



## Review

## Selective neck dissection in surgically treated head and neck squamous cell carcinoma patients with a clinically positive neck: Systematic review<sup>☆</sup>



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## ARTICLE INFO

## Article history:

Accepted 2 January 2018

Available online 11 January 2018

## Keywords:

Selective neck dissection  
Laryngeal carcinoma  
Hypopharyngeal carcinoma  
Oral cavity carcinoma  
Oropharyngeal carcinoma  
Node-positive neck  
Therapeutic

## ABSTRACT

Adequate treatment of lymph node metastases is essential for patients with head and neck squamous cell carcinoma (HNSCC). However, there is still no consensus on the optimal surgical treatment of the neck for patients with a clinically positive (cN+) neck. In this review, we analyzed current literature about the feasibility of selective neck dissection (SND) in surgically treated HNSCC patients with cN + neck using the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) guidelines. From the reviewed literature, it seems that SND is a valid option in patients with cN1 and selected cN2 neck disease (non-fixed nodes, absence of palpable metastases at level IV or V, or large volume →3 cm-multiple lymph nodes at multiple levels). Adjuvant (chemo) radiotherapy is fundamental to achieve good control rates in pN2 cases. The use of SND instead a comprehensive neck dissection (CND) could result in reduced morbidity and better functional results. We conclude that SND could replace a CND without compromising oncologic efficacy in cN1 and cN2 cases with the above-mentioned characteristics.

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## Introduction

Metastatic spread to cervical lymph nodes is considered the most important clinicopathologic prognostic factor in patients with head and neck squamous cell carcinomas (HNSCC) in the absence of distant metastases. Given the impact of neck metastasis on

<sup>☆</sup> This article was written by members and invitees of the International Head and Neck Scientific Group ([www.IHNSG.com](http://www.IHNSG.com)).

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prognosis, the selection of adequate treatment is crucial to avoid or reduce regional failure in the neck. Neck dissection, with or without post-operative radiotherapy (RT) or chemoradiotherapy (CRT), is one of the fundamental therapeutic options in the treatment of neck metastasis.

The radical neck dissection (RND) represented the traditional surgical management of the clinically positive neck for many years, until the modified radical neck dissection (MRND), developed in the 1960s, progressively replaced the RND. These two forms of neck dissection were considered the only two suitable surgical options for the management of clinically positive necks (cN+) in patients with HNSCC [1,2]. However, in many cases of a clinically positive neck not all the palpable or radiologically detectable nodes are pathologically positive and not every neck level is involved. For this reason, RND or MRND may lead to an overtreatment in many cases, and the same rationale that became accepted using selective neck dissections (SND) for the elective treatment of cN0 necks could apply in the case of cN + necks [3].

Moreover, in the elective SND histologic specimens, metastatic lymph nodes are frequently found, and evidence of extracapsular spread has been identified in up to one third of cases with pathologically proven nodal metastasis. Therefore, SND is in fact being used routinely in cN0 necks already involved with lymphatic metastatic disease (pN+) [4]. We also know that HNSCC tends to metastasize in predictable pathways related to the primary tumor site. In a histopathological study by Shah in 1990 [5], which involved 1081 previously untreated patients who underwent 1119 elective and therapeutic classical RNDs for squamous cell carcinoma of the upper aerodigestive tract, lymph node levels I, II and III were found to be at greatest risk for nodal involvement from oral cavity tumors, while levels II, III, and IV seemed to be at risk for metastases from cancers of the oropharynx, larynx and hypopharynx. In this study, skip metastases were rare, and there were very few patients with metastatic disease at level V, all of whom had gross metastases at level III or IV. In cancer of the larynx and hypopharynx it has been shown that even in case of cN + disease most metastatic nodes were present at levels II, III, and IV, level I being involved in 7% and 10% and level V in 4% and 11% of the specimens, respectively [5]. In addition, a study by Kowalski et al. [6], which analyzed RND specimens of 164 patients with oral cavity cancer with a cN1 or cN2a neck, found a high false-positive rate (57.4% pN0) in patients with clinically palpable nodes at level I. Similarly, Simental et al. [7] reported a false-positive rate of 32% in patients who were initially staged as cN+. Therefore, in a further step to reduce treatment morbidity, pretreatment identification of lymph node metastasis is of utmost importance, as only reliable detection or exclusion of lymph node metastases can replace elective neck treatment. Diagnostic techniques, such as ultrasound-guided fine-needle aspiration cytology (USFNAC), are an option in selected patients in order to detect metastases at an early stage. USFNAC has the advantage of providing cytological evidence of the presence of metastatic cells in the lymph nodes. Specificity of the procedure is approximately 100% as false-positive results of cytology are exceedingly rare. With the use of USFNAC, unnecessary elective neck dissections can be avoided in the majority of patients without compromise of regional control of the neck and survival [8].

Various studies suggested that a comprehensive neck dissection (CND) may not be necessary in all cases with positive necks and selective procedures have progressively gained popularity. In the retrospective study of Byers et al. [9], including 517 SNDs mainly for patients cN0 or cN1, 50 patients had pathologic N1 disease (of these patients, 36 received postoperative RT and only one presented with a regional recurrence; in patients who did not receive irradiation, five of fourteen had neck failure). In a large retrospective review of

296 SNDs, Spiro et al. [10] reported a rate of regional failure of 6.5% in patients staged with a pathologically positive neck (most of these patients had postoperative RT). Schmitz et al. [11] reported a regional failure rate of 8% in pN1 necks treated with a SND, while the regional control rate was not improved with postoperative radiation therapy, suggesting that postoperative irradiation is not justified in pN1 neck disease without extracapsular spread. With the inherent limitation of retrospective studies, it appears that SND for patients with clinically positive neck disease is a safe procedure, if postoperative irradiation is given in the presence of risk factors for regional relapse. Also, a current Cochrane analysis by Bessell et al. [12] found no evidence that RND increases overall survival compared to more conservative neck dissection surgery.

These findings have encouraged the use of SND for the management of the cN + neck, to provide the patient with a well-aimed surgical treatment which reduced morbidity without reducing oncologic efficacy. The first reports were on the cN1 neck, but the number of studies regarding SND application in cN2 necks increased considerably in the recent literature.

SND for the cN + neck has not only a therapeutic purpose, but may also be considered as a pathological staging procedure. In fact, the histopathological report can provide very valuable information for planning of adjuvant radiotherapy, with or without concurrent chemotherapy; dose levels, irradiation volume design, and addition of concurrent chemotherapy are based on the extent of disease in the neck (number, size, and location of positive nodes) and more importantly on the presence of extra nodal extension (ENE) of metastatic tumor [13,14]. But the more limited the neck dissection is, the more limited this information can be provided by histopathology.

However, although an increasing number of studies report the use of SND in patients with a cN + neck, these studies usually include a limited number of patients, and there is no consensus on the indications of SND in the cN + setting. Therefore, the aim of this study is to review the existing literature to analyze the regional control after SND for the treatment of cN + necks, and to compare those results with the results reported for the more extensive neck dissections, in an attempt to derive guidance for the selection of HNSCC patients with cN + neck that may indeed benefit from SND. As neck dissection is a fundamental component of surgical treatment of cN + cancers originated in different subsites within the head and neck, all subsites are included in this review, irrespective of the pattern of metastatic spread.

## Materials and methods

The Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) were used to conduct a systematic review of the current literature [15]. The search strategy aimed to include all articles concerning the use of SND in the management of clinically positive necks. A PUBMED internet search updated to March 7, 2017 was performed for English language publications between the years 1990–2016 using the following search criteria in the title or abstract: 'selective neck dissection', coupled with 'positive' or 'therapeutic'. The search results were reviewed by two independent researchers (JPR and GG) for potentially eligible studies. When there was any statement in the abstract on follow-up data and outcomes of the use of SND in the therapeutic setting, the full text article was searched; all review articles were also checked in full. References from any full text articles were cross-checked to ensure inclusion in this review if appropriate (Fig. 1). Disagreements over the eligibility of an article were resolved by consensus.

Studies were selected if they met the following inclusion criteria: 1) patients with mucosal HNSCC not previously treated, 2) clinical or radiological evidence of neck node metastasis (cN + necks), which

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