

Research Article

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Health-Related Quality of Life and Voice Outcomes after Total Thyroidectomy a Cross-Sectional Study Using the Thypro-39 and Voice Handicap Index-10 in a Moroccan Cohort

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ABSTRACT

Background: Total thyroidectomy is the standard treatment for multinodular goiter and differentiated thyroid carcinoma, but biochemical euthyroidism does not guarantee patient well-being. Data on patient-reported outcomes after TT remain scarce in North Africa and in populations with limited health literacy.

Objective: To evaluate health-related quality of life (QoL) and voice-related handicap after TT and to identify their clinical, biological, and sociodemographic determinants.

Methods: We conducted a cross-sectional, observational, analytical study of 82 adults who underwent TT (with or without neck dissection) and had ≥ 6 months of postoperative follow-up at the Department of Otorhinolaryngology-Head and Neck Surgery, Hôpital 20 Août 1953, Ibn Rochd University Hospital Center, Casablanca, Morocco (June 2024–July 2025). Because 80.5% of participants had no formal education, both the ThyPRO-39 (thyroid-specific QoL questionnaire) and the Voice Handicap Index-10 (VHI-10) were administered as a structured interview using a Moroccan Arabic (Darija) linguistic adaptation rather than self-administration. Bivariate associations were assessed with Student's t-test and Pearson correlation (r).

Results: The cohort was predominantly female (90.2%; mean age 51.0 ± 11.8 years). Papillary carcinoma accounted for 58.5% of final histology, and multinodular goiter was the leading indication (95.1%). Permanent dysphonia occurred in 12.2% of patients and symptomatic hypocalcemia in 4.9%. The mean VHI-10 score was 1.88 ± 5.39 (median 0), rising to 10.4 ± 11.0 in patients with permanent dysphonia. The ThyPRO-39 composite QoL score averaged $38.4 \pm 27.4/100$, driven chiefly by fatigue ($59.0 \pm 32.1/100$, affecting 61% of patients). QoL correlated strongly with anxiety ($r = 0.91$), depressivity ($r = 0.83$) and fatigue ($r = 0.75$), and moderately with vocal handicap ($r = 0.36$, $p < 0.001$). Female sex ($p < 0.001$) and absence of formal education ($p = 0.0058$) were independent multipliers of impaired QoL, whereas age, comorbidities, extent of surgery, and benign versus malignant histology were not. A lower TSH was associated with greater fatigue and a worse composite score ($r = -0.36$, $p = 0.005$).

Conclusion: Although TT achieves excellent oncological and surgical safety outcomes, a substantial subset of patients remains “biochemically cured but functionally impaired,” burdened chiefly by fatigue, anxiety, and when present vocal handicap. Individualized TSH targets, systematic screening for fatigue and voice complaints, and simplified therapeutic education for patients with low health literacy should be integrated into routine post-thyroidectomy follow-up.

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Introduction

Thyroid disease is among the most common endocrine disorders encountered in surgical practice worldwide, and Morocco carries a particularly high burden of multinodular goiter and thyroid nodular disease presenting to ear, nose and throat (ENT) and head and neck surgery services [1].

For decades, the success of total thyroidectomy (TT) was judged almost exclusively by narrow clinical and biological endpoints:

absence of immediate surgical complications, normalization of thyroid-stimulating hormone (TSH), and, in oncological cases, absence of tumor recurrence. The evolution of the World Health Organization's biopsychosocial definition of health has since shifted this paradigm toward a broader view of the operated patient, in which the persistence of chronic fatigue, mood disturbance, and cognitive complaints often invisible on standard biochemical panels — can coexist with an ostensibly successful operation [2].

A clinically significant proportion of thyroidectomized patients who are “biochemically cured” continue to report impaired well-being, creating a gap between the surgeon's perception of

therapeutic success and the patient’s lived experience [3-5]. This gap may be even wider in resource-limited settings characterized by low health literacy, restricted access to specialized follow-up, and socio-economic vulnerability, features that are common among patients treated in Moroccan tertiary referral centers but that are rarely captured by validated, culturally adapted patient-reported outcome measures.

Materials and Methods

This was a single-center, observational, descriptive and analytical study conducted in the Department of Otorhinolaryngology and Head and Neck Surgery of Hôpital 20 Août 1953, Ibn Rochd University Hospital Center, over a 13-month period (June 2024-July 2025).

Adult patients who had undergone TT, with or without neck dissection, for any indication, with a minimum postoperative follow-up of 6 months, and who agreed to participate in this study were included. Data collection proceeded in three steps. First, objective clinical and paraclinical data were abstracted retrospectively from paper medical records. Second, given the high proportion of non-literate patients in our target population (81%), questionnaires were not self-administered; instead, they were completed through a structured, interviewer-led oral interview. Both the ThyPRO-39 and the VHI-10 were linguistically adapted into Moroccan Arabic (Darija). Third, an updated postoperative biological was obtained directly from patients to ensure temporal concordance between the hormonal status and the quality-of-life assessment. The ThyPRO-39 is a multidimensional, thyroid-specific patient-reported outcome questionnaire comprising 39 items across 13 domains including items such as: goiter symptoms, dysthyroid symptoms, fatigue, cognitive complaints...and an overall quality-of-life scale, from which a composite score is also derived. Use of the instrument was authorized in writing by its principal author, Dr. Torquil Watt 50. Items are scored on a five-point Likert scale, positively worded items are reverse-scored, and raw scores are linearly transformed to a normalized 0–100 scale, where 0 denotes the best and 100 the worst possible quality of life. A composite score is calculated from 22 items covering QoL impact. The VHI-10 is the abbreviated, validated form of the Voice

Handicap Index, assessing patient-perceived vocal handicap across functional, physical, and emotional domains. Each of the 10 items is scored from 0 to 4, and the summed total score (range 0-40) allows classification of vocal handicap as absent/mild, moderate, or severe. The study was conducted in accordance with principles of patient dignity and confidentiality.

Results

Eighty-two patients who had undergone TT at our institution met the inclusion criteria and were analyzed. A summary of sociodemographic, clinical, surgical, and biological characteristics is presented in Table 1.

The cohort showed a marked female predominance (90.2%; female-to-male ratio 9.25), with a mean age of 51.0 ± 11.8 years (range 25–85) and 68.3% of patients within the 40–60-year bracket. The most frequent comorbidities were diabetes mellitus and hypertension (22.0% each), often co-occurring, and 24.4% of patients reported a family history of thyroid disease. Four patients (4.9%) had a documented history of neck or thoracic irradiation. Multinodular goiter was the leading surgical indication (95.1%). All patients underwent TT (100%), associated with cervical (recurrent and/or jugulo-carotid) neck dissection in 7.3% of cases. Final histology identified malignant disease in 58.5% of patients (n = 48), invariably papillary carcinoma, and benign nodular follicular disease in 36.6% (n = 30); results were unavailable for 4.9%.

The postoperative course was uneventful for 82.9% of patients. Permanent dysphonia - the most frequent morbidity in our series - was observed in 12.2% (n = 10), and symptomatic postoperative hypocalcemia in 4.9%, all managed with combined calcium and vitamin D supplementation. No patient experienced a compressive hematoma requiring reoperation or a surgical-site infection. All patients (100%) were on lifelong levothyroxine replacement, at a mean dose of 121 ± 40.3 µg/day (range 75–250 µg/day). At the time of assessment, 39.0% of patients had a suppressed TSH (< 0.5 mIU/L), 36.6% had a normal TSH, and 4.9% remained under-replaced, TSH data were unavailable for the remaining patients.

Table 1: Sociodemographic, Clinical, Surgical and Biological Characteristics of the Cohort (N = 82)

Characteristic	n	%
Sex		
Female	74	90.2
Male	8	9.8
Age, years — mean ± SD (range)	51.0 ± 11.8 (25–85)	
40–60 years	56	68.3
Family history of thyroid disease	20	24.4
History of neck/thoracic irradiation	4	4.9
Surgical indication — multinodular goiter	78	95.1
Extent of surgery		
Total thyroidectomy alone	76	92.7
Total thyroidectomy + neck dissection	6	7.3
Final histology		
Malignant (papillary carcinoma)	48	58.5
Benign (nodular follicular disease)	30	36.6
Not available	4	4.9
Postoperative course		

Uneventful	68	82.9
Permanent dysphonia	10	12.2
Symptomatic hypocalcemia	4	4.9

Overall vocal function was well preserved: the mean VHI-10 score was 1.88 ± 5.39 (median 0; range 0–31). Ninety-five percent of patients scored within the absent-to-mild handicap range (0–10), including 75.6% with a strictly null score. Only 2 patients (2.4%) fell in the moderate range (11–20) and 2 (2.4%) in the severe range (> 20). Item-level analysis showed that vocal effort (item P14, “having to strain to produce voice”) carried the highest mean score of the questionnaire (0.51 ± 1.18), reported by nearly 20% of patients, followed by voice unpredictability (item P10, mean 0.24 ± 0.91 , 7.3% of patients). When stratified by clinical outcome, patients without vocal complications ($n = 72$) had a negligible mean score (0.86 ± 2.7), whereas those with permanent dysphonia ($n = 10$) had a markedly higher mean score of 10.4 ± 11.0 (range 3–31), with 2 patients reaching severe handicap.

Table 2: Voice Handicap Index-10 (VHI-10) Outcomes

VHI-10 outcome	Value
Mean total score $\pm$ SD (range)	1.88 ± 5.39 (0–31)
Median score	0
No/mild handicap (score 0–10), n (%)	78 (95.1%)
— of which score = 0, n (%)	62 (75.6%)
Moderate handicap (score 11–20), n (%)	2 (2.4%)
Severe handicap (score > 20), n (%)	2 (2.4%)
Mean score — patients without vocal complications ($n = 72$)	0.86 ± 2.7
Mean score — patients with permanent dysphonia ($n = 10$)	10.4 ± 11.0 (3–31)
Most affected item — vocal effort (P14), mean $\pm$ SD	0.51 ± 1.18

The ThyPRO-39 composite score averaged $38.4 \pm 27.4/100$ (median 34.1; range 0–93.2), indicating moderate overall impairment with wide inter-individual heterogeneity: 20 patients scored below 15 (near-normal QoL), while others reported severe, disabling impact. Fatigue is the single most affected domain, with the highest mean score of the entire questionnaire (59.0 ± 32.1 ; median 67), reported as clinically significant (score > 50) in 61% of patients. Psychosocial domains were also substantially affected - emotional susceptibility (38.8 ± 29.8), anxiety (38.1 ± 32.5), depressivity (37.0 ± 32.1), and cognitive function (35.2 ± 32.0) - whereas domains reflecting the immediate surgical result were minimally impacted: goiter symptoms (12.1 ± 16.6) and cosmetic complaints (7.3 ± 15.9) recorded the lowest scores of the instrument, indicating excellent perceived surgical outcomes on these dimensions.

Table 3: ThyPRO-39 Domain Scores (N = 82)

ThyPRO-39 domain	Mean $\pm$ SD	Median	Min	Max
Fatigue	59.0 ± 32.1	67.0	0	100
Emotional susceptibility	38.8 ± 29.8	36.0	1	95
Anxiety	38.1 ± 32.5	34.0	1	96
Depressivity	37.0 ± 32.1	29.0	0	97
Cognitive function	35.2 ± 32.0	29.0	1	95
Impaired daily life	30.8 ± 31.7	22.0	0	98
Overall quality of life	29.9 ± 30.0	25.0	0	75
Eye symptoms	23.9 ± 28.1	14.0	1	89
Impaired social life	19.9 ± 32.8	0.0	0	100
Hypothyroid symptoms	19.4 ± 19.2	12.5	0	62.5
Hyperthyroid symptoms	17.2 ± 15.6	13.0	2	66
Goiter symptoms	12.1 ± 16.6	2.0	2	84
Cosmetic complaints	7.3 ± 15.9	1.0	1	80
Composite score	38.4 ± 27.4	34.1	0	93.2

Bivariate analysis identified several independent correlates of the ThyPRO-39 composite score. Female sex was the strongest sociodemographic determinant, with a substantially higher (worse) mean composite score than male patients (41.7 ± 27.1 vs. 8.5 ± 6.7 ; $p < 0.001$). Absence of formal education was likewise associated with a worse score (42.0 ± 28.1 vs. 23.7 ± 15.9 for schooled patients; $p = 0.0058$). Permanent dysphonia increased the composite score by approximately 22 points (57.7 ± 17.9 vs. 35.8 ± 27.5 without vocal complications; $p = 0.014$), and the VHI-10 score correlated positively with both the ThyPRO-39 composite score ($r = 0.36$, $p < 0.001$) and, more specifically, with the fatigue domain ($r = 0.25$, $p = 0.025$).

A lower postoperative TSH was associated with greater self-reported fatigue and a worse composite score ($r = -0.36$, $p = 0.005$).

Age ($p = 0.451$), presence of diabetes or hypertension ($p > 0.05$), extent of surgery and histological nature ($p = 0.910$) were not significantly associated with the composite QoL score. Finally, the composite score correlated very strongly with the anxiety ($r = 0.91$), depressivity ($r = 0.83$), and fatigue ($r = 0.75$) domains, underscoring the central role of the psychological burden in the overall QoL construct.

Discussion

This study provides one of the first structured, dialect-adapted assessments of patient-reported quality of life after TT in a North African population with a high burden of illiteracy. Two findings stand out:

- Surgical and oncological safety were excellent
- Despite this technical success, a substantial fraction of patients remained functionally impaired, dominated by fatigue and psychological distress.

The marked female predominance observed in our cohort is consistent with national and international epidemiological data on thyroid surgery, and is mirrored by African series as well as by large Western cohorts, in which female predominance - attributed to estrogen-driven thyroid growth and autoimmunity - is somewhat less pronounced. The mean age of our patients (51.0 ± 11.8 years) closely matches the age reported in the German validation cohort of the ThyPRO-39 (51.2 ± 14.0 years), situating our population within the classic 40–60-year bracket of peak professional and family responsibility - a period during which postoperative fatigue may be particularly disruptive [6–8].

Our complication rates compare favorably with international benchmarks: the 4.9% rate of symptomatic hypocalcemia falls within, or below, the reported range for transient hypoparathyroidism (10–30%), and our 12.2% rate of permanent dysphonia sits within the classically reported 10–16% range for subjective vocal complaints after thyroid surgery [9–11]. Notably, because our study captured patient-reported symptoms rather than laryngoscopically confirmed vocal cord palsy, this figure likely reflects functional vocal complaints which are known to be more common than objective nerve injury [12].

The high prevalence of cardiometabolic comorbidities (diabetes and hypertension, 22% each) is consistent with the bidirectional relationship documented between thyroid dysfunction, insulin resistance, and vascular stiffness [13,14]. Family history of thyroid disease in nearly a quarter of patients underscores a probable genetic or shared-environment contribution, consistent with recognized rates of familial non-medullary thyroid cancer, while the four cases with prior therapeutic irradiation - including two after breast cancer treatment with a 10-year latency to papillary carcinoma - align with the well-documented, dose- and latency-dependent risk of radiation-induced thyroid neoplasia, supporting closer endocrine surveillance in irradiated patients [15–17].

Vocal handicap in our cohort followed a clearly dichotomous pattern: excellent in the vast majority, but severe in a small subgroup. This pattern mirrors the pathophysiology of thyroidectomy-related dysphonia, which can arise from recurrent laryngeal nerve injury, external branch of the superior laryngeal nerve dysfunction, strap-muscle scarring altering laryngeal biomechanics, or transient intubation-related trauma. Reassuringly, most patients without nerve injury recover baseline vocal function within 1 to 3 months [11,18,19].

The item-level predominance of vocal effort (P14) in our data correlated significantly with the general fatigue domain of the

ThyPRO-39 ($p = 0.025$), suggesting that the energetic cost of maintaining an audible voice contributes directly to the broader asthenia reported by our patients. More broadly, the moderate but highly significant correlation we observed between VHI-10 and ThyPRO-39 composite scores ($r = 0.36$, $p < 0.001$) is consistent with prior work identifying permanent dysphonia as one of the strongest single predictors of poor postoperative quality of life, reinforcing that the voice is not merely a communication tool but a pillar of social identity after thyroid surgery [9, 20,21].

The most clinically important finding of this study is the inverse relationship we observed between postoperative TSH and quality of life: patients with a suppressed TSH (< 0.5 mIU/L) reported the highest fatigue scores in the entire cohort (68.5/100), and TSH value correlated negatively with the composite QoL score ($r = -0.36$, $p = 0.005$). Approximately 10–15% of athyreotic patients on levothyroxine monotherapy continue to report residual neuropsychiatric symptoms fatigue, “brain fog,” mood disturbance despite a normalized TSH. Proposed mechanisms include imperfect peripheral T4-to-T3 conversion under LT4 monotherapy, deiodinase (DIO2) polymorphisms, coexisting autoimmune thyroiditis, and psychosocial comorbidity [22,23]. Anxiety and emotional susceptibility scores were elevated across the cohort and showed the strongest correlations of any domain with the overall QoL score ($r = 0.91$ and via depressivity $r = 0.83$), confirming that psychological distress — rather than any single physical symptom dominates the composite impairment. Although we found no significant difference in composite scores between malignant and benign histology ($p = 0.910$), the qualitative nature of this distress likely differs: fear of cancer recurrence is a well-documented driver of anxiety among thyroid cancer survivors whereas patients operated for benign disease may instead be burdened by the chronicity of lifelong hormone dependency and the loss of a native organ. Reassuringly, domains reflecting the immediate surgical outcome goiter symptoms and cosmetic complaints scored very low, corroborating international reports of high scar satisfaction after conventional cervicotomy and confirming that the “mechanical” aims of surgery were fully achieved in our series.

Conclusion

In this cohort of 82 patients undergoing total thyroidectomy at a Moroccan tertiary referral center, surgical and oncological outcomes were excellent, with low rates of permanent hypoparathyroidism and dysphonia. However, a substantial proportion of patients remained “surgically cured but functionally diminished,” with fatigue emerging as the sentinel symptom of residual impairment, closely tied to the degree of TSH suppression rather than to the extent of surgery or the benign/malignant nature of the underlying disease. Female sex, low educational attainment, and permanent dysphonia independently amplified this burden. These findings argue for a shift away from a purely biochemical definition of therapeutic success, toward routine integration of validated, culturally adapted patient-reported outcome measures, individualized TSH targets, early voice rehabilitation, and simplified therapeutic education in the long-term management of thyroidectomized patients [24–26].

Declarations

Ethics Approval and Consent to Participate: Informed consent was obtained from all participants prior to interview. All patient data were pseudo-anonymized before analysis. [Institutional ethics committee reference to be completed prior to submission.

Competing Interests: The authors declare no competing interests.

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