Pros and Cons of prophylactic central neck dissection in radiologically N0 neck in differentiated thyroid carcinoma

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Introduction

• Thyroid carcinoma has the fastest rising incidence of all carcinomas; ↑4% per year
• Papillary thyroid carcinoma (PTC) is the most common type of differentiated thyroid carcinoma, incidence x 2 throughout 25 years
• Excellent prognosis, 10-year cancer specific survival rate >90%
• Locoregional recurrence (LRR) is a major cause of disease morbidity

Cancer incidence and mortality in Hong Kong 1983–2008: Hong Kong Cancer Registry, Hong Kong
Ultrasound Features of Lymph Nodes Predictive of Malignant Involvement

<table>
<thead>
<tr>
<th>Sign</th>
<th>Reported sensitivity, %</th>
<th>Reported specificity, %</th>
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</thead>
<tbody>
<tr>
<td>Microcalcifications</td>
<td>5–69</td>
<td>93–100</td>
</tr>
<tr>
<td>Cystic aspect</td>
<td>10–34</td>
<td>91–100</td>
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<tr>
<td>Peripheral vascularity</td>
<td>40–86</td>
<td>57–93</td>
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<tr>
<td>Hyperechogenicity</td>
<td>30–87</td>
<td>43–95</td>
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<tr>
<td>Round shape</td>
<td>37</td>
<td>70</td>
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*Adapted with permission from the European Thyroid Association guidelines for cervical ultrasound (20).

Neck Dissection

- **Therapeutic**
  Clinically evident and FNA proven LN involvement

- **Prophylactic**
  No clinical evidence of LN

- **HOT debate:** Prophylactic Central LN dissection (level VI)
Central neck dissection (minimum)
- Pre-laryngeal
- Pre-tracheal
- Para-tracheal

Central neck dissection may be extended to:
- Retropharyngeal
- Retroesophageal
- Paralaryngopharyngeal (superior vascular pedicle)
- Superior mediastinal (inferior to innominate artery)

Central Neck dissection

- SEER (Surveillance, Epidemiology, and End Results) database
  - 9904 Papillary thyroid cancer
  - Cervical LN mets in papillary cancer of Age >45

- The most common site for lymph node metastases and DTC recurrence is **within the central compartment**
  

- Central neck dissection may convert some patients from cN0 to pathologic N1a

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Central Neck dissection

- Mayo clinic 60-year observation of 900 patients with <1cm micro-carcinoma

  In 450 patients with any form of LN surgery done, 30% lymph node involvement was found

CND may reduce recurrence

- In 950 Papillary thyroid cancer patients
  - Stage I 45%, Stage II 25%, Stage III 22%, Stage IV 6%
  - 75% LN dissection done (mostly CND only)

- Recurrences
  - LN dissection: 6.8%
  - No LN dissection: 16.5% (p<0.001)
  - Stage I (1%), Stage II (6%), Stage III (6%), Stage IV (77%)

- No difference in 10-yr / 15-yr survival


Central Neck Dissection

- Seems Improve survival in comparing observational studies

Central Neck Dissection

- Increases the proportion of patients who appear disease free with un-measureable Tg levels 6 months after surgery
  - Undetectable TG levels
    - Total thyroidectomy + CND: 72%
    - Total thyroidectomy only: 43% (p<0.001)

Sywak M et al. Routine ipsilateral level VI lymphadenectomy reduces postoperative thyroglobulin levels in papillary thyroid cancer. Surgery 2006. 140:1000–1007

Does central neck dissection increases the rate of complications?
Complications of thyroidectomy alone Vs thyroidectomy + CND

<table>
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Fig. 1. Temporary hypocalcemia.

Chrisholm et al. Systematic review and meta-analysis of the adverse effects of thyroidectomy combined with central neck dissection as compared with thyroidectomy alone. Laryngoscope 2009 Jun;119(6):1135-9

Complications of thyroidectomy alone Vs thyroidectomy + CND

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Fig. 2. Permanent hypocalcemia.

Fig. 3. Temporary vocal cord palsy.

Fig. 4. Permanent vocal cord palsy.

Chrisholm et al. Systematic review and meta-analysis of the adverse effects of thyroidectomy combined with central neck dissection as compared with thyroidectomy alone. Laryngoscope 2009 Jun;119(6):1135-9
The Benefits and Risks of Prophylactic Central Neck Dissection for Papillary Thyroid Carcinoma: Prospective Cohort Study


Central Neck Dissection

- All existing literatures are cohort studies
- No RCT
- American thyroid association has commented it is NOT feasible to do an RCT on prophylactic central neck dissection
  - Need to randomize 5840 patients to have enough power to show a difference in recurrence or complications!

American Thyroid Association Design and Feasibility of a Prospective Randomized Controlled Trial of Prophylactic Central Lymph Node Dissection for Papillary Thyroid Carcinoma. THYROID. Volume 22, Number 3, 2012
Central Neck Dissection

Pros
1) ↓ recurrence
2) Lower postop serum Tg to simplify FU and surveillance for recurrence
3) ↓ need for reoperation in the central neck

Cons
1) ↑ temporary hypoparathyroidism (1-4%)
2) ↑ temporary RLN injury (2-12%)

2009 American Thyroid Association (ATA) guideline – Central neck dissection
2009 American Thyroid Association (ATA) guideline – Central neck dissection

• **Prophylactic central-compartment neck dissection**
  PTC with clinically uninvolved central neck LN, especially for advanced primary tumors (T3 or T4).
  Recommendation rating: C

• **Total thyroidectomy without prophylactic central neck dissection**
  for small (T1 or T2), noninvasive, clinically node-negative PTCs.
  Recommendation rating: C

• These recommendations should be interpreted in light of available surgical expertise.

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2015 American Thyroid Association Management Guidelines

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*This description of supporting evidence refers to therapy, therapeutic strategy, or prevention studies. The description of supporting evidence is different for diagnostic accuracy studies.

RCT, randomized controlled trial.
2015 American Thyroid Association Management Guidelines

RECOMMENDATION 36

(A) Therapeutic central-compartment (level VI) neck dissection for patients with clinically involved central nodes should accompany total thyroidectomy to provide clearance of disease from the central neck.

(Strong recommendation, Moderate-quality evidence)

RECOMMENDATION 36

(B) Prophylactic central-compartment neck dissection (ipsilateral or bilateral) should be considered in patients with papillary thyroid carcinoma with clinically uninvolved central neck lymph nodes (cN0) who have advanced primary tumors (T3 or T4) or clinically involved lateral neck nodes (cN1b), or if the information will be used to plan further steps in therapy.

(Weak recommendation, Low-quality evidence)
RECOMMENDATION 36

(C) Thyroidectomy without prophylactic central neck dissection is appropriate for small (T1 or T2), non invasive, clinically node-negative PTC (cN0) and for most follicular cancers.

(Strong recommendation, Moderate-quality evidence)

Recent research


CONCLUSION: CNs partially improve the extent and accuracy of neck dissection and preserve the normal anatomic structure and physiologic function of the parathyroid glands during thyroid cancer surgery.
Recent research

Lee DY. The Benefits and Risks of Prophylactic Central Neck Dissection for Papillary Thyroid Carcinoma: Prospective Cohort Study. Int J Endocrinol. 2015;2015:571480.

Conclusion: Patients treated with TT plus CND had a higher rate of complications with similar recurrence rate. We believe that CND may not be routinely recommended when treating patients with PTC.

Recent research

Ywata de Carvalho et al. Long-term Results of Observation vs Prophylactic Selective Level VI Neck Dissection for Papillary Thyroid Carcinoma at a Cancer Center. JAMA Otolaryngol Head Neck surgery, 2015 Jul;141(7):599-606.

Conclusion: Although the risk for occult lymph node metastasis reached 67.2% in a selected group of patients, elective central neck dissection for patients with PTC increased the risk for complications and did not contribute to a decrease in local recurrence rates.
Recent research

Sherif K et al. Does prophylactic central neck dissection in papillary thyroid carcinoma with N0 neck adds to disease outcome?. Laryngoscope (minor revision)

Conclusion: prophylactic CND in DTC doesn’t add to 5 year survival rate but it increases the rate of complications (2.7% and 6.3%)

Take home message

• Individualized management according to risk stratification
  (Low Vs High risk)

• Prophylactic Central neck dissection is indicated for T3-4 tumors to reduce local recurrence
  (For T1-2 tumors, need to balance benefits and complications)
Thank you