A Proposal for Redefining the Boundaries of Level V in the Neck

Is Dissection of the Apex of Level V Necessary in Mucosal Squamous Cell Carcinoma of the Head and Neck?

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In 1991, the Committee for Head and Neck Surgery and Oncology of the American Academy of Otolaryngology–Head and Neck Surgery proposed to define the anatomic boundaries between the lymph node levels in the neck, as initially described by the Memorial Sloan-Kettering Cancer Center (New York, NY). Recently, radiological parameters have been outlined to identify boundaries between various neck levels. The lymphatics of the posterior triangle of the neck are gathered in level V, recently subdivided into 2 subgroups: level Va and level Vb. The superior boundary of level Va is defined by the apex of the convergence of the sternocleidomastoid muscle and trapezius muscle. Based on anatomic evidence and surgical experience, we advocate the subdivision of level Va into 2 sections: the apex of level Va or level Vas (superior) and level Vai (inferior), demarcated by the lower two thirds of the spinal accessory nerve. Dissection of level Vas is not necessary in most head and neck cancers but should be considered only in selected skin cancer of the posterior cephalic area (retroauricular region, occipital scalp).


Since its first description by Crile in 1906 and popularization by Martin et al in the middle of the last century, the classic radical neck dissection (RND) has been and still remains a cornerstone in the surgical management of lymph node metastases of cancers of the head and neck. If there is little doubt that RND has been proven to be oncologically very effective, significant functional and cosmetic morbidity induced by this operation is also, in any case, not questionable.

Modifications of RND were introduced by Suarez and popularized by Bocca (and colleagues), who in his initial report described a so-called “functional” neck dissection in combination with a supraglottic laryngectomy. In this procedure, the spinal accessory nerve (SAN), the internal jugular vein, and the sternocleidomastoid muscle (SCM) were preserved, whereas all the lymphatic structures that routinely cleared during RND were resected. Dissection of the submandibular region was not routinely carried out. In the last decades, further modifications to RND have been reported. All have been based on the same concept: to improve the quality of treatment results without jeopardizing oncologic outcome. However, the terminology applied to these modifications has remained confusing.

In an attempt to avoid the confusion induced by the plethora of terms applied to the various modifications of the former description of the RND, the Committee for Head and Neck Surgery of the American Academy of Otolaryngology–Head and Neck Surgery proposed in 1991 guidelines for standardization of neck dissection. The Committee worked to define the anatomical boundaries of lymph node dissection and to offer basic principles upon which the terminology of neck dissection procedures should be based. In addition to the need for a uniform system of terminology, the objectives of the Academy’s Committee were to define the lymphatic structures and other nonlymphatic structures.
phatic structures removed or spared by each procedure; to standardize the terminology used to describe the lymphatic structures of the neck, particularly lymph node groups at risk for tumor metastases; and to define the boundaries of each of the lymph node groups removed in the different types of neck dissection previously described.

The Academy’s Committee adopted a classification based on the level system as described by the Memorial Sloan-Kettering Cancer Center,7 dividing the neck into 6 levels comprising 8 node groups.

In 1997, the fifth edition of the American Joint Committee on Cancer Staging Manual8 suggested adding a seventh level containing the lymph nodes inferior to the suprasternal notch, in the upper mediastinum. This level might be at risk of metastases in head and neck cancer (eg, subglottic carcinoma, thyroid gland carcinoma, and hypopharyngeal carcinoma), but should be considered as not lying into the neck but into the mediastinum.

The original classification of 1991 has been recently updated, introducing the use of anatomic structures depicted radiologically to better define boundaries between various neck levels.9-12

Level I is subdivided into level Ia (submental lymph nodes) and level Ib (submandibular lymph nodes).

Levels II, III, and IV refer to lymph node groups associated with the upper, middle, and lower parts of the internal jugular vein, including the fibroadipose tissue located between the lateral border of the stylohyoid muscle and sternohyoid muscle anteriorly and the lateral border of the SCM posteriorly.12 Level II includes 2 subgroups: level IIa, containing the lymph nodes in the region anterior to the SAN, and level IIb, containing the lymph nodes posterior to the SAN.

Level V comprises the lymphatic structures of the posterior triangle group, including the lymph nodes located along the lower two thirds of the SAN and the transverse cervical artery (Figure, A). Recently, level V has been subdivided into 2 groups: Va and Vb. This allows distinction of lymph node involvement of the lower part of the SAN chain (sublevel Va) from involvement of the transverse cervical artery chain (sublevel Vb).9,10,12 These 2 compartments are separated by a horizontal plane defined by the lower border of the cricoid cartilage. The anatomic boundaries of sublevel Va are defined as follows: 1°—superiorly, the apex of the convergence of the SCM and trapezius muscle; 2°—inferiorly, the horizontal plane defined by the lower border of the cricoid cartilage; 3°—anteriorly, the posterior border of the SCM; and 4°—posteriorly, the anterior border of the trapezius muscle.12

We believe that the limits of sublevel Va commonly accepted and depicted in figures of most textbooks on head and neck oncology should be debated. First, the distinction between the posterior end of sublevel IIb and the apex of sublevel VA is not clearly identified. Although theoretically the posterior boundary of sublevel IIb is defined by the posterior border of the SCM while the posterior boundary of sublevel Va is defined by the anterior border of the trapezius muscle, the differentiation between these 2 levels is virtually impossible during most neck dissection procedures. For this reason, the Committee for Neck Dissection Classification of the American Head and Neck Society and the Committee for Head and Neck Surgery and Oncology of the American Academy of Otolaryngology—Head and Neck Surgery recently introduced a modification including the vertical plane with the sensory branches of the cervical plexus as an additional border to facilitate, during sur-

A, Anatomy of the posterior cervical triangle showing the confluence of superficial (white) and deep (black) lymph nodes in the middle part of the spinal accessory nerve (SAN) chain. Lymph node groups are identified as occipital (1), mastoid (2), upper supra-SAN (3), middle peri-SAN (4), lower infra-SAN (5), and transverse cervical (6). B, Proposed subdivision of level V: the apex of level Va, located in a supra-SAN position should be named Vas (superior), the main lower peri-SAN portion should become level Vai (inferior). Level Vb remains unchanged.
surgery, the identification of the posterior boundary of levels II, III, and IV from level V. Essentially, this modification provides better orientation for the surgeon in delineating levels III and IV, but not sublevel IIb, from level V. Indeed, if sensory branches of the cervical plexus are well individualized below the level of the upper third of the SAN, no branch is usually identified up to this level. The lesser occipital nerve seems not to be a reliable border because it is only identified when the apex of level V must be resected. Therefore, performing a complete clearance of sublevel IIb, experienced surgeons resect usually in the same time the upper portion of sublevel Va.

Moreover, according to the anatomical works of Rouvière, the upper part of sublevel Va contains only superficial suprafascial occipital lymph nodes, and, inconsistently, subfascial and submuscular lymph nodes located close to the occipital attachment of the SCM (Figure, A). Collecting the lymphatic vessels arising from the occipital scalp and the postauricular and nuchal regions, these lymph nodes drain into the middle third of the SAN chain, but are obviously not at risk of metastases in head and neck carcinoma, except in cases of skin cancer.

In 1999, Robbins stated, “In some circumstances, lymph nodes lying along the upper third of the SAN may be found, but these nodes are actually included in level IIb.” Consequently, he argued that the uppermost part of level Va was devoid of any constant lymph node group. In the same way, we began recently a prospective study on neck dissection pathologic specimens, individualizing the upper part of sublevel Va for potential identification of lymph nodes. Among 39 consecutive neck dissections with individualization of the apex of level V performed in 22 patients with squamous cell carcinoma of the head and neck (oral cavity, 1; oropharynx, 4; hyoid region, 1; larynx, 7; unknown primary, 2; staging: N0, 8; N1, 3; N2a, 6; N2b, 2; N2c, 3), no lymph node could be identified in the apex in 32 dissections, whereas a single normal lymph node was found in 5 dissections and 3 normal lymph node in 2 specimens.

Consequently, it appears that subdividing level Va into 2 sections relates better with anatomic and clinical reality. The narrow apical part of sublevel Va, belonging to the superficial occipital group of the lymphatic system of the head, which contains few superficial supra-SAN lymph nodes connected to the mastoid and occipital skin, would be sublevel Vas (superior), while its main lower portion, which belongs to the deep lateral system of the neck region and includes a large amount of peri-SAN lymphatic pathways related to the drainage of the mucosal lining of the cervical and cephalic visceral cavities, would be sublevel Vai (inferior). The border between level Vai and level Vas should be the lower two thirds of the SAN. The horizontal plane defined by the upper edge of the body of the hyoid bone seems to be a reliable landmark to separate the 2 sections (Figure, B). In 1987, Suen and Goeplert had already proposed that level V was bordered superiorly by the lower SAN while the apex of sublevel Va, as described by the Academy’s Committee, was included in sublevel IIb.

Dissection of the apex of level V is not necessary in most head and neck squamous cell carcinomas and should be considered only in some skin cancers of the posterior scalp and posterior neck. In these specific situations, the targeted lymph node groups are not limited to the apex but extend toward the midline and posterior occiput along the occipital vessels and postauricular lymph nodes. This issue should be addressed not only by surgeons managing head and neck cancers but also by radiation oncologists for a more accurate delineation of lymph node target volumes in conformal radiotherapy.

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