

Radical neck dissection: is it still indicated?

Marc Hamoir · Carl E. Silver · Sandra Schmitz · Robert P. Takes ·
Alessandra Rinaldo · Juan P. Rodrigo · K. Thomas Robbins · Karen T. Pitman ·
Jesus E. Medina · Alfio Ferlito

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The presence of lymph node metastases in the neck remains a significant prognostic factor affecting patients with head and neck squamous cell carcinoma (HNSCC). Thus, treatment of regional disease remains a critical issue in the management of many patients.

The “classical” radical neck dissection (RND), consisting of removal of all the lymphatic and non-lymphatic structures from the mandible to the clavicle, with the exception of the carotid artery, hypoglossal, lingual, vagus and phrenic nerves, and brachial plexus, was developed in the late nineteenth and early twentieth century [1–4]. The procedure did not achieve widespread use in the medical community until the work of Martin et al. [5] when mid-century advances such as antibiotics, blood transfusion and modern anesthesia permitted safe and efficacious operation

in a large series of patients. The classic RND has been and is still considered the “gold standard” for the surgical management of lymph node metastases of cancers of the head and neck.

There is little doubt that RND is oncologically a very effective surgical procedure, although beset with significant functional and cosmetic morbidity. During the second half of the twentieth century, a considerable evolution in the philosophy of surgical management of cervical lymph nodes in patients with head and neck cancer took place [6]. The wish to reduce the morbidity associated with RND, in particular regarding shoulder disability, gave impulse toward modifications of RND. The functional neck dissection of Suárez [7], which preserved the spinal accessory nerve (SAN), internal jugular vein (IJV), and sternocleidomastoid muscle (SCM), while removing the lymphatic structures in levels I or II through V, was developed and popularized [8] in the 1960s. Subsequently, Byers [9], at the MD Anderson Cancer Center, introduced the concept of

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M. Hamoir · S. Schmitz
Department of Head and Neck Surgery, St. Luc University
Hospital and Cancer Center, Université Catholique de Louvain,
Brussels, Belgium

C. E. Silver
Departments of Surgery and Otolaryngology-Head and Neck
Surgery, Albert Einstein College of Medicine,
Montefiore Medical Center, Bronx, NY, USA

R. P. Takes
Department of Otolaryngology-Head and Neck Surgery,
Radboud University Nijmegen Medical Center,
Nijmegen, The Netherlands

A. Rinaldo · A. Ferlito (✉)
ENT Clinic, University of Udine,
Piazzale S. Maria della Misericordia, Udine 33100, Italy
e-mail: a.ferlito@uniud.it

J. P. Rodrigo
Department of Otolaryngology,
Hospital Universitario Central de Asturias and Instituto
Universitario de Oncología del Principado de Asturias,
Oviedo, Spain

K. Thomas Robbins
Division of Otolaryngology-Head and Neck Surgery,
Southern Illinois University School of Medicine,
Springfield, IL, USA

K. T. Pitman
Department of Otolaryngology and Communicative Sciences,
University of Mississippi Medical Center, Jackson, MS, USA

J. E. Medina
Department of Otorhinolaryngology,
The University of Oklahoma Health Sciences Center,
Oklahoma City, OK, USA

dissecting only the lymph nodes specifically at risk of metastases, according to the location of the primary tumor. Nevertheless, it was generally agreed, until recently, that RND was necessary for surgical management of advanced lymph node metastases of HNSCC. However, this concept is now challenged by the development of non-surgical treatment for advanced tumors and the emergence of less extended surgical procedures inducing less morbidity with equivalent oncologic outcome.

Over the past two decades, the concept of more tailored treatment, even for advanced disease in the neck, has gained increasing acceptance. The general application of this concept received a major impulse with the publications of the recommendations of the Committee for Head and Neck Surgery and Oncology of the American Academy of Otolaryngology-Head and Neck Surgery [10–12]. Wishing to respond to the need for uniformity, Robbins et al. [10–12] proposed guidelines for the standardization of neck dissection with regard to terminology and extent of lymph node resection. In the proposed classification, RND was defined as the resection of lymph node levels I to V, including removal of the SCM, IJV, and SAN. RND was considered the standard basic procedure for cervical lymphadenectomy while all other procedures represented one or more modifications of RND. Modified radical neck dissection (MRND) referred to the removal of all lymph nodes routinely resected by the RND but sparing one or more of the non-lymphatic structures (SAN, IJV, and SCM) usually removed during RND. Extended neck dissection was defined by the removal of one or more additional lymph node groups (e.g., parapharyngeal, paratracheal lymph nodes) or non-lymphatic structures (e.g., carotid artery paraspinal muscles, hypoglossal nerve, vagus nerve), not routinely resected by RND. Selective neck dissection (SND) refers to the preservation of one or more lymph node levels routinely resected during RND while sparing all non-lymphatic structures removed during RND. Recently a proposal for an even more rational and comprehensive classification has been proposed by Ferlito et al. [13] suggesting that the symbol ND for neck dissection be followed by the lymph node levels removed (I through VI) and the non-lymphatic structures resected (SCM, IJV, SAN, etc.).

Lymphatic metastases do not occur randomly, but in a predictable and well-documented pattern, in accordance with the site and subsite of the primary tumor, following the pre-existing lymphatic anatomy [14, 15]. Better knowledge of the anatomy of the lymphatics in the neck and improved understanding of lymphatic drainage patterns have led to surgical procedures which spare anatomical structures while removing the nodes at risk of containing metastasis. Application of this concept has significantly decreased the morbidity associated with the

more radical procedures. Consequently, the trend toward increasing the frequency and indications for less radical procedures is justified.

At this point we may ask the following question: “If equivalent oncologic results can be accomplished with less morbidity by modified procedures, are there still indications for the use of RND?” Certainly RND is unacceptable for elective treatment of the clinically negative (N0) neck. Either SND or sentinel lymph node biopsy is the procedure of choice if elective treatment is chosen for the N0 neck. RND is also an overtreatment for most patients with clinically positive (N+) neck disease. There is increasing evidence suggesting that MRND [16] and even SND in patients with N+ disease are equally efficacious as RND [17–20]. The SCM should be removed only when there is evidence of tumor extension or permeation of lymphatics. The SAN should be spared unless it is grossly infiltrated or encased by cancer. Even for patients with massive lymphadenopathy and significant extension to soft tissue, RND remains rarely indicated. Indeed, in this situation, when surgery is considered as primary treatment, it is rarely necessary to dissect all lymph node levels—although resection of one or more non-lymphatic structures or lymph node groups not usually included in RND may be necessary. In these circumstances the resultant disability could be very similar to that of classical RND or extended neck dissection, but resection of uninvolved tissue is avoided. For example, sublevel IA is usually not involved in patients with lymph node metastases from tumors of the larynx, hypopharynx, oropharynx, parotid gland, submandibular gland, thyroid gland, parathyroid gland, trachea, and cervical esophagus. Oral cavity SCCs do not usually metastasize to level V. The apex of level V is never invaded in mucosal HNSCC and the dissection of this sublevel should only be considered in skin cancer of the posterior scalp and posterior neck [21]. Accordingly, the absence of metastases in sublevel IA and/or in sublevel VB does not justify a comprehensive dissection including levels I to V in patients with primary mucosal cancer of the head and neck [22, 23]. In 1992, Wei et al. [24] have reported that, in view of the usually extensive nature of neck lymph node metastasis of recurrent nasopharyngeal cancer, RND should be performed. However, in such a situation, neck dissection may require dissection of parapharyngeal lymph nodes not routinely resected in RND whereas the lymph nodes in sublevels IA and IB may be frequently spared, even in cases with advanced regional recurrence. Patients with persistent neck disease after concurrent chemoradiation for advanced N2 and N3 disease may benefit from SND in terms of regional disease control. Although nasopharyngeal carcinoma is a separate entity, it may be presumed that neck dissection should be tailored to the recurrence, following the same principles for salvage surgery of HNSCC as has been discussed above [25].

In patients with very advanced neck disease, more extended procedures than the classical RND are often required. These patients have a dismal prognosis due to the high-risk of distant metastasis as well as neck recurrence [26]. In current practice, there is an emerging trend to treat those patients with chemoradiation, followed by neck dissection only in case of residual post-treatment disease in the neck [27]. When residual disease still persists in high-risk node levels following chemoradiotherapy, neck dissection is clearly required, but the likelihood of finding positive nodes in low-risk and initially uninvolved neck levels is still very low. Consequently, in HNSCC with advanced N2–N3 status treated by chemoradiation, SND and even super SND, limited to one or two levels, are suitable in most cases. Using this approach, complications are limited and oncologic outcomes are optimal [28–33].

The majority of patients who present with metastasis in the neck from an unknown primary tumor have advanced regional disease. Whereas the standard treatment for those patients has been RND followed by radiation therapy, there is now an increasing trend to treat such patients with a combination of chemotherapy and radiotherapy followed by post-treatment neck dissection in case of residual neck disease. Again, in this setting, RND is generally unnecessary and neck dissection should be limited to lymph node levels where residual disease is present [34].

In view of current concepts in head and neck oncology, we may conclude that the indications for RND are extremely limited [35, 36]. Accordingly, future updates to classification systems and publications on neck dissection should avoid consideration of RND as the “gold standard” for neck dissection, and should adopt a more rational approach.

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