De-Escalating Thyroid Cancer Surgery: Insights and Unresolved Questions From the 2025 ATA Guidelines

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In the current era of precision medicine, thyroid cancer surgery, for a long time considered a relatively standardized discipline, is undergoing a deep and necessary reconsideration. Advances in molecular diagnostics, imaging, and risk stratification are progressively reshaping clinical decision-making. In this context, the 2025 American Thyroid Association (ATA) guidelines for differentiated thyroid cancer (DTC) clearly articulate a shift toward a more conservative, risk-adapted, and patient-centered surgical philosophy [1]. Despite this evolution, several areas of uncertainty persist, leaving surgeons to navigate between guideline recommendations, biological heterogeneity, and real-world clinical complexity [2,3].

How Much Surgery Is Enough for Low-Risk Thyroid Cancer?

One of the most consequential changes in the ATA 2025 guidelines concerns the extent of initial surgery for DTC (Recommendation 15). Updated size cut-offs and refined risk stratification now explicitly support thyroid lobectomy as an appropriate initial treatment for a broad subset of low-risk tumors, particularly intrathyroidal cancers $\leq$4 cm without clinical evidence of nodal disease. Near-total thyroidectomy is no longer recommended, further simplifying surgical choices and reinforcing a binary approach: lobectomy or total thyroidectomy.

Importantly, completion thyroidectomy (Recommendation 16) has been reframed from a prescriptive strategy to a conditional option ("may be performed"), even in selected low-risk carcinomas. This change reflects a de-escalation, recognizing that oncologic safety can often be preserved while minimizing complications such as hypoparathyroidism and recurrent laryngeal nerve injury. Nonetheless, real-world adoption remains heterogeneous, highlighting the persistent tension between evolving evidence and established surgical paradigms.

Indeterminate Nodules: An Area Still Without Updated Guidance

Thyroid nodules with indeterminate cytology (Bethesda III and IV) remain one of the most problematic areas in thyroid surgery. Notably, the ATA 2025 guidelines do not yet include updated recommendations for indeterminate nodules, as explicitly acknowledged during the guideline development process. This absence leaves clinicians without new consensus guidance in a field where overtreatment remains common and clinically relevant.

While molecular classifiers have improved preoperative risk stratification, their variable performance and limited generalizability continue to constrain their impact [4]. Until dedicated guideline updates are released, management of indeterminate nodules remains largely dependent on institutional experience and individualized patient counseling.

Prophylactic Central Neck Dissection: A More Restrained Position

The role of prophylactic central compartment lymph node dissection (pCND) remains debated in the literature [5] and is further clarified in Recommendation 19. The ATA guidelines adopt a distinctly more conservative stance, discouraging routine pCND in clinically node-negative (cN0) patients and shifting the strength of language toward "should not be performed" or "may be considered" only in highly selected circumstances.

However, for many surgeons, these recommendations may feel overly restrictive in the frequent scenario of patients classified as cN0 preoperatively in whom small or borderline lymph nodes are encountered intraoperatively. In this gray zone, the surgeon's intraoperative assessment and clinical experience remain pivotal. A pragmatic option, still insufficiently studied, could be targeted sampling of the ipsilateral central neck hemicompartment with frozen-section examination, to confirm occult metastasis and thereby sup-

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port a truly therapeutic central lymphadenectomy while avoiding unnecessary routine pCND.

Notably, patient-reported outcomes such as decision regret have recently been highlighted as relevant in differentiated thyroid cancer surgery, reinforcing the importance of individualized counseling when the extent of central neck dissection is being considered [6].

Conversely, in patients with clinically evident lateral neck disease (cN1b), ipsilateral central compartment dissection is recommended, reflecting a therapeutic, anatomy-driven approach (Recommendation 20). This nuanced framework underscores the principle that lymphadenectomy should be guided by demonstrable disease rather than prophylactic intent alone.

Surgery, Surveillance, and Ablation for Small Papillary Thyroid Cancers: A De-Escalation Continuum

The management of small, low-risk papillary thyroid cancers has undergone one of the most profound paradigm shifts reflected in the ATA 2025 guidelines. For carefully selected patients with intrathyroidal, low-risk papillary thyroid microcarcinoma (PTMC), active surveillance is now formally recognized as an appropriate alternative to immediate surgery (Recommendations 11–14).

Importantly, the guidelines clearly define surveillance as an active management strategy, requiring structured imaging follow-up, biochemical monitoring, and predefined criteria for intervention in the event of disease progression or patient preference.

Within this same conceptual framework of treatment de-escalation, the ATA guidelines also acknowledge a limited role for percutaneous ablative techniques, including radiofrequency, laser, microwave ablation, and ethanol injection. These approaches may be considered in highly selected patients with small, intrathyroidal, low-risk differentiated thyroid cancers who are not optimal surgical candidates or who decline surgery, provided that the lesion is unifocal, well characterized, and managed in experienced centers.

Crucially, the guidelines do not position ablation as a replacement for standard oncologic surgery, nor as a broadly applicable alternative, but rather as a potential intermediate option between active surveillance and surgery. As with surveillance, patient selection is central: the absence of clinically evident nodal disease, extrathyroidal extension, or aggressive histologic or molecular features is mandatory. The ATA also highlights the current lack of long-term comparative data between ablation, surgery, and surveillance, underscoring that these techniques should be employed with caution and within structured follow-up programs.

Together, active surveillance and percutaneous ablation exemplify the evolving shift from a binary "operate or not" paradigm toward a continuum of tailored management strategies, in which the intensity of intervention is aligned with tumor biology, patient risk, and individual values. Their incorporation into the ATA 2025 framework reflects a broader maturation of thyroid cancer care—one that prioritizes proportionality of treatment while preserving oncologic safety.

Still Searching for Reliable Surgical Biomarkers

The ATA guidelines explicitly address the role of molecular testing in surgical decision-making. Recommendation 10 states that preoperative somatic genomic testing should not be routinely used to determine the extent of initial surgery, acknowledging that currently available biomarkers—such as *BRAF*, *RAS*, and *TERT* promoter mutations—lack sufficient standalone predictive accuracy.

While these markers contribute meaningfully to risk stratification and prognostication, the guidelines caution against overinterpreting molecular findings in isolation. Future progress will likely depend on integrated, multidimensional models that combine molecular, pathological, and clinical variables rather than relying on single-gene alterations.

Surgical Strategies in Aggressive Thyroid Cancers

The ATA 2025 document devotes substantial attention to aggressive and high-grade thyroid cancers, including poorly differentiated thyroid carcinoma (PDTC), differentiated high-grade thyroid carcinoma (DHGTC), and radioiodine-refractory DTC. In these settings, surgery is often constrained by biological aggressiveness, advanced local invasion, or systemic disease burden.

The guidelines emphasize a multidisciplinary, molecularly informed approach, particularly in advanced or radioiodine-refractory disease, where systemic targeted therapies and immunotherapy may precede or even replace surgical intervention. Surgery, when performed, is frequently palliative or aimed at local control rather than cure, underscoring the need for realistic goal-setting and integration within multimodal treatment strategies.

Regional Differences in Guidelines and Clinical Practice

Despite increasing international convergence, meaningful differences persist among the ATA, ETA, and Asian guidelines. While the ATA 2025 update reinforces a conservative and patient-centered trajectory, variability in healthcare systems, resources, and training continues to influence implementation, complicating comparative research and global harmonization.

Treating Elderly and High-Risk Patients: A Delicate Balance

The ATA guidelines implicitly support a more nuanced approach in elderly and frail patients, emphasizing individualized risk–benefit assessment rather than chronological age alone. Given the often indolent nature of DTC, less aggressive surgical strategies—or even active surveillance—may be appropriate in selected patients, though standardized geriatric frameworks remain an unmet need.

Conclusion

The 2025 ATA guidelines represent a clear maturation of thyroid cancer management, moving decisively toward surgical de-escalation, active surveillance, and biologically informed decision-making. At the same time, critical gaps remain—most notably the lack of updated guidance on indeterminate nodules and the limited role of current biomarkers in directing surgical extent.

The future of thyroid cancer surgery will depend not only on generating more data but on applying existing evidence with clinical judgment, humility, and attention to patient context. In an era increasingly defined by precision medicine, the true challenge is no longer determining what can be done, but discerning what should be done, for whom, and when.

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Not applicable.

Author Contributions

FM, GLC, and PGC conceived the editorial concept. GLC, FC, GL, SC, and FB outlined the editorial and contributed to the discussion. FM drafted the manuscript. All authors contributed to the critical revision of the manuscript for important intellectual content. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

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Conflict of Interest

Fabio Medas is serving as one of the Editorial Board Members of this journal. We declare that Fabio Medas had no involvement in the review of this article and has no access to information regarding its review. Other authors declare no conflict of interest.

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