Current Practices and Perspectives on Ambulatory Thyroid Surgery in Italy: A Survey by the Società Italiana Chirurgia Endoscopica e Nuove Tecnologie (SICE) in Preparation for the DECORATED Trial

Ann. Ital. Chir., 2025 96, 12: 1745–1755
https://doi.org/10.62713/aic.4015

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AIM: The Coronavirus disease 19 (COVID-19) pandemic has significantly impacted elective thyroid surgery, leading to a reduction in procedures and an increase in waiting lists. In response, thyroidectomy is increasingly being performed as an outpatient procedure worldwide, with comparable outcomes and readmission rates to those of overnight stays after surgery in high-volume centers. However, in Italy, ambulatory thyroid surgery is rarely practiced because of concerns about the safety and efficacy of such approaches. This specific timeframe represents a unique opportunity to capture a snapshot of the Italian thyroid surgery practices and drive a practice change while providing a practical solution to the huge backlog of procedures.

METHODS: A survey was conducted among Italian surgical centers to assess their practices and preferences regarding various aspects of thyroid surgery, including preoperative assessment, intraoperative techniques, and postoperative care. The survey also explored the use of minimally invasive approaches and the adoption of day surgery or overnight stay procedures. Data were collected through a structured questionnaire. The survey data were analyzed using descriptive statistics and clustering techniques to identify patterns and groupings among surgeons on the basis of their responses.

RESULTS: A variety of practices have emerged among surgeons performing thyroid surgery, with varying preferences for hemostatic methods, additional hemostasis techniques, and the use of drains. A significant proportion of surgeons (47%) still favor traditional inpatient stays for thyroid surgery, whereas others offer day surgery or overnight stays for selected cases (53%). The use of intraoperative nerve monitoring is widespread (73%), but the choice of monitoring methods and the factors influencing its use vary among surgeons. Only 21% of surgeons rely solely on traditional suture ligations for hemostasis, whereas 41% routinely use hemostatic absorbable gauze for additional hemostasis. Minimally invasive approaches, such as Minimally Invasive Video-Assisted Thyroidectomy (MIVAT) (23%) and robotic surgery (7%), are also utilized. Day surgery is offered only in academic hospitals and endocrine surgery referral centers.

CONCLUSIONS: Significant variation exists in thyroid surgery practices, emphasizing the need for further research and standardized protocols, particularly in areas such as preoperative assessment, hemostasis techniques, and postoperative care. By establishing best practices, surgeons can confidently expand the offering of day-surgery and one-day surgery options, leading to shorter waiting lists and improved patient care. This shift toward more efficient and patient-centered approaches requires collaborative efforts among surgeons and hospitals to ensure safety and optimal outcomes for patients undergoing thyroid surgery.

Keywords: thyroidectomy; MIVAT; ambulatory surgery; day surgery thyroidectomy

Introduction

The Coronavirus disease 19 (COVID-19) pandemic has disrupted healthcare systems worldwide, postponing or canceling numerous elective surgical procedures. Thyroid surgery has been particularly affected, with some Italian centers reporting reductions in surgical volume of up to

Submitted: 20 February 2025 Revised: 17 March 2025 Accepted: 3 April 2025 Published: 18 November 2025
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65% during peak pandemic phases [1]. This significant backlog of procedures highlights an urgent need for effective solutions to address the accumulated demand for surgical care.

Many countries have gradually adopted ambulatory thyroidectomy. Large centers worldwide have shown that properly selected patients undergoing day-case thyroidectomy can experience excellent outcomes, including low rates of compressive hematoma and readmission rates comparable to those of traditional inpatient care [2]. Benefits such as shorter hospital stays, reduced healthcare costs, and improved patient satisfaction are particularly relevant when optimizing surgical services and hospital resources.

Despite these advantages, Italy has been slow to adopt outpatient thyroid surgery. The contributing factors include concerns about patient safety, lack of standardized postoperative protocols, and limited infrastructure for postoperative home care. Italian surgeons often prefer the perceived safety of inpatient care because of potential risks associated with thyroid surgery, such as postoperative bleeding, hypocalcemia, and recurrent laryngeal nerve injury. Furthermore, the absence of national guidelines for outpatient thyroidectomy may hinder the transition to this model.

Addressing these challenges is critical, as the current surgical backlog presents an opportunity to reassess thyroid surgery practices in Italy and align them with international trends. Understanding the current practices and preferences of Italian surgeons can help develop strategies to facilitate the adoption of outpatient thyroid surgery, thereby improving patient care and reducing surgical wait times.

Through this study, the Società Italiana Chirurgia Endoscopica e Nuove Tecnologie (SICE) sought to capture current thyroid surgery practices in Italy. The secondary objectives included identifying patterns and variations in preoperative assessment, intraoperative techniques, and postoperative care, as well as evaluating the adoption rates of minimally invasive approaches and day-surgery options. This survey also sets the stage for the DECORATED (ambulatory thyroid surgery for the recovery of surgical waiting lists after COVID-19) trial, which aims to establish structured guidelines to ensure safe one-day thyroidectomy in properly selected patients, reduce waiting lists, and ultimately improve patient care.

Methods

This study utilized a cross-sectional survey design to assess current thyroid surgery practices across Italian surgical centers. The survey aimed to capture data regarding preoperative assessment, intraoperative techniques, minimally invasive approaches, and postoperative care. A copy of the survey is available in the **Supplementary Material**. The data collection period spanned from 1 June 2024 to 31 October 2024, during which responses were collected from participating surgical centers across Italy. Eligible participants included surgeons performing thyroid surgery in Italian centers from various settings, such as academic hospitals, community hospitals, and referral centers specializing in endocrine surgery, to ensure that the survey provided a representative snapshot of Italian thyroid surgery practices. Data on the characteristics of the participating centers, including type (academic, referral, or community hospital), geographical region, and experience level of the surgeons (e.g., years of experience, surgical volume), were collected. These data provided context for the survey responses, enabling comparisons across different institutional settings and experience levels. The survey did not explicitly collect detailed patient selection criteria for ambulatory surgery. The structured questionnaire was developed through a comprehensive review of the literature and in consultation with thyroid surgery experts to ensure that it addressed relevant aspects of thyroid surgery practices. The questionnaire underwent preliminary testing for clarity and reliability before distribution.

The questionnaire covered five main sections:

1. Preoperative assessment: Standard preoperative procedures, diagnostic imaging practices, and risk assessment protocols.
2. Intraoperative techniques: Preferred hemostatic methods (e.g., suture-ligations, hemostatic gauze, advanced bipolar sealers, and ultrasonic dissectors), intraoperative neurophysiological monitoring (IONM), and specific techniques used for thyroidectomy.
3. Postoperative care: Drain usage policies, patient discharge criteria, and postoperative monitoring protocols.
4. Minimally invasive approaches: Adoption rates and usage of approaches such as Minimally Invasive Video-Assisted Thyroidectomy (MIVAT) and/or robotic/endoscopic procedures.
5. Ambulatory practices: Frequency of day surgery or overnight-stay thyroidectomy, obstacles limiting its wider implementation, patient selection criteria and institutional resources for these practices. In this study, “day surgery” refers to procedures in which patients are discharged within 12 hours without an overnight hospital stay.

The questionnaire was pilot-tested among a subset of sur geon members of the SICE to ensure reliability and to refine the questions for clarity. Feedback was incorporated to improve the instrument’s alignment with the study objectives.

The survey was distributed electronically through a secure online platform, with invitations sent via email to potential participants among SICE members and via advertisements on the societal website. The participants were informed about the study’s purpose, the voluntary nature of participation, and the confidentiality of their responses.

Informed consent was obtained from all participants prior to survey completion, and the study protocol was waived by relevant institutional review boards. Participation was entirely voluntary, and participants could withdraw at any

point without consequence. The data were anonymized to protect the participants' identities and ensure confidentiality.

The internal consistency and reliability of the questionnaire were evaluated using Cronbach's alpha for each construct assessed by multiple questions. Constructs assessed included preoperative assessment, intraoperative techniques, postoperative care, and ambulatory practices. Cronbach's alpha values equal to or greater than 0.70 were considered acceptable. The ambulatory practices construct demonstrated excellent internal consistency (Cronbach's alpha = 0.91), indicating high reliability of these questions. Constructs related to preoperative assessment (Cronbach's alpha = 0.33) and intraoperative techniques (Cronbach's alpha = 0.40) had lower internal consistency, suggesting variability in practices.

Data analyses were performed using R Statistical Software (v4.1.2, R Foundation for Statistical Computing, Vienna, Austria). Descriptive statistics summarized survey responses, and associations were tested via contingency tables and Monte Carlo Fisher's exact tests (B = 1,000,000 replicates). Statistical significance was set at a two-sided p-value of <0.05. Google Analytics provided visual representation of the data.

Results

Fifty-six questionnaires were returned; one was excluded because the respondent practiced outside Italy. Thus, 55 surveys were analyzed. Academic hospitals represented 56.4% of the respondents, endocrine referral centers 25.2%, with the remainder from community hospitals, district hospitals, or private practices.

- High-volume surgeons (more than 100 thyroid surgeries annually): 22 respondents (40%).
- Moderate-volume surgeons (26–100 surgeries annually): 18 respondents (32.7%).
- Low-volume surgeons (less than 25 surgeries annually): 15 respondents (27.3%).

Only 34.5% were exclusively endocrine/thyroid surgeons; the rest practiced broader general surgery (Fig. 1).

The survey respondents were mostly male (74.5%), with only 25.5% female, and all age groups were almost evenly represented. The most represented age group was 25–34 years (32.7%) (Fig. 2).

Only 14.5% of the respondents were still undergoing residency at the time of the survey, while 85.5% of the surgeons had completed their formal surgical training.

A significant proportion of surgeons (47%) still favors traditional inpatient stays for thyroid surgery, whereas others offer day surgery or overnight stays for selected cases (53%). The majority of the survey takers perform inpatient thyroid surgeries, while day surgery is less frequently offered, with only a subset of academic and high-volume centers utilizing it routinely.

Fourteen respondents described overnight stays for total thyroidectomy, whereas the majority of the responding centers (39/55) reported a median postoperative stay of 2 days. Only 2 centers offer solely traditional inpatient stays of 3+ days (Table 1 and Fig. 3). No significant associations were evident among the institution types and relative length of stay (Monte Carlo Fisher's exact test, $p = 0.101$).

Centers performing day surgeries were rare and primarily in high-resource institutions (2 academic hospitals and 1 endocrine referral center). The main reasons cited for preferring overnight stays included monitoring for hematoma formation, hypocalcemia and bleeding risks.

The preferred hemostasis methods varied significantly across institution types (Table 2). University/academic hospitals showed a strong preference for advanced energy devices, such as Ligasure Small Jaw (8 respondents), Ligasure Exact (5 respondents), and Focus harmonic scalpel (2 respondents), though traditional suture-ligations were also used by 8 respondents.

Endocrine surgery referral centers favored Focus harmonic scalpel (4 respondents) and suture-ligations (7 respondents), showing a balanced use of traditional and advanced methods.

Community and district hospitals tended to use suture-ligations and hemostatic clips, with limited adoption of advanced tools such as Thunderbeat or Focus harmonic scalpel, likely reflecting resource constraints.

Private institutions showed a more varied approach, with some surgeons using Focus harmonic scalpel and Ligasure Small Jaw, depending on available resources.

These results indicate that access to advanced hemostatic tools is more common in university and endocrine referral centers.

Moreover, in respondents' practice, in 41% of cases they also typically use additional hemostasis methods, before closing the surgical site, such as absorbable gauze (e.g., Surgicel, Spongostan, etc.), fibrin glue, absorbable collagen, collagen and thrombin gelatin granules. Only 14 (25.5%) respondents do not use any additional method of hemostasis.

The use of intraoperative nerve monitoring is widespread (73%), but the choice of monitoring methods and the factors influencing its use vary among surgeons. Routine IONM was predominantly adopted by high-volume surgeons (20 out of 22 respondents), reflecting a focus on reducing the risk of recurrent laryngeal nerve injury. In contrast, only 5 out of 15 low-volume surgeons reported using IONM, indicating that its adoption is probably limited by resource availability or procedural familiarity in lower-volume settings. Furthermore, the majority of respondents who adopted IONM used the intermittent intraoperative neurophysiological monitoring (I-IONM) method (95%). In contrast, only 15% used continuous intraoperative neurophysiological monitoring (C-IONM) with automatic periodic stimulation by placing a clip on the vagus nerve. The decision to not routinely use IONM during thy-

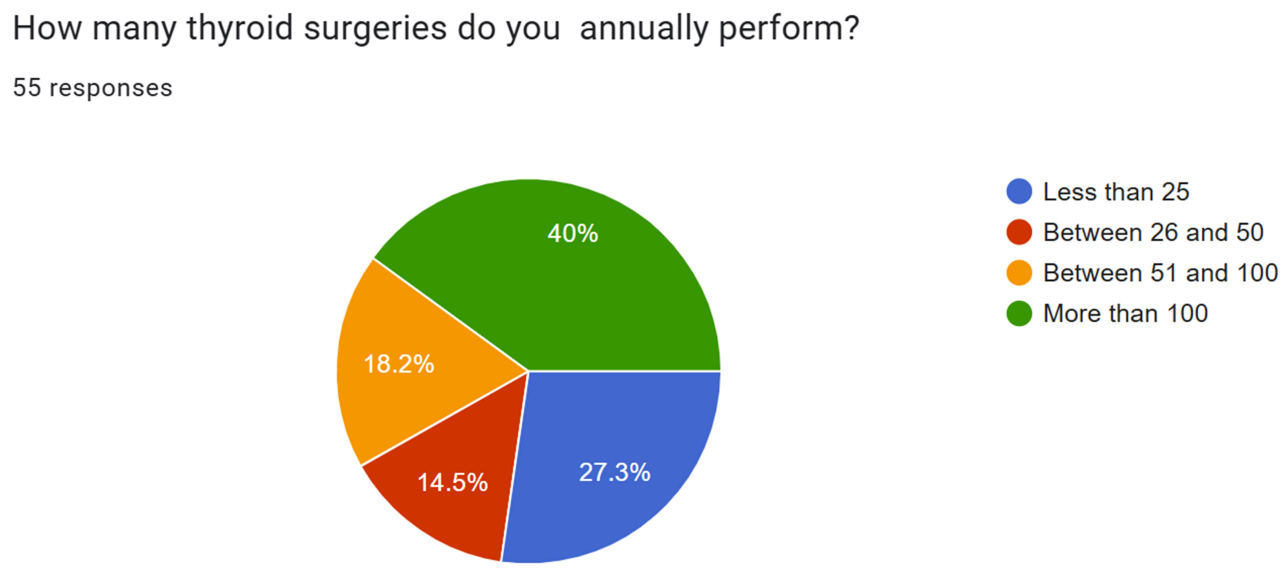

Fig. 1. Relative percentages of thyroid surgeries performed annually by respondents.

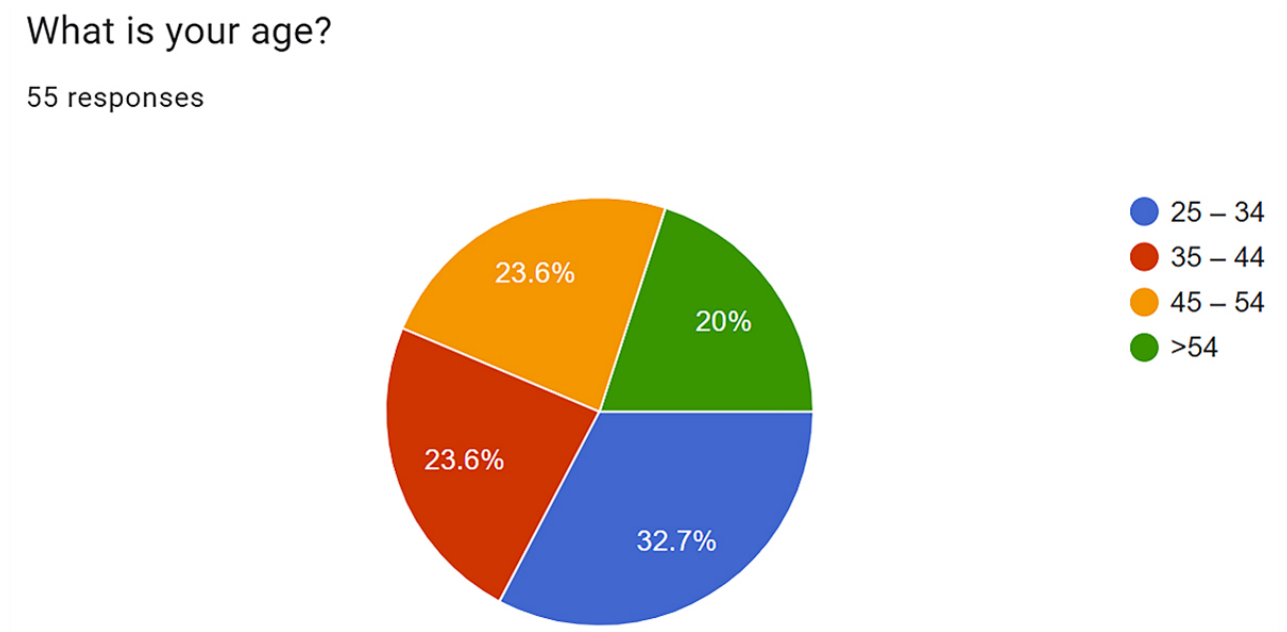

Fig. 2. Survey respondents by age group.

roid surgery is influenced by many factors; the most common are cost considerations, uncertainties about its effectiveness, and limited access to necessary equipment.

Common complications leading to overnight observation included the following:

- Hypocalcemia: A major concern among respondents (46/55), indicating that hypocalcemia is a primary reason for monitoring.
- Hematoma formation: remained the paramount concern for early discharge for both high-volume (10/22) and moderate-volume surgeons (6/18), given the risk of airway compromise.
- Bleeding risk: This was a similarly prevalent concern across all surgical volumes respondents. A comparison of hemostasis methods with bleeding risk concerns provided insight into their perceived effectiveness:

Focus harmonic scalpel: Widely used among surgeons with minimal bleeding concerns (5 respondents) but was still associated with some bleeding risk monitoring (4 respondents), indicating reliable yet cautious use.

Ligasure Small Jaw: Frequently used by surgeons with no bleeding concerns (7 respondents), suggesting it is perceived as highly effective for bleeding control.

Suture ligations: Equally divided between those with and without bleeding concerns (9 in each group), reflecting a balanced perception of effectiveness.

Electrocautery and hemostatic clips: Limited use, mostly among lower-volume centers, with a slight ten-

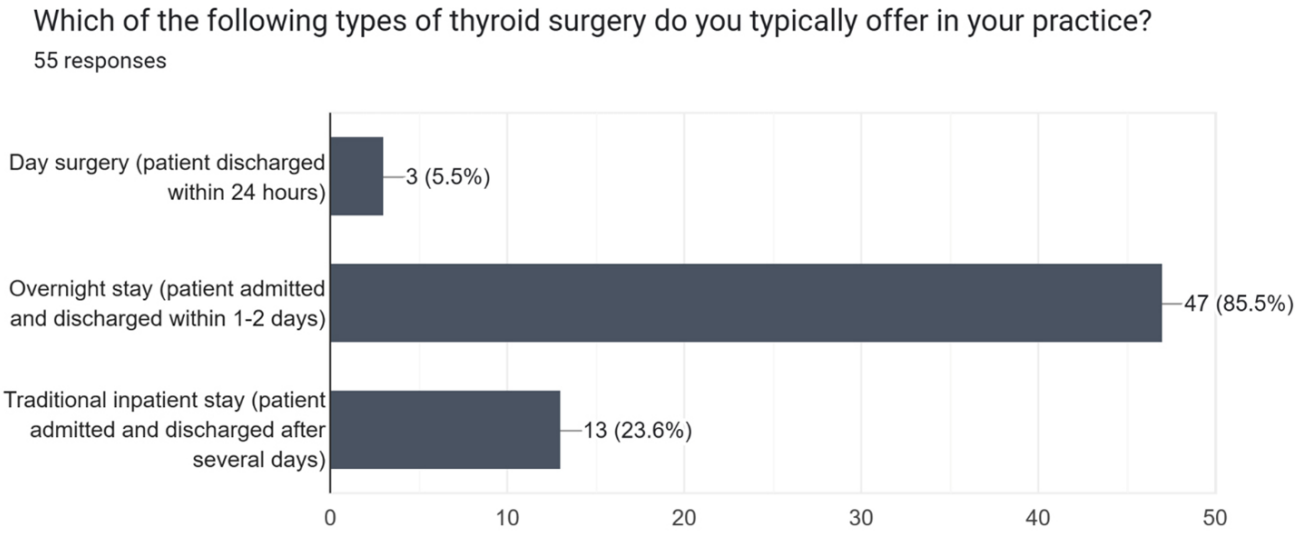

Fig. 3. Types of hospitalization offered by the respondents' centers to patients undergoing thyroid surgery.

Table 1. Association between type of practice and length of stay after total thyroidectomy.

Type of practice	Length of stay (LOS) after total thyroidectomy			Total
	One-day surgery (overnight stay)	2 days	3 days or more	
Endocrine surgery referral center	4	10	0	14
University/academic hospital	5	25	1	31
Community hospital	1	2	1	4
Private practice	2	1	0	3
District hospital	2	1	0	3
Total	14	39	2	55

Monte Carlo Fisher's exact test, $p = 0.101$.

dency for bleeding monitoring, suggesting they are reserved for lower-risk cases.

- Lack of social support: Less commonly cited, although some high-volume surgeons (5 respondents) reported this as a factor influencing overnight stays, reflecting the need for stable home environments post-discharge.

Drains were routinely used by 74.5% of the participants after total thyroidectomy, with lower usage (54.5%) after lobectomy (Table 3, Figs. 4,5). No statistically significant association was found between the minimally invasive surgery (MIS) approach and routine drain placement at Monte Carlo Fisher's exact test ($p = 0.137$). After combining similar MIS approaches and pooling the "Yes" and "Occasionally" columns into a single "Drain used" category, a Fisher's exact test was repeated. Nevertheless, no statistically significant association between approach and drain usage was found ($p = 0.443$).

Ultrasound was widely used for preoperative assessments, with high-volume and academic centers reporting routine usage. Ultrasound is personally performed by 45.5% of the survey participants on patients before surgery while 43.6% prefer to have the ultrasound performed by a trained radiologist/ultrasound technician. University and referral centers showed a greater tendency for in-house or trained radiologist/technician-performed ultrasounds than community and district hospitals, which often relied on selective or external ultrasound assessments. Only 10.9% do not systematically use preoperative ultrasound, but only in selected cases.

Preoperative assessment of vocal cord function in thyroid surgery patients is always performed with flexible fiberoptic laryngoscopy in 61.8% of cases, in 7.3% with mirror laryngoscopy, in 3.6% with rigid transoral laryngoscopy, while 27.3% of the respondents perform a preoperative assessment of vocal cords only in selected cases. Preoperative assessment (Cronbach's alpha = 0.33) and intraoperative techniques (Cronbach's alpha = 0.40) constructs had lower internal consistency, suggesting variability in practices.

Instead, in the postoperative period, 10.9% of the respondents routinely perform a flexible laryngoscopy before discharge as part of their standard post-operative care for thyroid surgery patients. 9.1% routinely perform a flexible laryngoscopy at the first post-operative clinic visit. The remaining part, which is the majority, does not perform routine flexible laryngoscopy after thyroid surgery, or only occasionally, or only after total thyroidectomy. The postoperative care question bundle had acceptable reliability (Cronbach's alpha = 0.44).

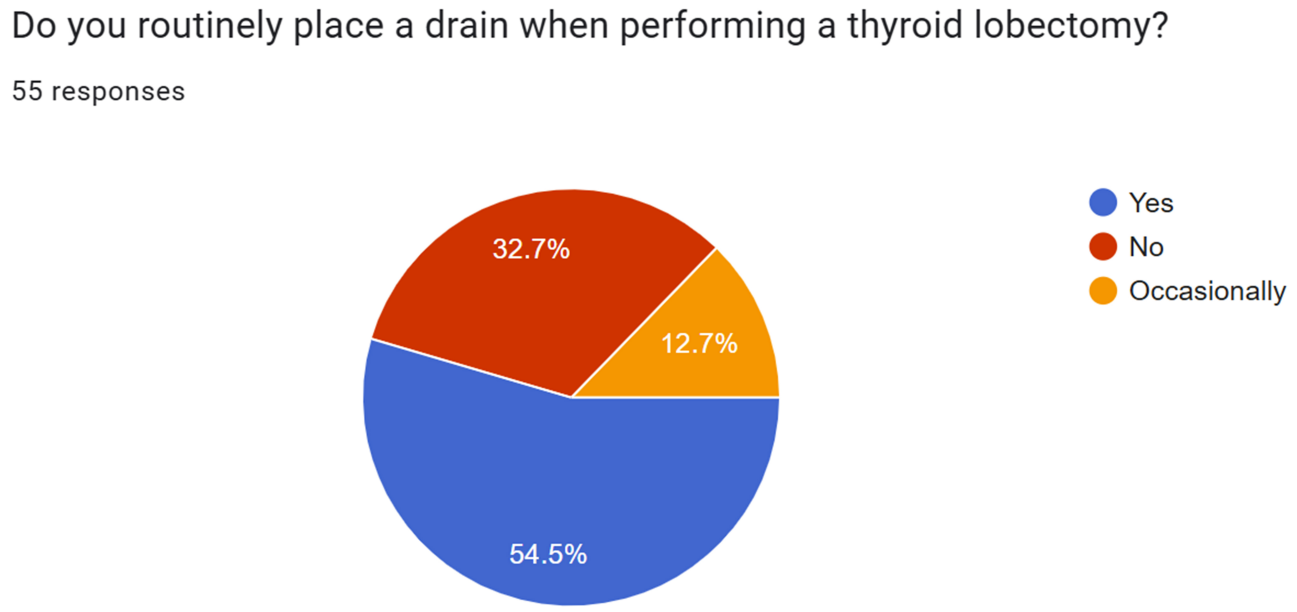

Fig. 4. Percentage of respondents who do or do not regularly place a drain after thyroid lobectomy.

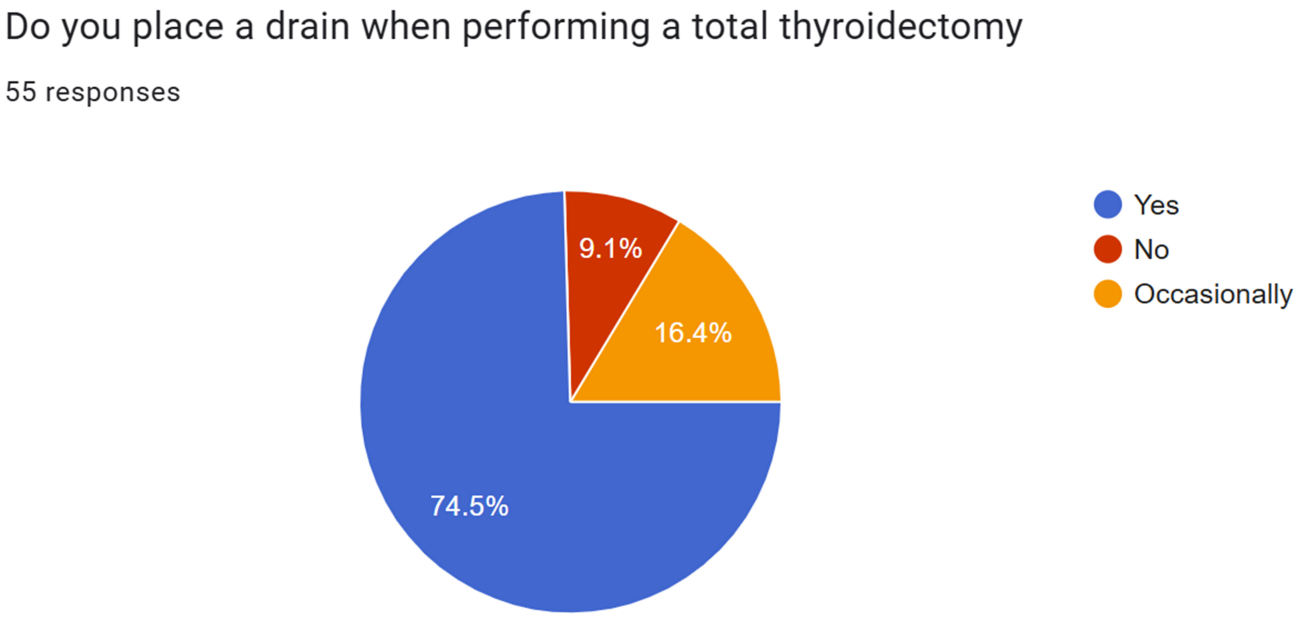

Fig. 5. Percentage of respondents who do or do not place a drain after total thyroidectomy.

Only 23% of the respondents performed MIVAT, and 7% adopted robotic or distant-access approaches, mostly in high-volume or academic settings. These centers also reported slightly greater acceptance of 24-hour discharge, assuming robust postoperative nursing and patient support. This trend aligns with the availability of advanced resources and training, allowing for the selective use of minimally invasive approaches in complex or specialized cases. This question set related to ambulatory practices demonstrated excellent internal consistency (Cronbach's alpha = 0.91), indicating high reliability of these questions.

Discussion

This study provides a comprehensive overview of current thyroid surgery practices across various Italian surgical centers, highlighting significant variability largely related to institutional volume and resource availability. Although most respondents (40%) identified as high-volume surgeons (>100 surgeries/year), a sizeable proportion were moderate-volume (32.7%) or low-volume (27.3%), and only 34.5% of respondents focused exclusively on endocrine or thyroid procedures. These results help explain the uneven adoption of advanced techniques and day-case models: high-volume and academic hospitals generally

Table 2. Preferred hemostasis method for the thyroid blood vessels for the different types of practices.

Preferred hemostasis method for the thyroid blood vessels	Type of practice					Total
	Endocrine surgery referral center	University/academic hospital	Community hospital	Private practice	District hospital	
Suture-ligations	7	8	1	0	1	17
Hemostatic clips	1	3	1	0	0	5
Electrocautery (monopolar or bipolar)	0	1	1	0	0	2
Focus harmonic scalpel	4	2	1	2	0	9
Ligasure Small Jaw	2	8	0	1	0	11
Thunderbeat	0	4	0	0	1	5
Ligasure Exact	0	5	0	0	1	6
Total	14	31	4	3	3	55

Table 3. Association between the surgical approach and routine drain placement for total thyroidectomy.

MIS approaches	Routine drain placement for total thyroidectomy			Total
	Yes	No	Occasionally	
Distant access techniques (e.g., axillary approach, periareolar, sublcavicular)	1	0	0	1
Distant access techniques (e.g., axillary approach, periareolar, sublcavicular), robotic thyroid surgery	1	0	0	1
Minimally Invasive Video-Assisted Thyroidectomy (MIVAT)	12	2	4	18
MIVAT, robotic thyroid surgery	0	0	1	1
MIVAT, transoral endoscopic thyroidectomy vestibular approach (TOETVA)	3	2	0	5
Robotic thyroid surgery	0	0	1	1
Robotic thyroid surgery, TOETVA	1	0	0	1
None of the above	23	1	3	27
Total	41	5	9	55

Monte Carlo Fisher's exact test, p-value = 0.137.

have greater access to advanced energy devices (e.g., Ligasure Small Jaw, Focus harmonic scalpel, etc.) and routine IONM, used by 20 out of 22 high-volume surgeons. In contrast, lower-volume or community institutions more often rely on traditional suture ligation or metal clips, reflecting both resource constraints and a more conservative clinical approach.

Despite growing evidence that day-case thyroidectomy can be safely performed in well-selected patients [2–9], the survey showed that most respondents still favored at least an overnight stay, with only a subset of academic and high-volume centers offering one-day surgery. Compared to countries with established outpatient thyroid surgery protocols, Italy exhibits a more conservative approach. For instance, studies from the United States [2,6] report outpatient thyroidectomy success rates exceeding 70% with low complication profiles. In these settings, standardized protocols and rigorous patient selection have facilitated early discharge, a practice that remains relatively underdeveloped in Italy [3]. Adopting standardized international guidelines and practices could probably facilitate the broader implementation of ambulatory surgery in Italy.

Concerns regarding hypocalcemia (cited by 46/55 respondents), compressive hematoma, and broader bleeding risks remain key reasons for extended admission, a practice aligning with international evidence highlighting these risks in thyroidectomy [7,8]. Indeed, the relatively low incidence of hematoma (0.4–4.2%) does little to mitigate its potentially life-threatening nature. While most postoperative neck hematomas occur within the first 6 hours, 10–20% can arise after 24 hours, and require emergent management [10,11]. Moreover, risk factors such as male sex, hypertension, and autoimmune disease (Graves', Hashimoto's) have been associated with higher rates of compressive hematoma [10]. Additionally, roughly half of the hematomas requiring reintervention may arise beyond the immediate postoperative window [6]; this finding underlies the reluctance of many Italian centers to discharge patients early. Surgeons emphasize the need to control patients' systolic blood pressure below 150 mmHg in the first 24 hours, manage postoperative pain and limit coughing or retching. Such protocols, also recommended by recent guidelines from the Association Francophone de chirurgie Endocrinienne [11], may reduce hematoma risk.

Despite these concerns, recent data suggest that with careful risk stratification, especially vigilant blood pressure control and the management of cough, vomiting, or other triggers, a significant proportion of thyroid operations can be performed with an overnight stay or even as a true day-case surgery [7,11].

Hypocalcemia is another major factor in extending hospital stays. The measurement of Parathyroid Hormone (PTH) in

the early postoperative period—often at 4, 6, or 24 hours—has become a reliable means of identifying high-risk patients who need prolonged calcium or vitamin D supplementation. Indeed, a Spanish cohort demonstrated that combining calcium and intact PTH checks 24 hours postoperatively could safely identify up to half of thyroidectomy patients for early discharge [4]. This approach can be especially valuable in high-volume centers seeking to reduce the length of stay without compromising patient safety.

A further point of controversy relates to routine drain placement, which is historically considered beneficial for detecting active bleeding or to prevent fluid collections. However, emerging evidence, including large national database analyses [12] and meta-analyses [13], shows that prophylactic drains do not significantly reduce postoperative neck hematoma rates and may prolong the length of stay and possibly increase infection risk. Consistent with these data, some high-volume centers in Italy have increasingly opted out of drain usage for standard thyroidectomies, as shown by this survey.

Finally, concerns about readmissions concerns, especially in high-risk patients, have slowed the adoption of ambulatory or 23-hour discharge models. However, several large-scale comparisons have demonstrated that outpatient thyroidectomy can be performed safely in more than 70% of cases in specialized units, with no difference in mortality or major complications compared with inpatient procedures in well-selected patients [2,6]. The preference for overnight stays also reflects a conservative approach within the Italian healthcare context, where cultural and institutional practices favor extended postoperative observation to ensure patient safety.

The integration of advanced technology such as IONM and advanced bipolar or ultrasonic shears is also associated with lower rates of bleeding in high-volume institutions [5]. Many centers see the standardization of preoperative risk stratification, strict postoperative protocols (for hematoma, hypocalcemia, and Recurrent laryngeal nerve (RLN) palsy), and telemedicine follow-up as crucial steps in safely expand day-case surgery.

The pandemic-related reduction in elective surgeries has led to significant backlogs in thyroid surgery [1]. In this context, exploring pathways to safely implement day surgery could help alleviate this backlog. For centers with high surgical volumes, access to advanced energy devices and routine IONM, transitioning to outpatient models could be viable. These centers already exhibit lower complication rates associated with advanced hemostasis methods, potentially enabling safe early discharge without compromising patient outcomes [3]. Implementing pilot programs in high-resource settings to assess the outcomes of day surgery models could help pave the way for broader adoption, as success in these centers could encourage more widespread implementation and standardization.

Despite its proven benefits in other contexts, the reluctance to adopt day surgery underscores specific barriers. First, the responding surgeons show a strong preference for monitoring complications such as hematoma formation, including hypocalcemia and bleeding, overnight. High-volume centers tend to feel more confident in early discharge for select patients, but many lower-volume or resource-limited centers remain cautious. These preferences highlight the importance of risk mitigation and established safety protocols for broader day surgery adoption.

Advanced hemostatic tools and IONM are less accessible in community and district hospitals, which rely more on traditional techniques. Expanding the availability of these resources could increase confidence in early discharge and enabling a shift towards outpatient practices.

The adoption of advanced surgical techniques, including Minimally Invasive Video-Assisted and robotic surgery, remains limited in Italy, at least in the responding centers, and is concentrated in high-volume and academic settings. Increased training and education opportunities for surgeons in low-volume settings could help disseminate these techniques more widely among Italian surgical centers.

To address these challenges, several recommendations emerge from this study. Initiating day surgery programs in academic and referral centers with the established use of advanced hemostasis and monitoring tools could provide robust outcome data, serving as models for outpatient protocols. Standardized guidelines for outpatient thyroid surgery, particularly concerning patient selection criteria, hemostasis methods, and monitoring protocols, would provide a framework for thyroid surgeons across Italy. Establishing criteria for using advanced hemostasis techniques and routine IONM could also help improve care consistency and encourage evidence-based practices. Investment in surgical equipment and training programs at lower-volume centers, including community and district hospitals, could help bridge the gap in resource availability. Access to tools such as Ligasure and IONM could enhance surgeons' ability to adopt day surgery without compromising patient safety.

The relatively high Cronbach's alpha (0.91) for ambulatory practice-related questions suggests excellent internal consistency, indicating these items reliably assess a cohesive underlying construct. However, constructs measuring preoperative and intraoperative practices yielded lower alpha values, reflecting variability in surgeons' responses and potentially indicating diverse interpretations or practices. This finding highlights the need for future refinement of these questionnaire items or deeper exploration into the factors influencing this variability.

Although this study provides valuable insights into thyroid surgery practices across various Italian centers, several limitations should be noted. Firstly, due to the voluntary nature of the survey, there is an inherent sampling bias, as surgeons from high-volume centers or those with greater interest in advanced surgical techniques may have been more inclined to participate. This selection bias likely results in an overrepresentation of certain practices and viewpoints,

potentially limiting the generalizability of findings, especially within lower-resource or community hospital settings. Furthermore, the survey sample exhibited a gender imbalance (with 74.5% male respondents) and may reflect additional biases related to geographical location and hospital type, which could further influence the findings. Additionally, the relatively modest sample size and the reliance on self-reported data further restrict the study's ability to capture the full scope and diversity of thyroid surgery practices throughout Italy. These limitations should be carefully considered when interpreting the results, particularly in the context of resource-limited or less-represented healthcare facilities. The study uses indirect measures (such as surgeon-reported concerns and preferences) to assess the effectiveness of certain hemostasis techniques and complication management practices. While these insights are valuable, they cannot replace direct clinical outcome data. Future studies would benefit from tracking actual complication rates, readmission data, and patient outcomes to provide a more objective assessment of technique effectiveness.

As a cross-sectional survey, this study captures practices and opinions at a single point in time. Thus, it cannot account for changes in practices that may occur over time due to evolving guidelines, technological advances, or individual surgeon experience. A longitudinal approach could provide more robust data on trends and practice changes within Italian thyroid surgery.

The survey design did not allow for the collection of patient-level data, which limits insights into the direct correlation between specific practices (e.g., preferred hemostasis methods or monitoring techniques) and patient outcomes such as postoperative bleeding, hypocalcemia, or recurrent laryngeal nerve injury. Future research should consider including patient outcomes as a metric to better understand the impact of these practices on safety and effectiveness.

The study does not fully address the variability in institutional resources across the surveyed centers, such as differences in access to advanced surgical tools or staffing levels. These resource-related differences are likely to impact practices and preferences, particularly between academic centers and smaller hospitals, and could influence the feasibility of adopting certain techniques, such as minimally invasive surgery or day surgery protocols, in resource-limited settings. These centers, in fact, face distinct challenges such as inadequate infrastructure, limited access to advanced surgical equipment, and insufficient staff training. Addressing these issues will require targeted interventions, including investment in infrastructure, tailored training programs, and regional collaborations to share expertise and resources.

Despite these limitations, we believe that this study offers a valuable overview of thyroid surgery practices in Italy and highlights key areas for future research and improvement, particularly in standardizing protocols and expanding the adoption of outpatient surgery models where feasible.

This study highlights several opportunities for further investigation to enhance thyroid surgery practices and address current limitations in the Italian healthcare system. Key recommendations for future research include conducting longitudinal studies that track patient outcomes following day surgery. Such studies could provide robust data on safety, complication rates, and patient satisfaction and should examine the effects of day surgery on postoperative bleeding, hypocalcemia, and hospital readmissions to establish evidence-based guidelines tailored to the Italian context. Economic assessments are essential for evaluating the cost savings and feasibility of transitioning to day surgery models in Italy. Multicenter studies comparing Italian practices with those in countries that have successfully implemented ambulatory thyroid surgery are needed. These studies should control for patient selection, hospital resources, and standardized postoperative protocols. Research should compare the costs associated with inpatient and outpatient thyroidectomy, factoring in potential reductions in hospital stays, resource use, and overall healthcare costs. These findings could support policymakers in advocating for investment in outpatient surgery infrastructure. Given the variation in practices across institution types, future research should collect patient-level data on surgical outcomes within different hospital settings, such as academic hospitals, referral centers, and community hospitals. This could help to identify specific factors within each setting that contribute to improved outcomes, informing targeted interventions to enhance the quality of care. Future studies should also examine the impact of specific tools (e.g., Ligasure, Focus harmonic scalpel) on intraoperative blood loss, postoperative bleeding, and patient recovery times to better understand the effectiveness of various hemostasis methods. Randomized controlled trials comparing different methods could provide evidence-based insights into optimal bleeding management techniques.

Research focused on evaluating the effectiveness of complication monitoring protocols (especially those related to bleeding, hematoma formation, and hypocalcemia) could help develop standardized postoperative care pathways. These studies should aim to establish clear criteria that differentiate between patients who need overnight observation and those who can safely be discharged early, thus encouraging the wider adoption of day surgery. Additionally, since limited social support is a significant barrier to early discharge, further research should explore the development of patient-centered support systems. This could include telehealth follow-ups, community-based care, and at-home monitoring of complications. Integrating telemedicine and remote patient monitoring may offer effective solutions by ensuring continuous surveillance after surgery, enabling prompt interventions when complications occur, and enhancing patient education and support. Ultimately, this approach could facilitate earlier discharge without compromising patient safety. Establishing a national registry to collect standardized data on thyroid surgery outcomes, sur-

gical techniques, and complications would facilitate large-scale, data-driven studies. Such a registry could enable continuous evaluation of thyroid surgery practices across Italy and support ongoing improvements in clinical guidelines and resource allocation. Future research addressing these areas would provide the evidence needed to refine thyroid surgery practices, enhance patient outcomes, and support a gradual shift toward more efficient, safer, and standardized protocols.

Conclusions

This study reveals significant variability in thyroid surgery practices across Italian institutions, with high-resource centers favoring advanced hemostasis techniques and the routine use of IONM, while lower-resource settings rely more on traditional methods. Concerns about bleeding and hypocalcemia limit the adoption of day surgery, despite its safety in high-volume settings internationally. Standardized guidelines, resource investment, and targeted training, especially in lower-resource settings, along with the integration of telemedicine, are recommended to support the safe implementation of day surgery and to align practices more closely with international standards, ultimately reducing surgical backlogs while maintaining excellent outcomes.

Availability of Data and Materials

All data included in this study can be obtained by contacting the corresponding author if needed.

Author Contributions

FMC, AC, GC, VP, SM, FDA, GS, GA, DC, and ER conceived and designed the study and performed the research. FMC also analyzed the data and drafted the initial version of the manuscript. All authors contributed to important editorial changes in the manuscript. 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.

Ethics Approval and Consent to Participate

An ethics committee is not required for questionnaire-based studies as per the journal's policy. The survey data is anonymized and aggregated, does not involve any patient data, poses no risk of criminal or civil liability, and is not damaging to the participants' financial standing, employability, or reputation. All survey participants have provided their explicit consent to participate in the study and to data publication on a voluntary basis.

Acknowledgment

On behalf of SICE Decorated Study Group: Clementi Marco, Boniardi Marco, Curcio Silvia, Impellizzeri Harmony, Avella Pasquale, Oragano Luigi, Festa Federico, Fassari Alessia, Pino Antonella, Iacobone Maurizio, De Capua Michele, Dionigi Gianlorenzo, Caruso Ettore, Di Filippo Giacomo, Fratarcangeli Riccardo, Feroci Francesco, Dobrinja Chiara, Fama' Fausto, Antonelli Amedeo, Vallo Antonio, Palomba Giuseppe, Ammerata Giorgio, Anoldo Pietro, Evola Giuseppe, Vacante Marco, Piazza Luigi, Fernicola Agostino, Tucceri Cimini Irene, Perra Teresa, Porcu Alberto, Ristagno Serenella, Bossotti Maurizio, Castagnola Giorgio, Del Rio Paolo, Bononi Marco, Palmieri Livia, Minuto Michele, Panconesi Roberto, Talarico Carlo Alessandro Maria, Barbieri Diego, Leone Nicola, Fortuna Laura, Badii Benedetta, Giudici Francesco, Capuzzolo Sabino, Frustaci Gianluca, Mullineris Barbara, Materazzi Gabriele, Sessa Luca, Attard Andrea, Cardamone Eugenia, Andreuccetti Jacopo, Cestino Luca, Antonino Antonio, Saviello Cosimo, Corallino Diletta.

Funding

This research received no external funding.

Conflict of Interest

The authors declare no conflict of interest.

Supplementary Material

Supplementary material associated with this article can be found, in the online version, at https://doi.org/10.62713/aic.4015.

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