ELECTIVE PARATRACHEAL NECK DISSECTION FOR LATERAL METASTASES FROM PAPILLARY CARCINOMA OF THE THYROID: IS IT INDICATED?

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Abstract: Background. Therapeutic paratracheal neck dissection for patients with papillary carcinoma of the thyroid is standard treatment. Its use as an elective procedure is controversial.

Methods. Thirty-seven patients with papillary carcinoma of the thyroid and evidence of positive adenopathy at levels II-V underwent selective neck dissection and elective/therapeutic paratracheal neck dissection. Results of preoperative ultrasonography of the neck were compared with the dissection specimens.

Results. Morbidity of the surgical procedure was minimal (1 permanent hypocalcemia). All specimens showed metastases from papillary thyroid carcinoma: 100% (37/37) in the jugular chain of lymphatics and 83.7% (31/37) in the paratracheal region. The rate of occult (negative physical examination and ultrasonography) metastases in the paratracheal region in the presence of metastases in the ipsilateral jugular chain was 83.3% (20/24).


Keywords: paratracheal; metastases; papillary carcinoma; ND; elective

Papillary carcinoma of the thyroid has a high propensity for regional metastases. The paratracheal region represents the first echelon of lymphatic drainage of the thyroid gland and lymph node metastases presumably tend to appear in this region first. The treatment of occult metastases in the paratracheal region is a controversial issue because the prognostic significance of such metastases is questionable. The existing data in the literature on their effect on survival of patients with papillary carcinoma of the thyroid is unclear, but current understanding is that the survival of patients in whom metastases are found in neck dissection specimen is not lower than that of patients with no evidence of metastases. Moreover, there is no evidence that survival is affected by not treating these metastases. Thus, while some recommend only therapeutic neck dissections, others perform elective central compartment and lateral or modified radical neck dissections as part of initial treatment. In patients with nodal recurrence, the indication for a formal neck dissection is clearer: for them, the high rate of recurrence following “berry picking,” presumably due to subclinical involvement of lymph nodes,
has led to routine performance of formal neck dissections. As such, paratracheal (level VI) neck dissection has been advocated for positive nodes in the paratracheal and pretracheal region. The morbidity of paratracheal neck dissection as well as that of selective neck dissection of levels II–V was reported as being low in a recent report by Kupferman et al: none of their 39 thyroid cancer patients suffered any permanent hypocalcemia or permanent injury to the recurrent laryngeal nerve.

The necessity of performing elective neck dissection in patients with no evidence of metastases in the paratracheal region is more controversial. It stands to reason that there is a high incidence of metastases in the paratracheal region in patients with metastases to the jugular chain of lymphatics. The purpose of the current study was to measure the rate of occult metastases in the paratracheal region in the presence of metastases to the jugular chain of lymphatics and thus contribute more solid evidence for deciding whether to conduct elective paratracheal neck dissection in this setting.

PATIENTS AND METHODS

Thirty-seven patients with papillary thyroid carcinoma were diagnosed with metastases to the lateral neck (levels II–V) and were prospectively enrolled. Eleven had previously undergone total thyroidectomy and 26 were newly diagnosed. None of the patients had received previous treatment to the neck (either to the jugular or to the paratracheal region). They all underwent preoperative ultrasonography and ultrasonography-guided fine-needle aspiration biopsy (FNAB) to the thyroid as well as to the suspected involved lymph nodes. The biopsies were performed by an experienced head and neck sonographist. The presence of metastases to the jugular lymph nodes was confirmed pathologically (ultrasonography-guided FNA) in all patients before surgery.

Treatment of the neck included dissection of the paratracheal region and dissection of levels II–IV. Level V was dissected only if metastases were detected at that level or in the retrojugular part of the jugular chain of lymph nodes. Dissection of the paratracheal region included a systematic removal of all fatty tissues between the trachea and the carotid artery. The superior limit of this dissection was the thyroid cartilage, and the inferior limit included tissues of the upper mediastinum together with the thymus, if present. The recurrent laryngeal nerve was skeletonized all the way from the upper mediastinum to the cricothyroid membrane. The parathyroid glands were preserved together with their blood supply. The inferior parathyroid was more difficult to preserve and had to be reimplanted in several patients because of the inability to adequately preserve its blood supply. Preservation of the parathyroid glands along with their blood supply was attempted in all patients. The blood supply of each parathyroid gland was identified and dissected laterally toward the carotid artery and retracted along with the gland. Dissection proceeded from medial to the retracted gland. If the gland became darker following that manipulation, it was resected and reimplanted in the sternocleidomastoid muscle. In our institution, paratracheal neck dissection is performed only by experienced head and neck surgeons and not by residents.

The neck dissection specimens were sent to pathology immediately after the surgical procedure. The neck dissection specimen was examined by a dedicated head and neck pathologist for the presence of metastases. The results of the preoperative ultrasonography and the findings on the pathologic examination of the neck dissection specimens were compared.

The study was approved by the Institutional Review Board.

RESULTS

Thirty-seven patients (14 males and 23 females; average age 40 years; range, 14–70) were surgically treated for metastases to the jugular chain of lymphatics from papillary carcinoma of the thyroid. Eleven patients had previously undergone a total thyroidectomy, while the other 27 patients were previously untreated and underwent a total thyroidectomy as part of their current surgical management. All the study patients had a paratracheal neck dissection (elective in 24 patients and therapeutic in 13) as well as a therapeutic lateral neck dissection (levels II–IV in 31 patients and II–V in 6 patients). The side of the paratracheal neck dissection was always ipsilateral to the side of the neck with positive nodes in the jugular chain. Bilateral paratracheal neck dissection was performed in 9 patients (7 primary and 2 reoperations) because of bilateral metastases in the jugular chain.

There was no operative mortality. The postoperative morbidity was minimal: 5 patients (13%) developed transient hypocalcemia that resolved...
spontaneously, and 1 patient (2.7%) remained hypocalcemic 1 year following the surgical intervention. The recurrent laryngeal nerve was invaded by carcinoma and it was resected in 4 patients: 2 of them had preoperative paralysis of the ipsilateral vocal cord. Two patients (5.4%) suffered transient unintentional paralysis of the vocal cord, and none had permanent unintentional vocal cord paralysis. Three patients (8%) had wound infection or seroma, which resolved after conservative management. There were no other postoperative complications. Eleven patients had reoperation of the paratracheal region following previous total thyroidectomy. Nine of these patients had unilateral neck dissection, and 2 had bilateral paratracheal neck dissection. None of these 11 patients had either hypoparathyroidism or injury to the recurrent laryngeal nerve following reoperation.

The neck dissection specimen contained positive metastases in the lateral neck in all 37 patients. Metastases were most common at level IV (26 patients) and level III (25 patients), and less common at level II (17 patients) and level V (5 patients). Thirty-one of the 37 patients (83.7%) had positive nodes in the paratracheal region. The occurrence of the positive nodes according to the levels of the neck is shown in Table 1.

The preoperative ultrasonography demonstrated positive metastases in the lateral neck in all patients (sensitivity 100%). Ultrasonography was positive in the paratracheal region in 13 patients, and 11 of them had positive nodes in their paratracheal neck dissection specimen. Overall, 31 patients were found to have metastases in the paratracheal region on final pathology. The specificity of ultrasonography for the detection of positive paratracheal adenopathy was 85% (11/13 patients) and the sensitivity was 35.4% (11/31 patients). The rate of metastases in the paratracheal region in this group of patients was similar regardless of whether or not the ultrasonography had revealed metastases in this region (85% vs 83%, p > .05). Neither the physical examination nor the preoperative ultrasonography identified metastases in the paratracheal region in 24 patients, but metastases were found in the elective paratracheal neck dissection specimen in 20 of them. Thus, the rate of occult metastases in the paratracheal regions in this group of patients with overt metastases to the jugular chain was 83.3%.

**DISCUSSION**

Treatment of metastases of papillary thyroid carcinoma to the regional lymphatics is a subject of debate in the literature. Moreover, the role of neck dissection versus less aggressive surgical procedures is not well defined. “Berry picking” was the standard of care for patients seen with lymphatic metastases from papillary carcinoma of the thyroid in the area of radical neck dissections. The distribution of metastases from papillary cancer to multiple nodal basins suggests that a formal neck dissection may have an advantage over “berry picking.” Since the introduction of selective neck dissections and the significant decrease in postoperative morbidity of these surgical procedures compared with the radical neck dissection, “berry picking” has been replaced by more formal neck dissections as the standard of care for patients with metastatic papillary carcinoma of the thyroid. Paratracheal neck dissection has been advocated as a therapeutic procedure of choice for patients with evidence of metastases in the paratracheal region. After having been associated with a higher risk of postoperative hypocalcemia, however, the indication for elective paratracheal neck dissection has become much more controversial. Henry et al compared the incidence of hypocalcemia and recurrent laryngeal nerve injury in 50 patients who had a total thyroidectomy for benign disease to a second group of 50 patients who had a total thyroidectomy and elective paratracheal neck dissection for carcinoma of the thyroid. They found no difference in the rate of recurrent laryngeal nerve palsy but they did show a significantly higher incidence of transient and permanent hypocalcemia in patients who had a paratracheal neck dissection concomitantly with the thyroidectomy compared

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<tr>
<th>Site</th>
<th>Average no. of metastases/average number of nodes at this level</th>
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<tr>
<td>Ipsilateral paratracheal neck (level VI)</td>
<td>4.4/7.4</td>
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<tr>
<td>Contralateral paratracheal neck (level VI)</td>
<td>2.2/3.6</td>
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<tr>
<td>Jugular chain</td>
<td></td>
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<tr>
<td>Level II</td>
<td>3.6/13</td>
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<tr>
<td>Level III</td>
<td>2.5/8.8</td>
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<td>Level IV</td>
<td>2.5/10.5</td>
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<tr>
<td>Posterior neck</td>
<td></td>
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<tr>
<td>Level V</td>
<td>3.0/7.6</td>
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with thyroidectomy alone (8% and 0% for the former compared with 4% and 14% for the latter). The authors concluded that “...even taking into account the possible benefits, the results make it difficult to advocate prophylactic central compartment neck dissection as a routine procedure in all patients seen with papillary thyroid carcinoma.” On the other hand, when Tsugawa et al performed sentinel node mapping in patients with thyroid cancer, the paratracheal region was the site of the sentinel node in 22 of 27 patients in whom a sentinel node was localized. This argues for dissection of the paratracheal region when positive adenopathy is found (i.e., in the jugular chain). Goropoulos et al reported a high correlation between central compartment metastases and jugular chain metastases. In their study of 39 patients with papillary carcinoma, when the paratracheal lymph nodes were negative for metastases, the jugular chain was negative as well, but it was involved in 80% of patients with metastases in the central compartment.

In the current study, we report a selected group of 37 patients with metastases in the lateral neck. There was no preoperative evidence of metastases in the paratracheal region in 24 of them. Our study patients had an elective paratracheal neck dissection, and the rate of occult metastases in this region was extremely high (83%). Shindo et al found a higher incidence of occult metastases of papillary cancer in the paratracheal region in patients older than 45 years compared with a younger group of patients (39% vs 29%, respectively). Sixteen of our patients were older than 45 years, and the rate of metastases in the paratracheal region was 81% for them; this figure is not different from that of the younger group of patients (84%), but it is much higher than the rate of metastases (including occult metastases) in this series. This is probably attributable to the fact that our patients were seen with metastases in the jugular chain, and thus the rate of occult and overt metastases in the paratracheal region could be expected to be higher. Freeman and coworkers, however, found no difference in the rate of recurrence in the central compartment in patients with thyroid cancer (mostly papillary) treated with either posterolateral neck dissection together with central compartment neck dissection compared with posterolateral neck dissection alone when there was no clinical or radiological evidence of such metastases preoperatively. The implication of their study is that although subclinical central compartment metastases may occur, they are of no clinical impact. That study, however, was a retrospective one that opened in 1964 and it had a relatively short follow-up (average, 8 years; minimum, 4 months). Since paratracheal recurrence of papillary carcinoma may grow slowly over several years until they are clinically overt, we feel that the implication of this study be taken with caution. The rate of postoperative morbidity was low in our series, with 1 case of permanent hypocalcemia and no cases of permanent recurrent laryngeal nerve injury as well as a relatively low incidence of transient hypocalcemia and transient vocal cord paralysis (13% and 5%, respectively). These findings are in accordance with those of others. In 11 patients, reoperation of the paratracheal compartment was performed (following previous total thyroidectomy), and none of these patients suffered postoperative hypocalcemia or damage to the recurrent laryngeal nerve. We believe that the low rate of hypoparathyroidism in reoperations may be attributed to preservation of the contralateral parathyroid glands during the initial thyroidectomy as preservation of the parathyroid glands in reoperations was extremely difficult. Bilateral paratracheal neck dissection was performed in only 2 of these 11 patients.

In conclusion, the high rate of occult metastases and the low rate of morbidity in this particular setting argue in favor of routine elective dissection of the paratracheal region in patients with regional metastases to the jugular chain of lymph nodes. Ultrasonography is not a sensitive tool for the detection of metastases in the paratracheal region. The effect of dissection of these subclinical metastases on survival of these patients remains to be addressed.

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**REFERENCES**


