with normal motility of the vocal cords (VC).^{15,16} The most often reported symptoms are vocal fatigue, difficulty in high pitch and singing, among others.^{9,17}

Multiple causes have been mentioned to explain these disorders, such as pain, laryngeal edema, strap muscles division, laryngotracheal fixation, cricothyroid or cricoarytenoid trauma, perithyroidal external branch of superior laryngeal nerve (EBSLN) injury, neural plexus lesions, mucosal changes due to modification in vascularization or lymphatic drainage of laryngeal region,

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or psychologic postoperative reaction.^{9,10,12,16} Voice impairments can persist a long time after surgery, leading some authors to talk about “postthyroidectomy syndrome.”¹⁴ PTVD can be responsible for a significant impairment of daily life for singers or professional voice users.^{15,18}

Whereas direct flexible laryngoscopy is the gold standard for diagnosing RLN injury, PTVD evaluation remains debated.¹⁹ Speech-specialized therapist examination and acoustic voice analysis allow objective and reliable assessment of voice dysfunction, but do not explain why patients with similar vocal deficit experience markedly different voice handicap.¹¹ On the other hand, patient self-assessment is a subjective but simple, quick and easily accessible way to assess impact of PTVD.¹⁸ The aim of this study was to evaluate, using the Voice Handicap Index (VHI) self-questionnaire, the frequency and the evolution of PTVD after uncomplicated total thyroidectomy.

Methods

Patients who underwent total thyroidectomy from October 2014 to August 2015 in 3 French centers (Nantes University Hospital, Limoges University Hospital and Departmental Hospital of Vendée) were considered eligible to be included prospectively in this single-arm study. Exclusion criteria were age <18 years, suspected or confirmed malignant disease, and preoperative voice troubles with confirmed VCP.

This study was approved by the local ethics committees (Comité Consultatif sur le Traitement de l'Information en Matière de Recherche; Groupe Nantais d'Éthique dans le Domaine de la Santé), and registered at clinicaltrials.gov (NCT02167529) as part of the “ThyrQoL” (Quality of Life After Thyroidectomy) study. All patients gave their written and informed consent before surgery.

Surgical procedure

Surgery was performed under general anesthesia with tracheal intubation. The surgical procedure was extracapsular total thyroidectomy through a collar incision with a midline opening of the fascia. The strap muscles were not cut unless required. Accurate dissection close to thyroid capsule and single ligatures of superior lobe vessels were performed in order to preserve EBSLN. EBSLN was not routinely identified. RLNs were routinely identified and preserved, possibly with the help of intraoperative neuromonitoring (IONM) (Medtronic, Jacksonville, FL), the use of which was left to surgeon's choice. Unilateral central lymph node dissection could be performed in case of suspected malignant disease on frozen section. Drainage was left to surgeons' choice. The closure of the surgical incision consisted of a 2-layer closure comprised of a subcutaneous absorbable continuous stitch and intradermal absorbable single stitches.

Laryngeal examination

All patients were assessed preoperatively and if their voice had no abnormality were defined as normal; therefore, systematic preoperative laryngeal examination was not performed. An experienced otolaryngologist performed systematic postoperative direct laryngoscopy at day 1 or 2 during the same hospitalization. The existence and severity of a VCP were noted.

Subjective voice self-assessment

The Voice Handicap Index (VHI) was used in order to assess pre- and postoperative voice quality. VHI has been validated in its French translated version.²⁰

The VHI includes 30 items, each scored on a 5-point scale ranged from “never” to “always” and scored from 0 to 4.²¹ VHI score is graded on a total of 120 points. Items are distributed in 3 10-items subscales: “emotional” (e), “functional” (f), and “physical” (p) subscales. The higher the VHI score, the more the voice quality is impaired. A difference ≤ 18 points on the total score, based on the values reported by Jacobson *et al.*, was considered to be significant.²¹

Preoperative voice was assessed during the preoperative consultation. Postoperative voice was assessed 2 and 6 months after surgery. VHI questionnaires were sent and returned by mail to the patients. In case of missing response or filling error on the received questionnaires, patients were contacted by phone in order to correctly complete the questionnaires.

Statistical analysis

Patient data were compiled in a Microsoft® Excel version 14, Microsoft® Corporation, Redmond, USA (state of Washington) and SPSS version 22, IBM, Armonk, USA (state of New York). Statistical analyses were performed with SPSS software (version 22), using a 5% *P* value. Changes from preoperative baseline to postoperative follow-up time points were compared using paired-samples *t* tests. Univariate analysis was made with χ^2 tests for categorical variables and 2-sample *t* tests for continuous variables. Graphics were made using GraphPad Prism version 5, GraphPad Software, San Diego, USA (state of California)

Results

Population characteristics

Two hundred and three patients were included in this study. Three patients did not complete the preoperative questionnaires. Nineteen patients (9.5%) had documented postoperative VCP at early postoperative direct laryngoscopy. One patient (0.5%) had a persistent partial VCP 6 months after surgery but showed partial recovery of VC movement at a follow-up direct laryngoscopy examination. The other 18 patients (9.0%) had transient vocal cord palsy and completely recovered normal VC motility 6 months after surgery.

Among the 181 patients with proved uncomplicated total thyroidectomy at early postoperative direct laryngoscopy, 2 were lost to follow-up. Twenty-two patients did not complete either the 2-month or 6-month questionnaire. The flowchart of the study is summarized in [Fig 1](#).

Characteristics and outcomes of analyzed patients with no postoperative VCP are summarized in [Table 1](#). There was no reoperative surgery.

Analysis of voice evolution after surgery

VHI scores were significantly altered on the 2-months postoperative follow-up compared with preoperative values (7.02 ± 11.56 vs 14.41 ± 19.44 ; $P < .0001$). VHI subscales scores were also significantly increased (f subscale $P < .0001$; e subscale $P = .008$; p subscale $P < .0001$; [Table II](#), [Fig 2](#)).

VHI scores were not significantly different at 6 months postoperative compared with preoperative values (7.02 ± 11.56 vs 7.61 ± 14.02 ; $P = .381$). VHI subscales scores also were (f subscale $P = .575$; e subscale $P = .728$; p subscale $P < .183$; [Table II](#), [Fig 2](#)). VHI and VHI subscales were significantly different between 2 and 6 months, except for the emotional subscale (VHI: $P < .0001$; f subscale: $P < .0001$; e subscale: $P = .058$; p subscale: $P < .0001$; [Table II](#), [Fig 2](#)). Results were similar when limiting the analysis of the 157 patients for whom the results of the three questionnaires were available.

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