

Preoperative information for thyroid surgery

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Abstract: The preoperative information necessary to communicate to the patient to obtain informed consent in thyroid surgery is not detailed in length in the current medical literature. Advances in technology and the advent of remote access approaches in thyroid surgery have increased the need for a detailed communication of risks, benefits and alternatives to achieve an informed consent. In this review article, we outline the indications for thyroid surgery, risks of thyroid surgery, different approaches to thyroidectomy, and possible consequences of using advanced technology using intraoperative nerve monitoring (IONM) as an example. A truly detailed informed consent in the modern age of thyroid surgery is crucial. This article not only details the risks, benefits and alternatives of thyroid surgery, but also incorporates new practices, guidelines and technologies to allow patients to achieve a comprehensive preoperative understanding of treatment recommendations.

Keywords: Preoperative information; thyroid surgery; intraoperative nerve monitoring (IONM)

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Introduction

For patients undergoing thyroid surgery, there is a changing standard of care. A thyroidectomy, whether it is partial or total, is set against standards of excellent outcomes, low risks and patient satisfaction. With the recent revision of professional society practice guidelines and paradigms, the indications for thyroid surgery have become more fine-tuned and selective. With the growing incidence of thyroid malignancy and improved detection of thyroid nodules, the number of patients requiring thyroid surgery is increasing (1). The use of new technology including intraoperative nerve monitoring (IONM) has allowed thyroid surgeons to improve outcomes. Currently, an open discussion between the surgeon and the patient, and an informed consent with the risks, benefits and alternatives of thyroid surgery is advocated. The goal of this article is to outline the preoperative information that all patients should know prior to thyroid surgery. It

also highlights the elements of an informed consent that considers the use of new technology and/or approaches to secure excellent patient outcome and satisfaction. We will discuss indications, consequences, risks of surgery, different approaches to thyroidectomy, and consequences of using technology such as IONM including failures of IONM technology.

The Italian Association of Endocrine Surgery Units published an article in 2016 that evaluated the pathway towards therapeutic management of a patient requiring thyroid surgery (2). In their algorithm, informed consent is crucial. It is the frank discussion between the surgeon and the patient that 'should preliminarily take place during the first visit' but should occur again to reinforce patient understanding (2). Furthermore, 'given the peculiarity of the therapeutic intervention', i.e., the type of thyroid surgery is different for each individual, the informed consent should be documented (2). We extend the importance of informed consent because the use of new

technologies can lead to specific patient expectations for a particular outcome. Our article discusses the informed consent as it relates to the tools a surgeon might use during thyroid surgery, and how patients should be informed that, while there may be benefits to a certain approach, there are also potential pitfalls.

Indications for thyroidectomy

The indications for thyroid surgery have been described in detail in both the endocrine and endocrine surgery literature.

The indications for thyroidectomy include:

- (I) Fine needle aspiration of thyroid malignancy;
- (II) Suspicious nodule with risk factors for thyroid malignancy (age, radiation exposure, family history);
- (III) Interval growth in thyroid nodules with concern for compressive symptoms;
- (IV) Location of nodule;
- (V) Some thyroid nodules greater than 4 cm;
- (VI) Multinodular goiter with substernal extension causing airway or esophageal compression;
- (VII) Graves' disease refractory to medical management, radioactive iodine or patient preference.

The American Thyroid Association Guidelines, recently revised in 2015, discusses the risk factors and patient considerations when deciding partial versus total thyroidectomy (3). The guidelines are advised by a multidisciplinary team to provide the most up-to-date evidence based recommendations in thyroid surgery. These guidelines allow the surgeon to discuss thyroid surgery as it pertains to the individual patient based upon an evaluation of the individual's history, risk factors and disease diagnosis. It is important to establish the indications for thyroid surgery with the patient, with a further description of the risks and benefits of the type of procedure being employed.

Alternative solutions to thyroidectomy

Alternatives to thyroidectomy are an important part of the informed consent regarding surgery. Continued observation is one of the alternatives of thyroidectomy in specific circumstances. This may be relevant in a benign nodule that has demonstrated interval growth in size but is not concerning for malignancy or causing tracheal or esophageal deviation.

- (I) Observation may also be undertaken in papillary microcarcinoma in appropriate situations such as controlled trials, with psychosocial and patient considerations taken into account with each patient (4). Local recurrences can also be managed with observation based upon size and location, as illustrated by the revised 2015 ATA guidelines (3,5,6).
- (II) Additional surgical alternatives may also include ethanol injections for locoregional thyroid malignancy recurrence, although less frequently utilized at most centers (7).
- (III) Radiofrequency ablation using US guidance and/or other imaging guidance is the newest form of targeted therapy and is currently being studied (8).

Consequences of thyroidectomy

The consequences of thyroid surgery require patients to understand the post-operative follow up and compliance.

- (I) All patients undergoing thyroidectomy, whether partial or total thyroidectomy, are at risk for post-operative life-long thyroid hormone dependence.
- (II) A dedicated endocrinologist should engage patients after surgery to help manage this, although some choose to eventually transition to a primary care provider in appropriate situations. For those with calcium requirements post-operatively, this also needs to be medically managed and monitored closely.
- (III) Thyroidectomy using the traditional transcervical incision means there will be a scar that may require patient compliance with scar care issues for a period of time to achieve the best cosmetic outcome.
- (IV) Important issues that should be known prior to thyroid surgery include the compliance with lifelong surveillance in the cases of thyroid malignancy, the risk of lymph node dissection if there is evidence of disease seen on imaging or intraoperatively, the possibility for adjunctive treatment (radioactive iodine, external beam radiotherapy, chemotherapy) and the risk of recurrence or disease spread.

Risks of thyroidectomy

The risks of thyroid surgery are few but relevant. A thorough discussion of the risks in a clear and marked outline should

be discussed once, if not more than once, with the patient.

Associated risks of thyroidectomy include:

- (I) Anesthesia.
- (II) Pain.
- (III) Bleeding.
- (IV) Infection.
- (V) If done through a transcervical approach, a scar.
- (VI) The risk of post-operative compressive hematoma is small but significant in that it can cause airway compromise. Patients with large goiters especially substernal, on anticoagulation or concern for intraoperative bleeding, should be monitored and considered for drainage with a post-operative drain placement.
- (VII) Common complications of thyroidectomy include hypoparathyroidism resulting in hypocalcemia that can lead to temporary or permanent need for calcium supplementation. For all patients undergoing thyroid surgery, there is a risk of becoming thyroid hormone dependent. The risk is not zero for partial thyroidectomy patients, so they need to be informed of a less than 100% risk as compared to their total thyroidectomy counterpart (9).
- (VIII) In patients undergoing lymph node dissection for related locoregional disease in thyroid malignancy, we divide the risks into the compartments that are being dissected: central and lateral neck dissections.
 - (i) For a central neck dissection, division can be made along midline for a unilateral or bilateral central neck dissection. The risks associated with a central neck dissection include injury to the recurrent laryngeal nerve leading to vocal fold motion impairment, and the inadvertent excision of the inferior parathyroid glands leading to an elevated risk for hypocalcemia post-operatively. If the lymph node is close to the trachea or esophagus, damage to these structures may occur.
 - (ii) Risks of lateral neck dissections include shoulder palsy and/or pain secondary to injury, traction, or manipulation of cranial nerve XI, tongue weakness secondary to injury of cranial nerve XII, facial droop secondary to injury to cranial nerve VII, chyle leak, phrenic nerve injury, and Horner's

syndrome.

- (IX) The most feared complication after thyroid surgery is temporary or permanent vocal cord paralysis. Voice alterations post thyroid surgery has been cited to occur in 25–84% of patients (10). All patients in our institution undergo a preoperative and post-operative fiberoptic laryngoscopy for evaluation of vocal fold mobility and symmetry. As in most high volume thyroid surgery centers, we use IONM for every case, but the adjunct use of the technology does not guarantee a zero risk of vocal fold immobility. Pre-operative assessment of voice and swallow is also important in both the subjective and objective assessment because other underlying pathologies may be contributing to handicap the patient, and should be addressed prior to surgery. Furthermore, patients need to have a clear understanding that the risk of vocal fold paralysis, while small, does not necessarily mean a patient will not have dysphonia or dysphagia post-operatively. Functional dysphonia, the placement of an endotracheal tube and resulting trauma, damage to the external branch of the superior laryngeal nerve, scarring or damage to the cricothyroid musculature during surgery, can all contribute to post-operative dysphonia and dysphagia (11,12). The importance of a speech language pathologist (SLP) in the preoperative and post-operative evaluation of patients with pre-existing dysphonia or dysphagia is crucial. 'Voice professionals' or individuals with high vocal demand and/or required vocal range including singers, are a group that we recommend to be evaluated by an SLP prior to thyroid surgery because vocal parameters may be compromised post-operatively for these patients despite not having vocal cord paralysis (13). For patients undergoing total thyroidectomy, it is important to discuss the risk of bilateral vocal cord paralysis that can lead to airway compromise. This can require tracheostomy placement for a secure airway. Therefore, in the intraoperative decision making process, if there is concern for unilateral vocal fold immobility based upon the integrity of the nerve or change in nerve monitoring, the contralateral dissection may be staged in hopes of preventing bilateral vocal cord immobility and

tracheostomy risk.

- (X) Additional risks that should be discussed include the need for further treatments, recurrence, possible sternotomy if there is a mediastinal component needing to be resected (with appropriate consultation by a thoracic surgeon) and the possibility of no improvement in subjective compressive symptoms (dysphagia, globus, cough, choking).

Different access approaches

While the consequences of the traditional cervical incision are well understood, remote access and minimally invasive approaches are not as familiar. A recent position statement reviews some but not all of these approaches and potential risks (14).

The obvious advantage of any minimally invasive or remote access approach is the minimization or absence of a cutaneous incision.

- (I) Minimally invasive approaches will use incisions generally 1.5–2 cm (15).
- (II) Remote access approaches will use more distant incisions (axillary, breast, retroauricular, oral, or any combination of these) to place the final scar in a less conspicuous location.
- (III) Because these require additional dissection to reach the thyroid, additional risks are incurred. These risks are specific to each approach, and each alternative should be discussed thoroughly with the patient. Additionally, surgeon experience with each approach, or the lack thereof, should be clearly defined (16).

The primary risk with any procedure designed to mitigate scarring is:

- (I) Visualization of critical structures and any nerves, great vessels, or other upper aerodigestive structures. For example, early reports on the North American experience with axillary approaches introduced risks of carotid and esophageal injury that was almost unheard of with traditional thyroid surgery. Such risks greatly repressed early North American enthusiasm based on remote access experiences of international authors (14,17).
- (II) In addition to these risks, some reports of transoral surgery through the floor of mouth resulted in unacceptably high rates of permanent recurrent laryngeal nerve paralysis (18).

- (III) Specific risks with robotic instrumentation stem from the lack of haptic feedback.
- (IV) Possible injury to lips or teeth may occur in the transoral approaches.
- (V) The possible need for conversion to open surgery must clearly be explained in any alternative approach.

More recent revisions and modifications have led to great advancements in these approaches, with authors reporting outcomes similar to transcervical approaches (19–21). With each, the value of experience and the presence of a learning curve are clear, and the informed consent process should detail the risks of any procedure with which a surgeon is relatively unfamiliar, including the potential for novel or unanticipated risks (16).

Within those constraints, the ideal remote access surgery will be one that avoids cutaneous incisions, offers minimal risk to critical structures, allows full visualization of the bilateral central neck, and provides the shortest learning curve. The functional outcome must be at least as good as one could achieve with a transcervical approach. Transoral approaches using a vestibular approach have gained interest recently for each of these reasons. It is important to discuss the risk of mental nerve injury resulting in regional hypoesthesia, which has been temporary in all reported cases to date. To our knowledge, no additional complications beyond those typically associated with a cervical incision have been reported after more than 800 international and North American trans-oral approach cases.

Consequences of IONM in staging a total thyroidectomy and failure of IONM technology

IONM is a well-defined, feasible adjunct to thyroid surgery that has become important in the neural mapping of the recurrent laryngeal nerve, particularly in high-risk for nerve injury cases and re-operative cases (22). The decision to use IONM is surgeon-dependent, but it is also important to consider the preoperative expectations of the patient and how the surgeon should frame the utility of IONM-guided surgery. A patient-physician dialogue about IONM should consider (Dionigi, personal communication):

- (I) If the surgeon routinely uses IONM.
- (II) If IONM is being used in a center with routine, selective, limited, or no use of IONM.
- (III) If the surgeon is able to inform the patient about false-positives and false-negatives of IONM and its

potential consequences.

(IV) The patient's expectations regarding IONM.

It is our institution's practice to discuss our use of IONM and specify why use this technology if the patient has a question regarding it. We address IONM with the following goals:

- (I) Explain how the IONM works without using excessive medical jargon.
- (II) Explain how IONM assists in monitoring the recurrent laryngeal nerve but it cannot rule out the possibility of a vocal fold palsy and resulting hoarseness, and therefore every patient is subject to the risk for vocal fold weakness post-operatively.
- (III) Explain the referral pattern to the appropriate specialist (SLP or laryngologist) if there is a post-operative complication using the technology.
- (IV) Explain the possibility of a staged procedure, i.e., aborting dissection of the contralateral side, if there is concern for recurrent laryngeal nerve integrity either secondary to an iatrogenic injury, involvement of the nerve by the disease process itself, or changes in the neural stimulation using the IONM.
 - (i) Staged procedure is suggested by the International Neural Monitoring Group guidelines, and the surgeon should be familiar with these guidelines (23).
 - (ii) Explain the possibility of a false negative, and staging the procedure inappropriately when the RLN and TVF is still mobile.
- (V) The surgeon should facilitate any questions or concerns by the patient regarding the IONM.

Conclusions

This article highlights the role of informed consent in the modern age of thyroid surgery whereby adjunct technology and novel techniques are defining thyroid surgery, outcome and patient satisfaction. We believe that it is crucial for every patient to have the adequate preoperative information available so that he/she can commit to thyroid surgery with realistic expectations on outcome. Overall, the patient-surgeon interaction is crucial in understanding the risks, benefits and alternatives to thyroid surgery. The way thyroid surgery is performed continues to evolve making informed consent critical for the patient to make their own value determination as to how they would like to be treated.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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