Supplementary Table 1. Discrimination, calibration, and internal validity of the primary multivariable model	
Metric	**Value (95% CI)**
Apparent AUC	0.903 (0.873-0.931)
Bootstrap optimism (1000 resamples)	0.007
Optimism-corrected AUC	0.896
10-fold cross-validated AUC	0.892
Hosmer-Lemeshow goodness-of-fit	χ^2=8.67; df=8; p=0.371
Highest variance inflation factor	1.18 (all <1.2)
McFadden pseudo-R^2	0.423
The model includes six variables (toxic functional status, cervical lymphadenopathy, nodule size, sex, age, bilaterality); n=415, events (Bethesda V-VI) =151, events per variable =25.2. AUC: Area under the curve, CI: Confidence interval, df: Degrees of freedom	

Supplementary Table 2. Contribution of cervical lymphadenopathy to model discrimination (sensitivity analysis and DeLong comparison)				
Model	**Variables**	**AUC (95% CI)**	**Optimism-corr. AUC**	**10-fold CV AUC**
Primary model (with LAP)	6	0.903 (0.873-0.931)	0.896	0.892
Model without LAP	5	0.890 (0.858-0.923)	0.884	0.882
Cervical LAP alone	1	0.625 (-)	-	-
Model comparison: the difference in discrimination between the primary and LAP-removed models was small (ΔAUC =0.013) and not statistically significant by the DeLong test (z=1.91; p=0.056). In contrast, the likelihood-ratio test confirmed that cervical lymphadenopathy remained an independent and significant predictor (χ^2=12.58; df=1; p=0.0004). AUC: Area under the curve, CV: Cross-validation, CI: Confidence interval, LAP: Cervical lymphadenopathy, df: Degrees of freedom. All models were fitted in the full cohort (n=415)				

Supplementary Table 3. Full distribution of fine-needle aspiration cytology across the six Bethesda categories				
Bethesda category	**Cytological interpretation**	**n**	**% of cohort (n=438)**	**Analysis grouping**
I	Non-diagnostic/unsatisfactory	23	5.3%	Excluded
II	Benign	115	26.3%	Low-to-intermediate (II-IV)
III	Atypia of undetermined significance	109	24.9%	Low-to-intermediate (II-IV)
IV	Follicular neoplasm	40	9.1%	Low-to-intermediate (II-IV)
V	Suspicious for malignancy	71	16.2%	High-risk (V-VI)
VI	Malignant	80	18.3%	High-risk (V-VI)
Total		**438**	**100%**	
Percentages are of the full surgical cohort (n=438). Cytological interpretations follow the 2023 Bethesda System for Reporting Thyroid Cytopathology. Bethesda I (non-diagnostic) cases were excluded from the analysis, leaving 415 patients. In the primary analysis the outcome was high-risk cytology (Bethesda V-VI; n=151, 36.4% of the analyzed cohort) versus low-to-intermediate cytology (Bethesda II-IV; n=264, 63.6%). The pre-specified sensitivity analysis restricted the high-risk outcome to Bethesda V (n=71) versus Bethesda II–IV (n=264)				

Supplementary Table 4. Baseline clinical characteristics according to cytologic progression in patients undergoing repeat fine-needle aspiration			
Characteristic	**Progressed to V-VI (n=19)**	**Remained II-IV (n=108)**	**p**
Toxic functional status, n (%)	2 (11)	36 (33)	0.057
Cervical lymphadenopathy, n (%)	4 (21)	5 (5)	0.028
Male sex, n (%)	5 (26)	29 (27)	1.000
Bilateral involvement, n (%)	13 (68)	91 (84)	0.112
Age, years (median)	47	52	0.243
Nodule size, mm (median)	17	26	0.002
Progression was defined as reclassification from an initially non-high-risk cytology result (Bethesda II-IV) to high-risk cytology (Bethesda V-VI) on a subsequent fine-needle aspiration (patients with repeat aspiration: n=127). One patient in whom suspicious cytology was obtained from a cervical lymph node rather than the index thyroid nodule was not considered to have experienced cytologic progression. Categorical variables were compared using Fisher's exact test, and continuous variables were compared using the Mann-Whitney U test. Baseline characteristics refer to data recorded at the time of the initial aspiration			