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Value of the supraomohyoid neck dissection with frozen section analysis as a staging procedure in the clinically negative neck in squamous cell carcinoma of the oral cavity

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Summary. A retrospective analysis was performed to evaluate with the efficacy of elective supraomohyoid neck dissection (SOND) with frozen section (FS) analysis in 57 newly diagnosed patients (62 SONDs) with squamous cell carinoma of the oral cavity. The protocol included sampling of both the most suspect and largest node in the jugulodigastric region (if present) and the most distal jugulo-omohyoid lymph node (if present). These nodes were then studied with FS histological examination. In the absence of evident nodes for FS analysis during surgery, histological examination uncovered occult metastatic disease in 3 of 11 SOND specimens. Among the remaining patients FS analysis revealed occult metastatic disease in 10 of the 51 samples (19.6%). In these latter cases surgery was continued using standard or modified radical neck dissection en bloc with the primary tumor. In 1 specimen only a single metastasis was found outside the original extent of the SOND. Among 41 FS analysis reports stating the absence of metastatic disease, histological examination of the SOND specimens demonstrated occult nodal disease in 7 (17%). All of the cervical metastases appeared in the ipsilateral side of the neck. False FS reports did not occur. In the histologically proven absence of metastatic disease in the SOND specimens, disease recurrence in the neck occurred only in 3 cases (7%), all in the presence of local failure: once in the previous SOND area, once in the ipsilateral supraclavicular region and once on the contralateral side. The results of our analyses support the conclusion that elective SOND with FS can be a valid staging procedure and a valuable approach to the management of the clinically negative neck in patients with squamous cell carcinoma of the oral cavity.

Key words: Supraomohyoid neck dissection – Oral cavity – Squamous cell carcinoma

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Introduction

Since the appearance of Crile's [8] description of the radical neck dissection (RND) in 1906, this operation has been modified in various ways. Nevertheless this classic operation remains a basic method for the management of cervical metastases in squamous cell carcinoma of the oral cavity.

In the absence of clinical evidence for cervical lymphadenopathy, oral cancer could possibly be controlled with less of a procedure than RND. Supraomohyoid neck dissection (SOND) with sampling of suspicious nodes for frozen section (FS) microscopic examination as part of the surgical procedure might form a means for excluding cervical lymphadenopathy while limiting morbidity by sparing certain anatomical structures, such as the sternocleidomastoid muscle, the internal jugular vein and the spinal accessory nerve. Such approaches leave the patient with less cosmetic and functional disability than after classic RND.

The present retrospective study assessed the efficacy of this protocol as a staging procedure in newly diagnosed patients with squamous cell carcinoma of the oral cavity who presented with clinically negative necks.

Patients and methods

The medical records of all newly diagnosed patients with histologically proven squamous cell carcinoma of the oral cavity presenting at the University Hospital Nijmegen between 1 January 1981 and 31 December 1987 were reviewed to identify the patients who underwent SOND as part of their surgical treatment. During this period, 66 patients had 72 SONDs. Excluded were 2 patients who underwent contralateral SOND and ipsilateral RND and 7 patients (8 SONDs) who received preoperative radiotherapy. This left 57 patients, representing 62 SONDs, for evaluation.

There were 37 men and 20 women whose ages ranged from 27 to 87 years, with an average age of 59 years. All of the patients were clinically N0 and were classified according to the classifica-

Table 1. Distribution of patients according to the site of the primary tumor and TNM classification [31]

Site of primary tumor	Number of patients	TNM classification			
		T1N0M0	T2N0M0	T3N0M0	T4N0M0
Floor of mouth	21	4	12	2	3
Tongue	21	3	15	3	0
Alveolar ridge	6	1	3	0	2
Retromolar trigone	9	1	6	1	1
Total	57	9	36	6	6

tion system of the International Union Against Cancer [31]. Patient profiles and tumor characteristics are summarized in Table 1.

In our study group, 52 patients had unilateral SOND and 5 patients had synchronous bilateral SOND because their primary tumors involved midline structures. SOND was defined as the selective en bloc removal of the lymph nodes in the submental and submandibular triangles, the jugulodigastric and jugulo-omohyoid lymph-node groups, the lymph-node-bearing tissues located anterior to the cutaneous branches of the cervical plexus and above the jugulo-omohyoid muscle (Suen and Goepfert's [29] levels I, II and III) and the suboccipital tissue lying on the deep musculature of the upper neck beneath the trapezius muscle. The sternocleidomastoid muscle, internal jugular vein and spinal accessory nerve were preserved in the dissection. FS analysis was subsequently performed in accordance with the protocol if any suspicious nodes were present; the largest jugulodigastric and the most distal jugulo-omohyoid lymph node of the SOND were also examined (if present). Surgery was continued using RND or modified radical neck dissection (MRND) if FS analysis revealed microscopic occult metastatic disease.

All patients had their primary tumors excised, usually en bloc with the neck dissection. Postoperative radiotherapy to a total dose of 60–70 Gy was given on the basis of either the nodal status or resection margins.

Follow-up data were obtained during routine outpatient visits at 2-monthly intervals during the 1st year, 3-monthly intervals during the 2nd year and at 4-monthly intervals in the 3rd year. Thereafter, the patiens were followed by check-ups twice a year. After 10 years without evidence of recurrence or a second primary tumor, the follow-up regimen was usually discontinued. The routine appointments included general ENT examinations and annual chest radiography. This was supplemented, when indicated, by laboratory tests, imaging techniques or endoscopic examinations. The minimum follow-up period was 2 years. For this study the endpoint of follow-up of all evaluable patients was defined as the first recurrence on either side of the neck, ragardless of whether it was dissected, or on the death of the patient. Analysis was completed on 1 January 1990.

Results

Of the 57 patients with clinically negative necks, FS analysis was not done in 11 patients (11 necks) as the presence of nodes was not evident at surgery. However, occult metastatic disease was demonstrated by routine histological examination in 3 SOND specimens (27%), of which 2 had extracapsular spread. Among the remaining 46 patients (representing a total of 51 necks), FS histological examinations revealed occult metastatic disease in 10 of the 51 samples (19.6%). In all these patients surgery was converted to (M)RND. All of the FS results were confirmed by routine histological examination.

Among the 41 FS analysis reports stating the absence of metastatic disease, histological examination of the SOND specimens revealed no false-negative reports in the nodes sampled. In 7 SOND specimens (17%), nodes with metastatic disease were found at other sites, of which 1 showed extracapsular spread. Compilation of the results of histological examination of all specimens demonstrated occult metastatic nodal disease in 20 of 62 SOND specimens, showing a false-negative rate of 31%. All positive nodes appread in the ipsilateral side of the neck. When the SOND specimen showed a single metastatic node, 18% showed extracapsular spread whereas 56% showed extracapsular spread when more than one lymph node was involved (Table 2).

Additional treatment in patients with occult metastatic disease consisted of surgery in 12 patients and was done twice as a second procedure. Four of these patients also received postoperative radiotherapy because of extracapsular spread. In 1 of the 12 (M)RND specimens, a single metastasis was found outside the original extent of the SOND. Two other patients, each with a single metastasis without extracapsular spread, received radiotherapy on the basis of close resection margins of the primary tumor.

Six patients did not receive additional treatment for various reasons: 1 patient with four metastatic lymph nodes and extracapsular spread in the SOND specimen died postoperatively, while another patient with two 0.5 cm metastatic lymph nodes had protracted postoperative complications. In the other 4 patients, additional therapy was not considered necessary: in 2 patients only sinus percolation existed in a solitary lymph node in the submandibular and subdigastric regions, respectively; 1 patient had a single submandibular lymph-node metastasis without extracapsular spread; and additional treatment was apparently overlooked for unknown reasons in 1 patient with two metastatic lesions.

Table 2. Distribution of patients on the basis of occult lymph node metastasis (LNM), extracapsular spread (ES) and TNM classification; all cervical metastases appeared at the ipsilateral side of the tumor

TNM classification	Number of patients (SOND)	Occult LNM			Multiple LNM	ES (%)
		Total	Single LNM	ES (%)		
T1N0M0	9 (9)	0	–	–	–	
T2N0M0	36 (38)	15	9	2 (22)	6	3 (50)
T3N0M0	6 (7)	4	2	–	2	2 (100)
T4N0M0	6 (7)	1	–	–	1	–

SOND, Supraomohyoid neck dissection

Of the initial 57 patients, 36 (42 SONDs) had histopathologically uninvolved SOND specimens. Follow-up in this latter group ranged from 2 to 9 years after the initial treatment. Two patients died within 2 years after the first treatment without evidence of recurrent disease. Six patients received postoperative radiotherapy because of positive resection margins. Regional metastases occurred in 3 patients (7%), all in the presence of simultaneous local recurrences. Two failures were observed in the ipsilateral side of the neck (5%), one of which was in the originally dissected area, while the third failure was located in the contralateral submandibular node.

Three of the 20 patients with histopathologically involved necks died within 2 years after the first treatment without any signs of regional failure. In 10 patients in whom SOND had been continued using (M)RND during the operation owing the the histopathological report on the FS samples, regional metastases occurred in 5, of which 4 were located in the contralateral neck. Distant metastases were diagnosed in 2 patients in this group: in the skin and lung 4 and 11 months after first treatment, respectively. In 10 other patients who showed metastatic disease postoperatively in the SOND specimens, none developed regional failure or distant metastases. A second primary malignant tumor occurred in 7 patients (12%); 2 patients developed a third primary tumor. The 5-year actuarial survival rate was 84% and the total 5-year survival was 55%.

Discussion

The adequate staging of malignant tumors is generally accepted as an important condition for treatment planning and defining prognosis. In head and neck malignancies, treatment and prognosis are mainly defined by metastatic nodal disease. The presence of a single cervical lymph node metastasis in the ipsilateral portion of the neck decreases the survival rate by 50% while the presence of bilateral cervical metastasis reduces the rate to one quarter [3, 30]. Involvement of the number of nodes as well as histological demonstration of extracapsular spread of tumor associated with cervical metastasis also has a statistically significant impact on survival [17, 19, 26]. Therefore, the evaluation of cervical nodes is of significant importance in the diagnostic work-up.

For practical purposes, clinical evaluation of the neck can be difficult, with large variations among different examiners. Palpation of the neck has a false-negative rate of between 15% and 65% and a false-positive rate of between 10% and 15% [22, 25]. Moreover, microscopic deposits and extracapsular spread escape detection. Patients with squamous cell carcinoma of the oral cavity and oropharynx with clinically negative necks may harbor occult metastatic disease ranging from 15% to 40%, with the greatest incidence in advanced T-stage of the primary tumor [16, 28, 30]. From these figures it is apparent that 60–85% of patients may receive overtreatment in order to avoid undertreatment of a minority. Whether the best treatment for such patients is either elective neck dissection or radiotherapy or observation with subsequent salvage, therapeutic neck dissection if clinical metastases appear remains controversial.

Elective (M)RND may lead to unnecessary morbidity in a large percentage of patients [15, 18]. Moreover, a large proportion of elective neck dissection specimens had no metastatic disease [5]. Elective radiotherapy also has its hazards, such as reduction of salivary secretions and deterioration of the dental status. It also influences the ablative and reconstructive surgical procedures in the presence of loco-regional recurrent disease as well as the postoperative complication rate.

In the present study, SOND with FS analysis was selected as a method for identifying patients with occult metastatic disease, with the aim of restricting the number of (M)RND and therefore preventing unnecessary morbidity. The rationale of this dissection is that this surgery, if done as designed [23], results in an en bloc removal of the lymph nodes that are most likely to contain metastases from primary tumors that arise from the oral cavity [4, 5, 20]. In this study occult nodal disease was found in 31% of the clinically negative necks, of which 19.6% were detected by FS histological analysos and resulted in conversion of the SOND to (M)RND. Overestimation of the value of a negative FS analysis can be insidious, but it does not alter the possibility of additional therapy, if necessary, whereas a positive FS analysis offers the surgeon the opportunity to decide during operation whether or not to complete a radical or modified radical neck dissection. The use of SOND with FS analysis also allows the more selective use of postoperative radiation, sparing patients the inconvenience of a prolonged course of treatment and the potential undesirable side-effects.

In the present study failure in the initially uninvolved SOND specimen occurred in 3 patients, all in the presence of simultaneous local recurrences. This means that the surgeon has the possibility of improving this result by improving local control of the primary tumor [32]. Although the contralateral SOND specimens were all without occult nodal disease, the small numbers do not allow reliable conclusions. Nevertheless, Morgan et al. [24] found pathological nodes in the contralateral neck in 5 out of 177 of their cases with oral carcinomas which crossed or approached the midline. Since this incidence was only 2.8%, they did not find the contralateral SOND to be of any significant therapeutic value. Squamous cell carcinoma of the base of the tongue might form an exception [9]. Surgical procedures of a less radical nature than SOND are associated with a significantly higher recurrence rate and are therefore contradicted [6, 10].

Our study indicates that SOND with FS sampling is a useful tool for managing clinically negative necks in patients with primary squamous cell carcinoma of the oral cavity. By SOND the neck levels at greatest risk of occult nodal metastasis in oral cavity carcinoma are removed. Our current results show there are possibilities for further refinement of the protocol. Instead of node sampling we would suggest sending the dissected SOND specimen below the level of the submandibular gland for immediate evaluation by the pathologist, even in the absence of evident lymph nodes at surgery. This will in-

crease the detection rate for occult disease and does not compromise en bloc resection with the primary tumor. If the histological examination of the specimen shows a single metastatic node without extracapsular spread situated in the submental or submandibular region, the patient could be treated expectantly, especially if radiotherapy is planned owing to close resection margins of primary tumor. In contrast, the surgeon can proceed to (M)RND in the presence of occult disease on all other occasions.

Since clinical evaluation of the neck is obviously imperfect, various imaging techniques have been investigated. Cervical lymphangiography proved unreliable in the past due to a high frequency of technical failures and numerous interpretation difficulties [27]. Computed tomography (CT) has been found to be superior to palpation in assessing the status of lymph nodes of the neck by most of authors [7, 13, 14]. However, other investigators have found no significant differences [11, 12]. The accuracy of ultrasound examination has also been reported to be more reliable than palpation [1, 11], while the predictive value of magnetic resonance imaging (MRI) is probably as good as CT. Areas of high T2 signal intensity within a lymph node may correspond to sites of tumor necrosis [21]. However, the criteria developed for these imaging techniques to differentiate between reactive nodes and metastasis are not satisfactory. Central necrosis may represent a sign of malignancy as well as fatty nodal replacement in postinflammatory or postirradiation nodes [26]. Reactive nodes may be larger than metastatic nodes, while nodes smaller than 1 cm or beyond detection by ultrasound, CT or MRI may harvest occult disease.

For the various reasons listed, the concept of simultaneous cytological examination and imaging technique is attractive. Unfortunately CT- and MRI-guided aspiration techniques have not been efficacious and are laborious. The technique of ultrasound-guided fine-needle aspiration of neck nodes together with further refinement and introduction of small-part transducers for ultrasound is characterized by a high sensitivity and high specificity [2]. Although the methodes for detecting occult metastatic disease by means of the above-mentioned modern imaging techniques have improved, so far no satisfactory criteria have been developed for differentiating between reactive nodes and metastases. Moreover, none of these modalities has proved to be appropriate for assessing extracapsular spread. These data support the argument that histological status is a more subtle prognostic indicator, as shown by our findings in the clinically negative neck in patients with oral cavity carcinoma when combining SOND with FS analysis.

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