

## PATHOLOGY OF NECK DISSECTIONS

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The presence of cervical lymph node metastasis at the time of presentation and treatment is the main adverse prognostic factor for patients with squamous cell carcinoma of the upper aerodigestive tract: its presence reduces the 5-year survival by approximately 50%, irrespective of the primary site.<sup>1</sup> However, clinical and pathologic findings specific to lymph node metastasis provide additional prognostic information related to tumor recurrence and overall survival. The basic histopathologic features of cervical lymph node metastasis of prognostic significance are: extracapsular spread (ECS) ; the level , number, and size of positive lymph nodes; pattern of lymph node response; and soft tissue deposits.<sup>2-6</sup> Furthermore, accurate pathologic staging of the neck of patients with head and neck cancer is important for providing information and optimizing the treatment plan.<sup>6</sup>

### *Gross examination of specimens*

Because the main anatomic and radiologic landmarks are lacking in neck dissection specimens, the orientation and labeling of the lymph node levels must be performed by the surgeon. Ideally, each level and sublevel of lymph nodes should be labeled and submitted to the pathology laboratory in separate containers, one container for each level or sublevel of lymph nodes removed.<sup>7</sup> The pathologist has a choice of two methods for examination of the specimens<sup>6,8</sup>.

The traditional method of assessing dissected nodes relies on the identification of lymph nodes by dissection of the received specimen.<sup>8</sup> All lymph nodes visible or palpable in each specimen are carefully dissected from connective tissue with a rim of perinodal connective tissue or fat. The number of lymph nodes should be noted; if tumor is present, the size in centimeters of the metastases and presence of ECS are also noted and recorded. Nodes greater than 2 to 3 cm are bisected along their longest axis plane, and both halves are submitted. Smaller nodes are submitted in toto. If a group of matted lymph nodes is present, two to three sections through the nodes often are adequate to document the extent of tumor<sup>8</sup>

In 2003, Jose et al<sup>6</sup> designed a new method for pathologic examination of neck dissections. In this method; the node levels and sublevels are sent to the laboratory in separately labeled containers and fixed in formalin. Each specimen is cut into 2- mm-thick blocks, embedded in paraffin and sectioned at 6 microns thickness and stained with hematoxylin and eosin. Any macroscopically enlarged lymph nodes present are noted and embedded in their entirety. Care must be taken to count only once those lymph nodes that appear in multiple sections . With this method, the lymph node yield obtained is 50.4 nodes per neck dissection and the average number of microscopic slides generated is 63 (Level I-IV dissection). This technique allows accurate and comprehensive pathologic staging of cervical metastases, because the entire neck dissection specimen is examined rather than only apparent lymph nodes.<sup>6</sup>

The following method for the pathologic examination the neck dissections is recommended when they are submitted to the pathology laboratory as a single surgical specimen rather than in separate containers. It pertains to standard radical neck dissection and needs to be modified for the other subtypes.<sup>8</sup> After the tissue specimen has been oriented and the platysma muscle has been removed, the first step in a gross examination is to measure the dimensions of the sternocleidomastoid muscle and the internal jugular vein and describe their involvement by the tumor. Next, the pathologist should dissect and divide the submandibular gland, sternocleidomastoid muscle, and internal jugular vein and separate the fat-containing nodes into five levels: sublingual and submandibular, superior jugular, middle jugular, lower jugular, and posterior. The presence of tumor in soft tissues, submandibular gland, and muscle should be described. The number of lymph nodes (by level) should be noted ; if tumor tissue is present, the size of the metastases and presence of extracapsular extension are likewise indicated. Tissue sections of all lymph nodes (separated by level), the submandibular gland, the sternocleidomastoid muscle, and the internal jugular vein are then submitted for microscopic examination. If the neck dissection is of the extended type, sections of all extra lymph node groups and nonlymphatic structures that were removed also should be submitted for microscopic examination<sup>8,9</sup>

It is important to distinguish lymphoid aggregates from true lymph nodes. Lymph nodes are defined as an aggregate of encapsulated lymphoid tissue of any size with a peripheral sinus present. Microscopic ECS is diagnosed when the tumor extends beyond the lymph node capsule and a desmoplastic stromal response is observed. A soft tissue deposit of carcinoma is identified as metastatic squamous carcinoma in the soft tissues of the neck, with no evidence of a lymph node present. Soft tissue deposits may represent extralymphatic deposits of squamous carcinoma or a totally effaced lymph node.<sup>6,8</sup>

#### *MICROSCOPIC EXAMINATION AND DETERMINANTS OF PROGNOSIS*

The aim of the microscopic examination is to discover the histologic features that are important in predicting patient outcome or that may determine whether the patient should be given adjuvant therapy. The seven important parameters are the number of positive lymph nodes, the presence of metastasis in different groups of lymph nodes, the presence or absence of ECS, the size of the metastasis, the presence of metastasis in soft tissues, invasion of jugular vein and the presence of desmoplastic reaction in metastatic tissue.<sup>2-7</sup>

Of these parameters, ECS has been increasingly identified as a major prognostic factor in terms of recurrent disease in the neck and overall survival.<sup>2,3</sup> In a study by Johnson et al,<sup>3</sup> histopathologic evidence of ECS was associated with a statistically significant reduction in the survival rate. Thirty–nine per cent of patients whose metastases showed evidence of ECS survived 5 years, whereas 75% of those without evidence of ECS survived 5 years. Patients with ECS had an increased risk of disease recurrence and a shorter time to disease recurrence. Local disease recurred within 6 months in 42% of patients with ECS and in 18% of patients without ECS, and distant metastases occurred within 18 months in 14% of patients with ECS and in 4% of patients without ECS. Similar results were observed by Woolgar et al,<sup>4</sup> in patients whose tumors showed only microscopic evidence of ECS. Carter et al.<sup>2</sup> demonstrated a 10-fold

difference in the risk of disease recurrence in the neck between patients with macroscopic ECS and patients with only microscopic ECS or no ECS at all.

Prognostic significance has often attributed to the number of lymph nodes and the number on involved nodal group. In a multivariate analysis performed by Carter et al<sup>2</sup> using Cox regression methods, the important factors in predicting survival time were the number of involved nodes and the number of involved anatomic groups.

Involvement of the lower jugular and posterior triangle nodes and noncontiguous or multiple disease sites have been associated with poorer prognoses.<sup>2,7</sup> Estimated 2-year survival rates in patients with one positive lymph node were 68.8%, 56.3% in patients with 2 to 4 positive nodes, and 28.6% when more than four lymph nodes were involved by metastatic carcinoma.<sup>4,5</sup> Also, Woolgar et al<sup>4</sup> found a correlation between the size of the metastatic lymph node deposits and 5-year survival when the deposits measured less than 3 mm the survival rate was 80% compared with 55% when the metastatic deposits were grossly appreciated.

In a study by Olsen et al<sup>5</sup> a desmoplastic stromal pattern in a lymph node metastasis was associated with a nearly sevenfold increase in the risk of recurrent neck disease. In the same study, the authors demonstrated that metastasis to soft tissue and /or invasion of the jugular vein were associated with a high rates of neck recurrences (50% and 27%, respectively) compared with rates for patients with neither of these two factors (84% and 75%, respectively)..

#### *INCIDENTAL FINDINGS IN LYMPH NODES OF NECK DISSECTIONS FOR SQUAMOUS CARCINOMA*

During the pathologic examination of neck dissection specimens, unexpected findings within the lymph nodes may occasionally be discovered.<sup>9-11</sup> Such findings may include the presence of a second primary tumor (thyroid, lymphoma, chronic lymphocytic leukemia and Warthin's tumor are the most common) , chronic infectious or inflammatory diseases (tuberculosis, sarcoidosis), benign ectopic inclusions (nevus cells, salivary glands, thymus, bronchial or parathyroid heterotopias) or keratin granulomas.<sup>2</sup> Such incidental findings during neck dissection occur in 2% to 5% of patients with carcinoma of the upper aerodigestive tract<sup>9-11</sup> Malignant tumors may be present in nearly half of these.<sup>9,11</sup> Thyroid tissue within lymph nodes is the most common incidental finding and may present management dilemmas.<sup>9,11</sup>

#### *References*

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