Central Neck Dissection For Papillary Thyroid Cancer

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 subcentimeter 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...
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 subcentimetric 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.

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 subcentimetric recurrences can be managed with observation by performing serial Tg determination and ultrasound. Non-surgical interventions such as radiofrequency 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 sternothyroid and ster- 
nothyroid 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 

The issue of prophylactic central 
neck dissection

The literature suggests that central neck 

dissection in a previously unoperated neck 


certainly, because of the high incidence 
of level VI / VII involvement with 
metastatic disease, the concept of a 
prophylactic dissection of these sites seems 
reasonable; 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 survival 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 dissec- 
tion 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 normalis- 
ation 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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