Central Neck Dissection For Papillary Thyroid Cancer

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None declared.

The incidence of papillary thyroid cancer has escalated significantly over the past several decades. The American Cancer Society reports that more than 56,000 new cases were diagnosed in 2012. The death rate, however, has remained the same over the past several decades [1]. Therefore it appears that the increased incidence in no small part is due to increased detection, mostly because of ultrasonographic examination for unrelated reasons and also due to a shifting paradigm in reporting from a pathology perspective.

As more cases are presenting to endocrinologists and surgeons, it is incumbent upon them to treat these cases in a rational evidence-based manner, especially with respect to the management of lymph node compartments.

Definition of central compartment

The accepted definition of the central compartment varies. Generally, the central compartment is defined as the lymph node compartment bordered by the hyoid bone superiorly, the innominate artery inferiorly, and the common carotid arteries laterally (Figure 1). The compartment from the hyoid bone to the sternal notch is referred to as level VI and from the sternal notch to the innominate artery as level VII. For practical purposes, we have found that the central compartment is the area between the cricoid and innominate artery as well as the common carotid arteries laterally. Metastases are rarely present superior to the cricoid; however, if a Delphian node is detected in that area, the surgical field can be extended towards the hyoid bone.

Pattern of spread

Papillary thyroid cancer has a high propensity for lymph node metastases. Up to 80% of papillary thyroid cancers will have metastasised to neck lymph nodes at the time of surgery [2]. It is controversial as to whether management of neck metastases, especially subcentemeric or micrometastases at the time of surgery, is relevant to improved survival or decreased recurrence.

Typically, papillary thyroid cancer will spread into the central compartment first and later into the lateral lymph node compartment. Generally, the pattern of spread follows a step-wise progression in terms of echelons from the central compartment incrementally through the various levels of the lateral neck from inferior to superior (Figure 2). However, lymph node metastases may skip echelons and

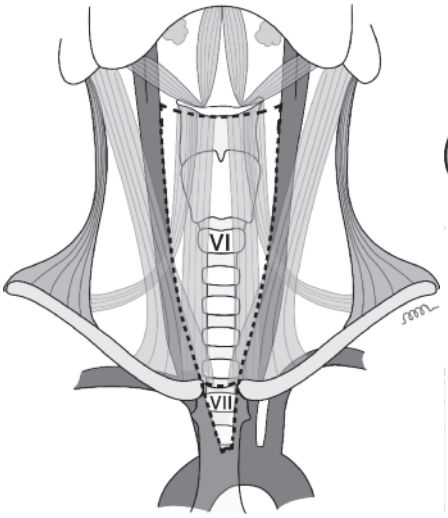

Figure 1: Boundaries of central compartment, levels VI and VII.

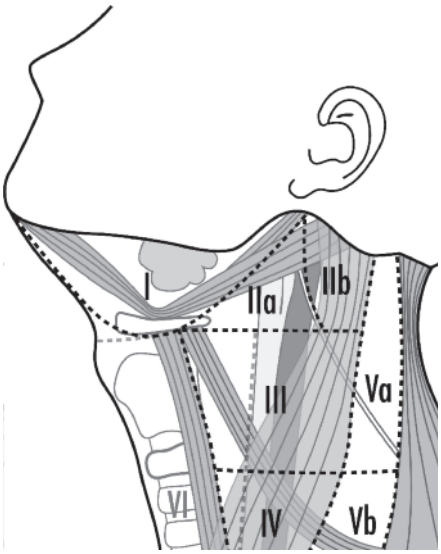

Figure 2: Boundaries of lateral neck, levels II-V.

present as isolated or combinations of metastatic disease that have not adhered to a step-wise progression.

According to the most recent American Thyroid Association (ATA) Guidelines for the Management of Well-Differentiated Thyroid Cancer, every patient with suspected cancer or a thyroid mass should have at least an ultrasonographic examination to assess primary disease and possible metastatic disease in the neck [3]. It is difficult to detect metastatic disease ultrasonographically in the central compartment unless a thyroidectomy has been done. Therefore, lymph node metastases in the central compartment are usually detected at the time of surgery.

Clinical scenarios

Metastatic neck disease usually occurs in the three following scenarios: disease detected before primary surgery, disease that presents intraoperatively, and disease that presents as a recurrence at a time after primary management of the malignancy.

Investigations

According to the ATA guidelines, every patient with a thyroid mass should have, at a minimum, a thyroid-stimulating hormone (TSH) level checked, a fine needle aspirate (FNA) of suspicious masses, and a diagnostic ultrasound [3]. As mentioned above, diagnostic central compartment ultrasound is difficult in a patient with an intact thyroid, and it is fortuitous if central disease is detected by this modality preoperatively.

It is certainly easier to detect central compartment metastases in the follow-up of patients who have already had a total thyroidectomy. Controversy exists as to which patients to biopsy and which patients to treat. Because the ultimate outcome of patients with subcentimeric central recurrence is unknown, there are increasingly more centres recommending observation of such nodules with serial ultrasound and thyroglobulin (Tg) determinations [4]. If a nodule increases in size on ultrasound or if the Tg increases, FNA is performed and the appropriate intervention is undertaken in the event of proven recurrence. The anxious patient may insist on a FNA, even for the tiny nodule. Nodules one centimetre or more should be investigated for recurrence.

Figure 3: Intraoperative picture shows central compartment following central neck dissection with bilateral carotid arteries, left recurrent laryngeal nerve, innominate artery, and cricoid cartilage displayed.

In patients with recurrent central compartment disease, it is advisable to obtain cross-sectional imaging of the neck as this may act as a complimentary study in the determination of the extent of central compartment disease as well as the detection of concomitant lateral compartment disease. It is also prudent to obtain cross-sectional imaging of the chest for the detection of metastatic lung disease. At times, positron emission tomography (PET) will be effective in detecting central recurrence when the Tg is elevated and all other investigations are negative [5].

It is mandatory that every patient undergoing this surgery have an examination of the larynx to assess vocal cord mobility.

Management of scenarios

1. Pre-op suspicion of central compartment disease

Suspicion of central compartment disease preoperatively is uncommonly due to palpation of disease, or more commonly imaging evidence. In this scenario, a planned central neck dissection, either unilateral or bilateral, should be done.

2. Intraoperative detection of central compartment disease

When central compartment disease is demonstrated intraoperatively either by inspection or palpation, a central neck dissection, either unilateral or bilateral, should be done.

3. Detection of central compartment disease in the recurrent situation

A central neck dissection should be planned with greater than one centimetre proven recurrence or evidence of progressive disease. The complication rate is much higher given the presence of fibrosis and realignment of anatomy from previous surgery, and this should be emphasised to the patient. A frank discussion relating to the risk of injury to the recurrent laryngeal nerve (RLN) and the parathyroid glands must take place with the patient.

As mentioned above, most subcentimeric recurrences can be managed with observation by performing serial Tg determination and ultrasound. Non-surgical interventions such as radiofrequecy ablation and alcohol injection have recently been shown to be effective in the management of central compartment recurrence [6-8].

Technique of central neck dissection

As mentioned above, a complete central neck dissection can be either unilateral or bilateral. The borders of the dissection are controversial but should encompass all ostensible and proven disease.

It is important to have adequate exposure. This usually is not a problem in cases where previous surgery has not been done.

It is incumbent on endocrinologist and surgeons to treat these cases in a rational, evidence-based manner

In reoperative situations, we have found that dividing the sternohyoid and sternothyroid muscles horizontally midway between the cricoid and the sternal notch and reflecting these muscles superiorly and inferiorly improves exposure. The common carotid arteries are identified and dissected into the mediastinum, exposing the innominate artery. Once these vessels are exposed, the RLNs are then identified and traced into the mediastinum under their respective carotid arteries.

Once exposure has been attained with these simple manoeuvres, the central compartment lymph node package is then dissected free of both RLNs as well as the innominate artery and reflected in a cephalad direction as high as the dissection mandates (Figure 3). At times, it is necessary to dissect lateral to the RLN. We have found that it does not matter if this portion of the dissection is removed as a separate specimen, as there is no long-term effect on efficacy of resection using this strategy.

At times, the RLN overlies metastatic disease. In those instances, the RLN must be dissected free of the metastases, and the metastases is passed medially under the RLN into the central compartment specimen for resection. The use of nerve monitoring may be helpful in the recurrent situation, but this is no substitute for a solid knowledge of the anatomy of the recurrent laryngeal nerve and good surgical technique. Auto-transplantation of any parathyroid glands deemed to be non viable or devascularised should be done.

Complications of surgery

The risk of complications of central neck dissection in patients who have had no previous surgery should be very close to the risk of complications of thyroidectomy only. In addition to the general risk of surgery, these risks are as follows: injury to the RLN, injury to the external branch of the superior laryngeal nerve, and hypoparathyroidism.

Patients who have had prior surgery and are being managed for recurrent disease in the central compartment have a higher incidence of injury to the RLN and parathyroid glands. There is a learning curve with respect to performance of this surgery, and the injury rate in experienced hands should be quite low, even in the recurrent scenario.

The issue of prophylactic central neck dissection

The literature suggests that central neck dissection in a previously unoperated neck is a safe procedure [9]. Certainly, there is a risk, especially in inexperienced hands, of hypoparathyroidism and injury to the RLN.

Controversy still exists about whether central neck dissection should be done for all suspected or existing thyroid cancers that are at high risk of recurrence (for example, large lesions or invasive lesions) with no demonstrable disease. Some believe that central compartment dissection should be done only for palpable and / or visible disease.

Certainly, because of the high incidence of level VI / VII involvement with metastatic disease, the concept of a prophylactic dissection of these sites seems rational; however, there is no long-term study that definitively indicates that a prophylactic central neck dissection is a manoeuvre that improves outcome in terms of survivorship and / or recurrence. Unfortunately, such a study would be difficult to mount due to the large number of patients that needs to be accrued to make a statistically significant statement.

Outcomes

Controversy still exists as to whether or not to perform a prophylactic level VI / VII dissection with no clinical / imaging evidence of disease. It is difficult to predict whether a prophylactic central neck dissection improves outcome as there is no compelling evidence basis. The literature does suggest that in the primary case, level VI / VII dissection for demonstrable disease will improve outcome [10]. In our series of 178 patients operated upon for recurrent central compartment disease, our normalisation rate of thyroglobulin is 50% with minimal risk to the recurrent laryngeal nerve and parathyroid glands [11].

Future directions

Hopefully, a prospective study will be mounted to determine the efficacy of prophylactic central neck dissection in papillary thyroid cancer. There are now centres doing robotic approaches to the central compartment as well as minimal access approaches and this may hold promise for the future [12].

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