

PROPOSAL FOR A RATIONAL CLASSIFICATION OF NECK DISSECTIONS

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It is important to have an internationally recognized, precise nomenclature for different types of neck dissection both for clinical and research purposes. However, as neck dissection techniques have evolved, previously described nomenclature of neck dissections have become confusing and less used globally. This lack of international acceptance of a uniform classification, and the increasing use of more limited lymphadenectomy procedures, prompted this re-evaluation of neck dissection classifications, and suggestion of a new system of terminology.

Evolution of Neck Dissection. Neck dissection has evolved into a variety of surgical procedures for excision of regional lymph nodes since its introduction in the 19th century, when surgeons first became aware that cancers of the head and neck metastasized to the cervical lymph nodes. Surgical lymphadenectomy was first described in the late 1800s by surgeons such as Kocher, Billroth, von Langenbeck, and von Volkmann, who explored removal of portions of lymph node-bearing tissue.¹ Initial attempts at surgical removal of neck metastases were disastrous. However, Jawdyński² in 1888 described in great detail his first successful radical *en bloc* resection of a metastatic mass in

the neck. Later in 1905, Crile³ reported his experience using this systematic *en bloc* approach for excision of cervical lymph nodes and documented its efficacy in a large series of patients. Martin et al⁴ also reported the efficacy of classical radical neck dissection based on a large series of patients, and recommended the operation both in an elective setting and as a therapeutic procedure. Starting in 1952, Suárez began to employ a modified technique by preserving nonlymphatic structures.⁵ He named this procedure the “functional” or “conservative” neck dissection, which was later promoted by Bocca⁶ and Gavilán et al.⁷ In the 1960s, Ballantyne and the surgeons at MD Anderson Cancer Institute introduced the concept of dissecting only the lymph nodes most at risk of containing metastases, depending upon the location of the primary tumor.⁸

The advent of chemoradiation as the initial definitive treatment for squamous cell carcinoma of many primary sites during the late 20th and early 21st century has enabled the use of other variations of neck dissection, as a valid pathological basis for performing less extensive procedures has been established.

At the present time, a variety of new modifications of neck dissection, in which only groups of lymph nodes

considered at risk are removed, have been shown to be oncologically, functionally, and cosmetically effective for prophylactic or therapeutic treatment of the neck. These procedures have been termed selective, extended selective, and superselective neck dissections, all of which have been applied as either part of the initial phase of treatment or after chemoradiation.^{9–12}

Neck Dissection Terminology. With a variety of modifications of neck dissection techniques reported in the literature, a varied and often confusing nomenclature has evolved. These names have usually been based on the extent or limitation, and intent or purpose of the neck dissection.

Myriad terms are and have been used for neck dissection procedures which extirpate all the nodes in levels I to V. This list includes radical neck dissection, modified radical neck dissection, modified neck dissection types I to III, modified comprehensive neck dissection types I to III, extended radical neck dissection, radical *en bloc* neck dissection, extended radical *en bloc* neck dissection, conventional radical neck dissection, classical radical neck dissection, conservative neck dissection, complete functional neck dissection, nerve-sparing radical neck dissection, nerve/muscle-sparing radical neck dissection, nerve/muscle/vein-sparing radical neck dissection, and total neck dissection.

For more limited neck dissection procedures, numerous terms have also been used, including selective, extended selective, superselective, suprahyoid, supraomohyoid, extended supraomohyoid, jugular node, lateral neck, posterolateral, anterior, anterolateral, regional, minor, limited, upper-lateral, lower, lower-lateral neck dissections, and many others. Additional terms that have been used are fascial neck dissection, precautious neck dissection, Suárez neck dissection, Bocca neck dissection, modified neck dissection, and cervical lymphadenectomy.

Terms based on the intent or purpose of the neck dissection include planned neck dissection, therapeutic neck dissection, elective neck dissection, prophylactic neck dissection, salvage neck dissection, and others, depending on the vocabulary and imagination of the surgeon.

Classification of Neck Dissections. The need to standardize the nomenclature relating to neck dissections is critical and self-apparent. In 1987, Suen and Goepfert¹³ were among the first to suggest a universally acceptable classification of neck dissections, which was simplified 2 years later by Medina.¹⁴ The principle behind both classifications was to identify 3 broad categories of neck dissection: standard radical neck dissection, comprehensive modified radical neck dissection, and selective neck dissection.

In 1991, the Committee for Head and Neck Surgery and Oncology of the American Academy of Oto-

laryngology–Head and Neck Surgery, in conjunction with the Education Committee of the American Society for Head and Neck Surgery (ASHNS),¹⁵ proposed a classification system which was revised in 2002.¹⁶ In 2008, the Committee for Neck Dissection Classification of the American Head Neck Society (AHNS) published an update.¹⁷ This classification is based on 4 basic procedures:

1. *Radical neck dissection* is the standard basic procedure for cervical lymphadenectomy which includes removal of lymph nodes from levels I to V, with removal of the sternocleidomastoid muscle, the spinal accessory nerve, and the internal jugular vein (the removal of the submandibular gland is implied).
2. *Modified radical neck dissection* involves removal of lymph nodes from levels I to V (as in radical neck dissection), but with the preservation of at least 1 of the nonlymphatic structures (ie, sternocleidomastoid muscle, spinal accessory nerve, and/or internal jugular vein).
3. *Extended neck dissection* refers to removal of additional lymph node levels or groups, and/or nonlymphatic structures (eg, muscle, blood vessel, nerve) not normally removed with a radical neck dissection. Examples of additional lymph node groups include superior mediastinal, parapharyngeal, retropharyngeal, periparotid, postauricular, suboccipital, and buccinator. Examples of other nonlymphatic structures are the external carotid artery, hypoglossal, and vagus nerves, and other neural, osseous, cutaneous, muscular, or vascular structures that are potentially involved with tumor or damaged by pre-sive therapy.
4. *Selective neck dissection* refers to preservation of 1 or more lymph node levels. There are several variations of the selective neck dissection, some of which have traditionally been given specific names (eg, lateral, supraomohyoid, extended supraomohyoid, posterior or central, in addition to others).

In 1997, Pellitteri et al¹⁸ reported that the spinal accessory nerve, internal jugular vein, and sternocleidomastoid muscle were preserved in the majority of selective neck dissections, and that of those 3 structures, the internal jugular vein was most likely to be sacrificed. In 2010, Hamoir et al¹² introduced the term “extended selective neck dissection” for when nonlymphatic structures such as the internal jugular vein, spinal accessory nerve, and/or the sternocleidomastoid muscle are removed in addition to selected lymph node levels.

The term “comprehensive” neck dissection encompasses the radical, modified radical, and extended neck dissections, in which all lymph nodes in levels I to V are removed. The terms “classical,” “elective,” or “prophylactic” neck dissection were proposed by Conley and von Fraenkel.¹⁹

Terms such as “functional,” “conservative,” and “limited” neck dissection are imprecise and are primarily nondescriptive.¹⁴ “Functional” neck dissection refers to the modified radical neck dissection type III.^{5,20} The term “functional” neck dissection is less precise, but has been used so extensively in the literature that these 2 terms may be considered synonymous. Medina¹⁴ recognized a subcategory of radical or comprehensive modified neck dissection in which level I is not included. These operations can be simply distinguished from their counterparts in which level I nodes are removed by designating them as subtype A (I–V lymph node groups) and subtype B (II–V lymph node groups), respectively. “Conservative” neck dissection usually refers to the same procedure,²¹ but the term should be avoided because of its lack of precision. Similarly, the term “limited” neck dissection proposed by Turkula and Woods²² is imprecise.

Subclassification into “therapeutic” and “elective” neck dissection refers to the indication for surgery, but does not specify the extent of the dissection. “Therapeutic” neck dissection is used when cervical metastases are detected preoperatively. “Prophylactic” or preferably “elective” neck dissection is used when neck dissection is done for potential subclinical cervical metastases.

In 2005, the Japan Neck Dissection Study Group proposed a different classification system for neck dissections,²³ published by the Japan Society of Clinical Oncology, and based on the classification of regional lymph nodes used in Japan.²⁴ This system divides the cervical lymph nodes into 3 basic regions with subregions in each. The basic regions are designated by letters S (submental-submandibular), J (jugular), and P (posterior triangle). The 2 components of the dissected region (S, J, and P) and resected nonlymphatic tissue (N = spinal accessory nerve, V = internal jugular vein, and M = sternocleidomastoid muscle) are described in simplified form with parentheses, and with a slash (/) to distinguish between them. Commas (,) are used to separate lymphatic tissue and nonlymphatic tissue from other lymph node groups and nonlymphatic tissue. For example, ND (SJP/VNM) denotes “radical neck dissection”; ND (J, pt) denotes “selective neck dissection (II–IV, VI)”. The subregions are identified by numbers after each letter (S1, S2, J1, J2, J3, P1, and P2), similar to the additional classification proposed by the AHNS for levels and sublevels IA, IB, IIA, IIB, III, IV, VA, and VB. Other lymph node zones are designated by the use of 2 lower-case letters (eg, sm = superior mediastinal, pt = paratracheal, and pg = parotid gland). The problem with incorporating this system into general usage is that the terminology used, along with the symbols, are entirely different from those commonly in use throughout the Western world. The majority of American and European surgeons would not adopt this completely unfamiliar system.

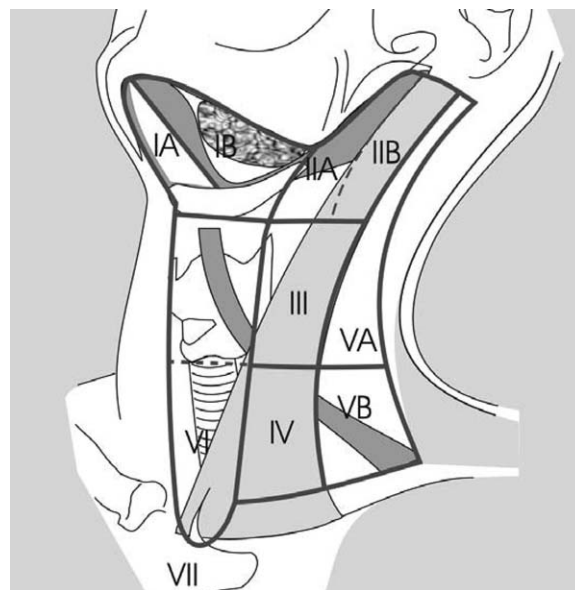


FIGURE 1. Lymph nodes levels and sublevels of the neck.¹⁷ Reproduced with permission from the Archives of Otolaryngology Head and Neck Surgery 134(5); 536–538, 2008. Copyright © 2008 American Medical Association. All rights reserved.

Recommended Classification of Neck Dissections.

In order to facilitate interinstitutional communication in the world, there is a compelling need to agree on an international nomenclature for cervical nodal groups and neck dissections, which is logical, unambiguous, precise, and easy to remember.

The classification for cervical lymph node groups proposed by Robbins et al¹⁷ in 2008 is simple, clear, well established, and easily understood by surgeons, oncologists, and diagnostic radiologists. It describes 7 levels and has precise clinical and image-based anatomic landmarks. These lymph node levels and sublevels are outlined in Figure 1.

To avoid confusion, redundancy, and misinterpretation among head and neck surgeons, we propose that neck dissection be classified as follows:

1. The symbol “ND” should be used to represent the term neck dissection and applied as the first component of the description. A prefix should be included to denote the side of the neck upon which the dissection has been performed using the abbreviation L for left, and R for right. If bilateral, both sides must be classified independently.
2. The second component of the description should be the neck levels and/or sublevels removed, each designated by the Roman numerals I through VII, in ascending order. For levels in which subdivision is applicable (such as I, II, V) the level is stated without a subdivision to indicate that the entire level (both A and B) was cleared. If a sublevel is named, it means that the remaining sublevel was preserved.

Table 1. Comparison of the new proposed terminology with the current widely used American terminology for different types of neck dissections. This demonstrates examples of neck dissection modifications currently practiced, which cannot be classified by the existing terminologies.

Proposed nomenclature	Nomenclature recommended by AAO-HNS/AHNS
ND (I–V, SCM, IJV, CN XI)	Radical neck dissection
ND (I–V, SCM, IJV, CN XI, and CN XII)	Extended neck dissection with removal of the hypoglossal nerve
ND (I–V, SCM, IJV)	Modified radical neck dissection with preservation of the spinal accessory nerve
ND (II–IV)	Selective neck dissection (II–IV)
ND (II–IV, VI)	Selective neck dissection (II–IV, VI)
ND (II–IV, SCM)	NA
ND (I–III)	Selective neck dissection (I–III)
ND (I–III, SCM, IJV, CN XI)	NA
ND (II, III)	Selective neck dissection (II, III)
ND (IIA, III)	Selective neck dissection (IIA, III)
ND (VI)	Selective neck dissection (VI)
ND (VI, VII)	Selective neck dissection (VI, VII)

Abbreviations: AAO-HNS, American Academy of Otolaryngology–Head and Neck Surgery; AHNS, American Head and Neck Society; ND, neck dissection; SCM, sternocleidomastoid muscle; IJV, internal jugular vein; CN XII, hypoglossal nerve; CN XI, spinal accessory nerve; NA, not available.

Note: Other suggested acronyms: SAN, spinal accessory nerve; ECA, external carotid artery; ICA, internal carotid artery; CCA, common carotid artery; CN VII, facial nerve; CN X, vagus nerve; SN, sympathetic nerve chain; PN, phrenic nerve; SKN, skin; PG, parotid gland; SG, submandibular gland; DCM, deep cervical muscles.

3. The third component of the description should be the nonlymphatic structures removed, each identified through the use of specified acronyms (symbols), all of which have been universally accepted (Table 1).

This classification is logical, simple, and easy to remember, and conveys precisely the extent of the lymphatic and nonlymphatic structures removed in a neck dissection. It prevents possible confusion associated with ambiguous terminology previously mentioned. Importantly, it allows recording of neck dissection procedures that cannot be classified under the existing systems (Table 1). The categorical nature of the elements in the classification has the added advantage of lending itself to easy recording and analysis in large databases. With regard to quality analysis, the proposed classification system offers a more precise description of the surgical procedure. Therefore, it would appear that such an improvement would translate into an improved ability to compare treatment outcomes among studies. With regard to procedure coding and billing, such changes in the nomenclature of neck dissection may introduce challenges concerning registration for billing and historical comparisons. These issues can be addressed and should not preclude refinements and modifications in the nomenclature.

CONCLUSION

The evolution of neck dissection from the extremes of the original radical neck dissection to the contemporary superselective neck dissection has exposed many shortcomings in the current AHNS Neck Dissection Classification system. This proposed neck dissection classification system overcomes all these limitations and will facilitate communication around the world with reliable reporting and comparison of outcomes among different surgeons and institutions. The next step would be for committees of various head and neck societies worldwide to come together and discuss and debate this proposed classification, recommend improvements, and then adopt a uniform international classification system for use by their respective memberships.

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