TRANSORAL RESECTION OF THYROID CANCER METASTASIS TO LATERAL RETROPHARYNGEAL NODES

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Accepted 1 June 2006
Published online 4 October 2006 in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/hed.20513

Abstract: Background. Lymph node metastasis from differentiated thyroid carcinoma may occur outside of the basins at greatest risk of spread, such as the lateral retropharyngeal lymph nodes. The extensive surgery of traditional approaches to the retropharyngeal space are rarely justified in the treatment of metastatic differentiated thyroid cancer. Therefore, a less invasive surgical approach is advantageous in resection of metastatic lateral retropharyngeal nodes.

Methods. To assess feasibility and safety, we report transoral excision guided by preoperative ultrasonography in a series of 3 consecutive patients with differentiated thyroid cancer metastatic to the retropharyngeal space.

Results. In all cases, the metastatic lateral retropharyngeal lymph node was successfully removed by transoral retropharyngotomy without complications.

Conclusions. We advocate a transoral approach guided by preoperative ultrasonography for resection of differentiated thyroid cancer metastatic to the retropharyngeal lymph nodes. The approach is feasible, minimally invasive, and safe in achieving the goals in management of regionally metastatic disease.

Keywords: thyroid neoplasms; lymphatic metastasis; retropharyngeal space; retropharyngeal lymph nodes; transoral approach

For differentiated thyroid cancer metastatic to regional lymph nodes, the goal in management is complete surgical resection of all grossly evident disease. Moreover, speech, swallowing, and protective airway mechanisms are preserved whenever possible. Regional disease portends a significantly higher 30-year cancer-specific mortality rate in patients with metastasis compared with patients without metastasis.1 Therefore, neck dissection is the preferred treatment to obtain regional control in patients with cervical lymph node metastasis detected on initial staging. Likewise, an aggressive surgical approach is warranted for recurrent regional metastasis, since complete resection of disease correlates with improved disease-free survival.2

The extensive lymphatic drainage of the thyroid gland allows spread by multiple routes to nodal groups throughout the head and neck. Lymph node involvement is found most frequently in the first echelon nodes of the central compartment (level VI) and the nodes of the lateral (levels II, III and IV) and posterior compartments (level...
V) of the neck. However, lymph node metastasis from differentiated thyroid carcinoma occasionally occurs outside of those basins at the greatest risk of spread. In patients with significant lateral neck disease or a history of neck dissection, metastasis may occur in the parapharyngeal and retropharyngeal lymph nodes.

The retropharyngeal space was first described by Grodinsky and Holyoke as a potential space bordered anteriorly by the visceral fascia of the pharynx and posteriorly by the alar layer of prevertebral fascia. The retropharyngeal space communicates with the upper part of the parapharyngeal space through the “Lincoln Highway” of the neck. A very thin alar fascia divides the space into an anterior, retropharyngeal space “proper” and a posterior, “danger space.” The retropharyngeal space “proper” extends from the skull base to approximately the level of the fourth thoracic vertebra, while the “danger space” extends to the level of the diaphragm. The contents of the retropharyngeal space are limited to retropharyngeal lymph nodes and fibrofatty tissue. The retropharyngeal lymph nodes, also known as the nodes of Rouviere, lie deep to the musculature of the pharynx and medial to the internal carotid artery. An inconsistently demonstrated medial group lies inferiorly, closer to the pharyngeal musculature and more accessible by surgery. The lateral group of retropharyngeal nodes lies superiorly near the base of the skull, close to the internal carotid artery and the sympathetic chain, separated from these structures by only a small amount of fibrofatty tissue (see Figure 1).

Surgery of the retropharyngeal lymph nodes was first described in 1964 by Ballantyne in a series of 45 patients treated at The University of Texas M. D. Anderson Cancer Center for primary tumors of the pharyngeal wall and other upper aerodigestive tract sites. This seminal report described wide exposure of the retropharyngeal space by a transcervical approach in which the retropharyngeal lymph nodes were resected with the primary tumor by en bloc pharyngectomy. For primary tumors of sites other than the pharynx, dissection was performed by retracting the internal carotid artery laterally and the pharynx to the opposite side to access the lymph node-bearing
structures up to the base of the skull. Subsequently, the access to the retropharyngeal lymphatic structures was modified by extended transcervical, transparotid, and transmandibular approaches. In recent decades, however, changes in the management strategies for cervical lymph node metastasis from squamous cell carcinoma of the nasopharynx and oropharynx have diminished surgery of the retropharyngeal lymph nodes. Furthermore, retropharyngeal lymph node dissection has failed to improve cumulative 5-year survival.19

The morbidity of such extensive approaches in the treatment of carcinomas of the upper aerodigestive tract is rarely justified in the treatment of metastatic differentiated thyroid cancer. Metastatic thyroid cancer frequently demonstrates a chronic, indolent biologic behavior. Therefore, regional control can be obtained in patients with differentiated thyroid cancer metastatic to isolated cervical lymph nodes by less extensive lymphadectomy than those with metastatic squamous cell carcinoma. Therefore, less invasive surgical approaches to remove retropharyngeal lymph nodes may be oncologically sound in the treatment of metastatic differentiated thyroid cancer. We developed a transoral approach guided by preoperative ultrasonography for the excision of metastatic lateral retropharyngeal lymph nodes. To assess the feasibility and safety of the procedure, we report 3 consecutive patients who underwent excision of differentiated thyroid cancer metastatic to the retropharyngeal space.

MATERIALS AND METHODS

Surgical Technique. With the patient supine on the operating table under general anesthesia, the head is placed in a neutral position. The oral cavity is irrigated with antibiotic solution and the head and neck region is prepared and draped in a standard fashion. A self-retaining tonsillectomy retractor is placed to expose the surgical site. An oral endotracheal tube is placed and secured to allow adequate access to the operative site. The soft palate and uvula are retracted with a soft rubber catheter passed through the nasal cavity and brought out of the mouth. The oropharynx is palpated to identify the location and character of the suspicious lymph node.

Ultrasoundography is performed with a real-time scanner and an endocavitary transducer (Aloka, Tokyo, Japan) using grayscale and color Doppler imaging. After identification of the suspicious node, the surface projection of the node is marked on the pharyngeal mucosa to facilitate the design of an incision (see Figure 2).

A curvilinear incision is made along the anterior or posterior tonsillar pillar in the mucosa overlying the lymph node. A bloodless field is maintained using monopolar electrocautery. Tonsillectomy is performed to facilitate access, if necessary. Under loupe magnification, the dissection is deepened to identify the superior and middle constrictor muscles. The fibers are divided to enter the submuscular plane containing the fibrofatty tissue of the retropharyngeal space. A layer by layer dissection exposes the node within the retropharyngeal space (see Figure 3). Bipolar electrocautery forceps further aid hemostasis as dissection progresses and numerous, small venous and arterial vessels are encountered. The glossopharyngeal nerve may be identified running downward and forward, lateral to the stylopharyngeus muscle. The alar layer of prevertebral fascia marks the deep limit of the dissection. The internal carotid artery lies medial to the stylopharyngeus muscle and is identified by pulsations of the overlying fat and fascia. The artery is exposed by the gentle, blunt application of a “peanut” to dissect the overlying fascia in a cephalo-caudad direction as the node is retracted medially. The node is mobilized in a pericapsular plane by gentle retraction and blunt dissection. The hilar vessels may be clamped, divided, and suture ligated or coagulated with bipolar electrocautery to deliver the specimen (see Figure 4). After assuring complete hemostasis (see Figure 5), the wound is irrigated and closed primarily with absorbable suture.
or allowed to heal by secondary intention (if tonsillectomy was performed).

Postoperatively, patients begin oral fluids upon recovery from anesthesia, and the diet is advanced as tolerated. Speech therapy for swallowing rehabilitation is indicated only if necessary.

Patients. Transoral retropharyngotomy was performed in 3 consecutive patients presenting to the Department of Head and Neck Surgery at M. D. Anderson Cancer Center with thyroid carcinoma metastatic to the retropharyngeal space between October 2003 and February 2006. Each patient had unilateral recurrent metastatic disease isolated to the lateral retropharyngeal lymph nodes. Ages ranged from 36 to 56. Upon completion of restaging, cases were presented at the Interdisciplinary Endocrine Neoplasia Conference for optimal treatment planning. Each patient was explained in detail the risks and benefits of surgery and consented for transoral retropharyngotomy, as well as transcervical and transmandibular approaches should conversion to a standard approach become necessary. This review was approved by the internal review board of the institution.

CASE REPORTS

Case 1. A 46-year-old Caucasian woman developed progression of disease in a lateral retropharyngeal lymph node during a course of follow-up after initial treatment of papillary thyroid carcinoma. She had originally presented 23 months earlier with dysphagia for solids foods and a right neck mass. A CT scan revealed a 1.5-cm nodule in the right lobe of the thyroid gland, as well as ipsilateral paratracheal, jugulodiagnostic, and parapharyngeal lymphadenopathy. Ultrasound-guided fine-needle aspiration biopsy of a right neck node confirmed metastatic papillary thyroid carcinoma. She underwent total thyroidectomy along with right paratracheal, mediastinal, selective neck (levels II, III, IV and V), and parapharyngeal dissection. Final pathology revealed a 2.5-cm primary tumor diffusely involving the right lobe of the thyroid and metastases in right paratracheal as well as level II, III, IV, and V lymph nodes.

Postoperatively, the patient underwent remnant ablation with 100 mCi of iodine-131. Four months postoperatively, CT scan revealed a 2-cm...
enhancing right lateral retropharyngeal node (see Figure 6) and the serum thyroglobulin level rose to 65 ng/mL. Subsequent restaging with a whole body radioactive iodine scan revealed no uptake, and CT scan of the chest revealed no further evidence of disease. Despite a second course of radioactive iodine therapy with 160 mCi of iodine-131, serum thyroglobulin levels remained persistently elevated. Thus, a surgical approach was warranted for regional control of disease in this patient with metastasis isolated to a single site in a right lateral retropharyngeal node.

She underwent transoral retropharyngotomy with excision of a single right lateral retropharyngeal lymph node. Final pathology revealed metastatic papillary thyroid carcinoma, of predominantly follicular variant cell-type, with focal extracapsular extension. Her postoperative course was uncomplicated, with hospital discharge on the first postoperative day. Six months after surgery, her serum thyroglobulin level remained barely detectable at 1.4 ng/mL.

**Case 2.** A 36-year-old Caucasian man developed recurrent disease in bilateral paratracheal, left supraclavicular, mediastinal and retropharyngeal nodes after surgery for sporadic medullary thyroid carcinoma. He had originally presented at another institution 13 months earlier with a left thyroid mass. Imaging had revealed a 7-cm mass arising from the left thyroid lobe extending into the superior mediastinum and displacing the trachea rightward, in addition to left jugular chain lymphadenopathy. He underwent total thyroidectomy with central compartment and left modified radical neck dissection. Final pathology demonstrated medullary thyroid carcinoma in an 8-cm primary tumor with extrathyroidal extension and metastases in the central compartment as well as multiple levels of the left neck. Six months postoperatively, he returned with palpable left jugular chain adenopathy and underwent a second left neck dissection.

The patient subsequently presented to our institution for re-evaluation, and MRI revealed metastatic disease in left neck level V, bilateral paratracheal, superior mediastinal, and left lateral retropharyngeal nodes (see Figure 7). Ultrasound-guided fine-needle aspiration cytology of the jugular node confirmed the presence of disease on both sides of the neck. Additional restaging revealed no evidence of disease elsewhere. Thus, despite extensive regional disease, a surgical approach was warranted in an attempt to remove all gross disease in this young patient with no evidence of distant metastasis.

Transoral sonography readily identified the lesion, and the patient underwent transoral retro-
pharyngotomy with excision of a left lateral retropharyngeal node. Additionally, he underwent bilateral neck, paratracheal, and mediastinal dissection. Final pathology demonstrated metastatic medullary thyroid carcinoma with extracapsular extension in the lateral retropharyngeal node. His postoperative course was uncomplicated.

**Case 3.** A 56-year-old Caucasian woman was referred with elevated serum thyroglobulin and sonographic findings suggestive of recurrent papillary thyroid carcinoma in the left neck, despite an iodine-131 whole body scan which revealed no iodine-avid disease. Eighteen years earlier, she was incidentally found with papillary thyroid carcinoma by fine-needle aspirate of a dominant nodule in a multinodular goiter and underwent total thyroidectomy. Final pathology revealed multifocal papillary thyroid carcinoma, with the largest lesion of 1 cm, and metastasis in multiple lymph nodes in level VI. She developed regional recurrences treated by 2 additional surgical procedures in the left lateral neck and postoperative radioactive iodine, 2 and 9 years after initial treatment.

Upon restaging evaluation at our institution, CT scan demonstrated recurrence in the left lateral neck, bilateral paratracheal, and left retropharyngeal lymph nodes. A left lateral retropharyngeal mass was found at the cranio-caudal level of the soft palate and suggested the possibility of a second primary tumor of the nasopharynx (see Figure 8). Nasopharyngoscopy, however, found no suspicious finding in the mucosa or submucosa. Therefore, preoperative transoral ultrasound-guided fine-needle aspiration biopsy was performed under local anesthesia to establish a diagnosis. A single fine-needle aspiration biopsy pass confirmed the diagnosis of metastatic papillary thyroid carcinoma (see Figure 9).

The patient underwent excision of the left retropharyngeal node by left retropharyngotomy in addition to bilateral paratracheal, superior mediastinal, and left neck dissection. Final pathology confirmed cystic papillary thyroid carcinoma metastasis in the retropharyngeal node without extracapsular extension.

**RESULTS**

In all cases, the metastatic lateral retropharyngeal lymph node was successfully removed by transoral retropharyngotomy. Operative times ranged from 10 to 22 minutes. No intraoperative complications were encountered in any patient, while the estimated blood loss was less than 5 mL in each case. The surgical defect was closed primarily in 2 patients and was managed by secondary intention in 1. All wounds healed well. All patients resumed oral diet within 24 hours following surgery, with only mild discomfort similar to

**FIGURE 8.** 56-year-old woman with recurrent papillary thyroid carcinoma, metastatic to a left lateral retropharyngeal lymph node, with obvious necrosis (arrow).

**FIGURE 9.** Transverse transoral sonogram of the same patient in Figure 8 obtained with an endovaginal probe clearly shows the metastatic node (arrows) in the left lateral retropharyngeal space. Note the intimate relationship of the node with the internal carotid artery (ICA).
that of tonsillec- tomy. One patient who underwent retropharyngot omy alone was discharged on the first postoperative day. Two patients who underwent the procedure with concurrent neck dissection were discharged on the first and the fourth postoperative days.

**DISCUSSION**

Our results suggest that transoral retropharyngotomy for the excision of metastatic thyroid cancer in lateral retropharyngeal nodes is technically feasible. Like Goodwin and Chandler reported in a series of lateral parapharyngeal space salivary gland tumors excised transorally, we found that an approach through the oral cavity was most direct and provided adequate access. However, those authors neither performed nor advocated a transor al approach for the excision of lateral retropharyngeal metastases (personal communication). In our series, the tumor was adequately exposed with far less surgery than alternative approaches in all cases. Despite the more significant exposure afforded with transmandibular approaches, the extent of soft tissue margins is affected by the maintenance of surrounding critical structures. Conversely, transcervical approaches offer limited access and visualization of the superior aspect of the internal carotid artery. Clearly, no approach allows the wide exposure necessary to perform dissection on the plane of adjacent structures to obtain wide soft tissue margins. Fortunately, most thyroid cancer metastases are readily dissected along surgical planes and can be completely excised without the need for wide margins. Indeed, complete excision was obtained even in the presence of extracapsular spread in 2 of the patients in our series.

A minimally invasive approach to access the retropharyngeal space through the oral cavity avoids the morbidity of alternative approaches. Any surgical approach to the retropharyngeal space risks injury to the carotid artery, lower cranial nerves, and cervical sympathetic chain. Indeed, each of the approaches previously described incur significant morbidity. Transcervical approaches are most commonly used for retropharyngeal lymph node dissection in the management of squamous carcinomas of the oropharynx, hypopharynx, and cervical esophagus. These approaches require extensive dissection to gain access to the retropharyngeal space. Transparotid approaches require dissection of the facial nerve and may lead to transient postoperative facial weakness. Transmandibular approaches risk the complications of poor healing of an osteotomy, damage to teeth, and temporomandibular joint dysfunction. Moreover, any of these approaches incur a higher risk of neurovascular injury in the previously operated neck common in patients with metastatic thyroid cancer.

The main limitation of a transoral approach to the retropharyngeal space is the potential for vascular injury in the lack of immediate access to proximal control of internal carotid and jugular vessels. Nonetheless, gentle blunt dissection prevented damage to the important structures adjacent the tumor in our series. The tonsillar vessels were easily dealt with using bipolar cautery to perform a relatively bloodless dissection. While prior tonsillectomy and peritonsillar abscess drainage are not absolute contraindications to the procedure, fibrosis from previous surgery requires greater vigilance to perform safe dissection. While meticulous technique is required to avoid vascular injury in any lymphatic dissection, its importance in dissection close to the internal carotid artery cannot be overstated. As a general note, the surgical procedures in our series were performed by the senior author, who has extensive experience in limited access surgery, as well surgery for recurrent thyroid cancer.

We performed preoperative ultrasonography to confirm CT or MRI findings, to assess the vascularity of the metastatic node, and to identify its relationship to the internal carotid artery. While ultrasonography in the evaluation of retropharyngeal nodes has been reported, a percutaneous technique was used to monitor response to radiation therapy. In contrast, our technique used endocavitary transoral ultrasonography to evaluate nodes prior to surgery. The technique was most critical in each of our cases to determine the suitability for transoral resection and to map the location of the node in designing an appropriate incision. A normal, hyperechoic fat plane between the retropharyngeal node and the internal carotid artery was reassuring that the mass could be safely excised. Moreover, ultrasound-guided fine-needle aspiration biopsy can be performed in cases with diagnostic uncertainty.

Thyroid cancer metastasizes to the retropharyngeal space by lymphatic spread. While retrograde spread may occur along the jugular chain to the retropharyngeal nodes, a route of spread can arise directly from the thyroid gland. Robbins et al. explained a pathway of direct spread superiorly by lymphatic trunks from the posterior and...
superior compartments of the lateral lobes of the thyroid in accordance with Rouviere’s description. These lymphatic trunks connect directly to the lateral retropharyngeal nodes and are considered anatomic variants, present in about 20% of the population. Furthermore, these routes of spread might gain additional importance after previous neck dissection has altered native lymphatic drainage pathways.

Our findings, in 3 patients presenting over a period of 30 months, suggest a higher incidence of retropharyngeal lymph node metastasis from differentiated thyroid carcinoma than that implied by the literature. Indeed, the occurrence of thyroid cancer metastasis to retropharyngeal lymph nodes has been described mainly in sporadic case reports. Moreover, each of these reports described parapharyngeal masses that were found to represent thyroid cancer metastasis. However, the radiologic imaging of most cases demonstrated bulky tumors contained in both the parapharyngeal and retropharyngeal spaces. Similarly, in a series of 51 patients who underwent surgery for parapharyngeal space tumors at the University of Pittsburgh, only 1 patient had metastatic thyroid cancer. In contrast, the largest experience of retropharyngeal spread of carcinoma of the thyroid was an early report by McCormack et al in 1970. The authors described retropharyngeal metastasis in 7 patients over a 20-year period among 313 patients with thyroid cancer who were referred for radioactive iodine studies. In this highly select patient population, the diagnosis was made clinically, without the benefit of modern radiologic imaging, and was confirmed by biopsy or necropsy, to demonstrate retropharyngeal metastasis in 2% of patients. Furthermore, our findings occurred during a period in which 88 patients underwent surgery for recurrent, metastatic thyroid cancer by a single surgeon (G.L.C.). In any case, retropharyngeal metastasis can be expected to occur in patients presenting to a multidisciplinary cancer center for management of metastatic thyroid cancer.

CONCLUSION

We advocate a transoral approach for the resection of differentiated thyroid cancer metastatic to the lateral retropharyngeal lymph nodes. Careful preoperative evaluation with CT and ultrasonography is mandatory to appropriately plan surgery. The approach is feasible, minimally invasive, and safe in achieving the goals in resection of metastatic thyroid cancer by surgeons experienced in limited access procedures.

Acknowledgment. The authors wish to thank Mr. Michael Cooley for the medical illustration of Figure 1.

REFERENCES