Supraomohyoid Neck Dissection in patients with Squamous Cell Carcinoma of Oral Cavity

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ABSTRACT

Aim: To evaluate the efficacy and outcome of a common SND-supra-omohyoid neck dissection (SOHND) with or without adjuvant radiation therapy in the management of cervical metastasis in squamous cell carcinoma of the oral cavity.
Methods: The study included 237 previously untreated patients with oral cavity cancer. The neck treatment consisted of SOHND or functional neck dissection (FND). One hundred sixty patients underwent postoperative radiation therapy. Survival probabilities, neck recurrences, and distant metastases were analyzed according to the surgical procedure.
Results: For patients having undergone SOHND, the 5-year survival probabilities were 70.2% and 76.5% in N0 and N1 necks, respectively. The neck recurrence rate in SOHND was 2%.
Conclusions: SOHND is an effective method of treatment for the clinically negative neck in patients with squamous cell carcinoma of the oral cavity. It also proves efficient, in conjunction with postoperative radiotherapy, for control of neck metastases in selected patients.
Keywords: Oral cavity; Squamous cell carcinoma; Radiation therapy; Supraomohyoid neck dissection

INTRODUCTION

The incidence of occult cervical lymph node metastasis in patients with squamous cell carcinoma (SCC) of the oral cavity varies from 6% to 85%[1]. The presence of cervical metastasis in patients with oral SCC is the most important critical factor in determining survival. The 5-year survival rate can decrease below 20% when cervical metastasis is present[2]. In addition to the treatment of primary lesions, management of the involved cervical lymph nodes also represents an important component of the overall treatment strategy. Because of the lack of precise noninvasive methods to predict cervical metastasis, elective neck dissection (END) is a recommended approach to patients with negative neck (cN0) when the probability of occult metastasis is estimated to be >20%[1,3]. Debate regarding the efficacy of END existed for approximately 4 decades. The surgical technique of neck dissections has evolved from radical neck dissection (RND) to modified or functional neck dissection and then to selective neck dissection (SND)[4]. The purpose of SND is to selectively remove the lymphatic groups at high risk for metastasis and to decrease morbidity by preserving the sternocleidomastoid muscle, internal jugular vein, and accessory nerve, which is routinely dissected in RND. Supraomyohyoid neck dissection (SOHND) is a subtype of SND that dissects only at-risk level I, II, and III nodes. SOHND has been identified as an appropriate staging procedure to provide valuable pathologic cervical information for patients with oral SCC[3,5,6,7]. Cervical metastases from head and neck cancer follow a predictable pathway[1]. Probably the most important prognostic factor in determining survival of patients with head and neck cancer is whether cervical metastasis is present or not[2,3].

In sensing the inadequate predictability of cervical metastasis by modern radiographic techniques, such as CT[6] or MRI[7], elective neck dissection has become a standard approach to patients with head and neck cancer when the probability of occult metastasis is judged to exceed 20%[8]. The rationale for such modification stems from the improved understanding of the local lymph node drainage pattern[1] and the realization that the cervical nodes are actually enveloped by a fascial envelope[9]. SND, the selective removal of only those nodes at greatest risk for metastatic disease, has become a standard approach to clinically negative neck and has been well appreciated as a staging procedure. It appears that SND can provide valuable pathological information for staging and for addition of further adjuvant treatment. However, the role of SND, as a therapeutic procedure, has been very controversial and the justification of adjuvant radiotherapy after SND has not really been established.

MATERIALS/METHODS

This study included 237 patients treated at Mayo Hospital Lahore, from January 1, 2006, to December

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31, 2010, for histologically proven squamous cell carcinoma of the oral cavity. To obtain a homogeneous group, previously treated patients were excluded as well as those treated with primary chemotherapy or radiation therapy or patients who had neck surgery after a delay. Therefore, all patients had surgery at the primary site and in the neck at the same time as initial treatment. There were 190 men (80.2%) and 47 women (19.8%) from 22 to 82 years (mean age 59). The primary sites of the tumors were the oral tongue (n=88 [37.1%]), floor of the mouth (n=75 [31.6%]), retromolar area (n=29 [12.2%]), gums (n=26 [11%]), and other sites in the oral mucosa (n=19 [8%]). The study addressing the efficiency of SOHND enrolled only patients with clinically negative neck (N0) or neck classified as N1. One hundred sixty-one patients (67.8%) had clinically negative necks; 76(32.1%) had N1 node involvement.

Table I. Tumor and Node Staging

	T1	T2	T3	T4	Tx	Total
N0	7	27	53	70	4	161
N1	8	15	26	26	1	76
Total	15	42	79	96	5	237

A SOHND was performed for all patients with N0 node involvement, for those with N1 node involvement in the submental and submandibular triangles; the remaining patients underwent a functional neck dissection (FND). Bilateral dissections were performed whenever the primary tumor site crossed the median line and systematically for the apex linguae. FND included a complete lymphadenectomy, dissection and preservation of the spinal accessory nerve, internal jugular vein, and sternocleidomastoid muscle. SOHND included the submental, submandibular, supraomohyoid jugular, and upper spinal nodes. Therefore, we removed levels classified I, II, III, and the upper and middle parts of the V level[1,9], leaving only IV and the lower part of the V level. One hundred sixty patients underwent postoperative radiation therapy (median dose, 60 Gy for the tumor [0 to 70], and 50 Gy for the neck sites [0 to 65]). Radiotherapy was administered when patients had positive margins in the tumor site, in stage T3 and T4 tumors, or in case of histologically positive neck dissection specimen. The primary site and bilateral neck received a 50 Gy dose. A boost up to 60 to 65 Gy was given in neck areas with extracapsular spread and in the tumor bed when positive margins were found. Median delay for postoperative radiation therapy was 24 days after surgery. Neck dissection specimens were fixed in 10% formalin, embedded in paraffin, and examined with hematoxylin-eosin-saffron stain. For each specimen, (1) number of nodes, (2) number, size, and location of positive nodes, and (3) number and location of extracapsular spreads were collected.

Survival probabilities, neck recurrences, and distant metastases were analyzed with SPSS according to the clinical status of the neck (N0 or N1), the histologic findings in the neck specimens and the surgical procedure (SOHND or FND). Neck recurrence was defined as a lymph node metastasis compatible with the previously treated tumor but without any new primary lesion in the head and neck area. The Wilcoxon test was used for comparison between factors. The Fisher test was also used for small numbers and the chi-square tests for multivariate analysis.

RESULTS

By the end of the study, 160 patients (67.5%) were alive, 76(32.1%) had died, and 1(0.4%) was lost to follow-up. Of the 237 patients, 148(62.4%) underwent SOHND only and 89(37.6%) FND There was a total of 330 neck dissections, 233 SOHND and 97 FND (bilateral procedures in 93 cases). Among the patients with N0 node involvement, 126 had SOHND (78.3%) and 35 FND (21.7%). As for the patients with N1 involvement, 22 had SOHND (28.9%) and 54 FND (71.1%). Finally, 75% of the patients with T1 or T2 tumors and 51% of those with T3 or T4 tumors had SOHND.

Overall 2- and 5-year survivals were 81.5% and 66.8%, respectively, for the complete series. As for nonrecurrence the 2- and 5-year probabilities were 84.8% and 72.8%, respectively. There were 56 recurrences (23.6%): 22 tumor recurrences (9.3%), 6 neck recurrences (2.5%), 15 distant metastases (6.3%), 10 tumor and distant metastasis recurrences (4.2%), 2 tumor and neck recurrences (0.8%), and 1 tumor, neck recurrence and distant metastases (0.4%). An analysis of factors correlated with survival showed that only tumor size ($P < 0.001$) and node involvement ($P < 0.001$) were significant. Among the 161 patients with clinically negative neck, 47 (29.2%) had histologic disease in the neck nodes, of whom 17 (36.2%) had extracapsular spread. There were 50% of positive nodes with extracapsular spread in FND and 32.5% in SOHND.

According to the node staging, 2- and 5-year survivals were, respectively, 83.1% and 67.3% for N0 and 78.2% and 65.8% for N1 patients ($P = 0.642$). The relationship of node involvement, survival, neck recurrences and distant metastases is shown in Table II. For each node stage, the relationship between type of neck dissection, survival, neck recurrences and distant metastases according to surgery type is shown in Table III and Table IV.

Table II. Analysis of Node Involvement

Node Stage	=n	2 year survival %	5 year survival %	Neck recurrence %
Negative	151	88.9	75.8	2.6
Positive nodes				
Without extracapsular spread	50	71.5	52.2	2.0
With extracapsular spread	36	64.8	49.4	2.8

For estimated survival P= 0.498
For distant metastasis P=0.2257

Table III. Analysis of Surgical Procedure in N0 Patients (n = 161)

Surgical procedure	=n	2 year survival%	5 year survival%
SOHND	126	85.8	70.2
FND	35	73.6	57.2

Table IV. Analysis of surgical procedure in N1 patients (n=76)

Surgical procedure	=n	2 year survival%	5 year survival%
SOHND	22	90.4	76.5
FND	54	73.3	61.6

Table V. Analysis of Neck Recurrenceslegend

Surgical procedure	=n	Neck recurrence(%)
SSOHND	148	3(2)
N-	108	3(2.8)
N+	40	0(0)
FND	89	3(3.4)
N-	43	0(0)
N+	46	3(6.5)

Isolated neck recurrences are analyzed in Table V. In the 6 patients who experienced isolated neck recurrences, the primary sites were the floor of the mouth in 3 cases, the oral tongue in 2 cases, and the lower gum in 1 case. Of the 6 recurrences, 3 occurred after a SOHND in histologically negative necks; the other 3 were after a FND, only 1 of which was in the controlateral neck in a patient who received 50 Gy postoperatively in the bilateral neck. None of the 5 homolateral recurrences was beyond the field of surgery. No recurrence was observed either in SOHND or in FND groups in clinically negative, histologically positive necks.

DISCUSSION

Previous reports have shown that in the clinically negative neck there is no significant difference in survival between patients who had an elective neck dissection and patients who received no primary neck treatment and underwent a therapeutic dissection when node involvement became apparent[2]. However, neck failure is significantly higher among the latter and highly correlated with ultimate treatment failure[3,5]. Elective irradiation in the neck offers comparable local control with less morbidity than a classic radical dissection, [3, 5 and 6] yet morbidity associated with SOHND is negligible[10]. Moreover, surgical staging of the neck is recommended since the addition of postoperative radiotherapy in patients with histologically positive neck decreases recurrence rates[5,8,10].

The purpose of SOHND is to include only the nodes at risk, i.e., in oral cavity cancer levels I, II, and III[1,9], although there is still controversy for oral tongue tumors[11]. In our series, it also included upper and middle level V although the incidence of supraspinal accessory lymph node metastases seems to be small[12]. The decision to perform SOHND for all patients with N0 node involvement and those with N1 node involvement who had clinically positive nodes in the submental and submandibular triangles has been vindicated by some authors over the years[1,3,10,13] although others seem to be more cautious[11,14,15]. However, there is a consensus that there is no need for removal of the posterior triangle in such patients[16].

All the published reports have shortcomings. In the present study there is a bias since SOHND patients underwent selection (node in the submental or submandibular triangle in N1 necks). Moreover, there are comparatively more patients with histologic neck involvement in the FND than in the SOHND group. Yet the aim of the study was not to demonstrate the superiority of SOHND versus FND but its efficiency for treating oral cavity cancer, if properly performed, in N0 and carefully selected N1 necks. The main problem with SOHND is the extent of lymphadenectomy, which may differ considerably according to the surgeon, so there are flaws in every study included in a meta-analysis of patients having undergone this technique[17]. The groups were equivalent in terms of patients, primary tumors, and postoperative radiotherapy. Moreover, while all patients with histologic disease in the neck underwent postoperative radiotherapy in the FND group, 37 of 40 equivalent patients in the SOHND group underwent such treatment. Each group of patients having undergone either a SOHND or a FND received the same radiation dose in the neck if they had positive nodes.

Careful reading of the survival curves and number of recurrences or distant metastases shows that in oral cavity cancer, there is no advantage to performing FND in N0 patients, including in the event of histologically positive nodes. This also includes the N0 patients with tongue tumors, who experienced only one neck recurrence. Moreover, in several

presentations, results of SOHND are superior. Although all 3 neck recurrences in patients having undergone SOHND occurred in histologically negative necks, we observed no recurrences beyond the field of dissection; when such recurrences are observed they are thought to be due to the limited surgery in SOHND. The only controlateral recurrence was in a patient who underwent FND and 50 Gy postoperative radiotherapy in the bilateral neck. As for the 40 patients with positive neck nodes in the SOHND group, none of them experienced a neck recurrence. These figures can compare with the rates of neck recurrences in the reports published in the literature: 4.9% in a large series of FND[18]; 3.8% in patients with tumors of the floor of the mouth and N0 neck having undergone SOHND[3]; and for SOHND in oral and oropharyngeal tumors, 5% in N0 patients with histologically negative neck or 7% in N0 patients with histologic disease in the neck[6].

Although the results were not significantly different for N1 patients, there was a trend in favor of SOHND. This is certainly due to the selection of patients so no valid conclusion can be drawn. However, it demonstrates that in carefully selected patients, SOHND is a safe procedure providing that patients with histologically positive necks are given postoperative radiation therapy, which does not automatically imply that the same attitude is adequate for other head and neck primary sites.

The alleged superior morbidity in SOHND owing to the larger use of postoperative radiotherapy is not an adequate argument since, in this series, patients underwent such treatment in the same conditions in both procedures (Table V). On the contrary, functional results and morbidity are better with the SOHND technique. Although there is a large variation in the degree of functional disability and pain in patients with similar neck dissection, the less extensive the surgical procedure, the better the results in terms of shoulder function[19].

CONCLUSION

In patients with carcinoma of the oral cavity including the oral tongue, supraomohyoid neck dissection is an effective and safe method of treatment in N0 necks. It also proves efficient, in conjunction with postoperative radiation therapy, for control of neck metastases in selected cases.

REFERENCES

1. J.P. Shah, Patterns of cervical lymph node metastasis from squamous carcinomas of the upper aerodigestive tract. Am J Surg 160 (1990), pp. 405–409.
2. C.J. Hughes, O. Gallo, R.H. Spiro and J.P. Shah, Management of occult neck metastases in oral cavity squamous carcinoma. Am J Surg 166 (1993), pp. 380.
3. W.F. McGuirt, J.T. Johnson, E.N. Myers et al., Floor of the mouth carcinoma. The management of the clinically negative neck. Arch Otolaryngol Head Neck Surg 121 (1995), pp. 278–282.
4. R.M. Byers, A.K. El-Naggar, Y.Y. Lee et al., Can we detect or predict the presence of occult nodal metastases in patients with squamous carcinoma of the oral tongue. Head Neck 20 (1998), pp. 138–1443.
5. H.C. Pillsbury and M. Clark, A rationale for therapy of the N0 neck. Laryngoscope 107 (1997), pp. 1294.
6. R.H. Spiro, G.J. Morgan, E.W. Strong and J.P. Shah, Supraomohyoid neck dissection. Am J Surg 172 (1996), pp. 650–653
7. S.J. Traynor, J.I. Cohen, J. Gray et al., Selective neck dissection and the management of the node-positive neck. Am J Surg 172 (1996), pp. 654–657.
8. J. Pinsolle, V. Pinsolle, C. Majoufre et al., Prognostic value of histologic findings in neck dissections for squamous cell carcinoma. Arch Otolaryngol Head Neck Surg 123 (1997), pp. 145–148.
9. K.T. Robbins, J.E. Medina, G.T. Wolfe et al., Standardizing neck dissection terminology. Arch Otolaryngol Head Neck Surg 117 (1991), pp. 601–605.
10. J.E. Medina and R.M. Byers, Supraomohyoid neck dissection: rationale, indications and surgical technique. Head Neck 11 (1989), pp. 111–122.
11. R.M. Byers, R.S. Weber, T. Andrews et al., Frequency and therapeutic implications of “skip metastases” in the neck from squamous carcinoma of the oral tongue. Head Neck 19 (1997), pp. 14–19.
12. D.H. Kraus, D.B. Rosenberg et al., Supraspinal accessory lymph node metastases in supraomohoid neck dissection. Am J Surg 172 (1996), pp. 646–649.
13. L.P. Kowalski, J. Magrin, G. Waksman et al., Supraomohyoid dissection in the treatment of head and neck tumors. Arch Otolaryngol Head Neck Surg 119 (1993), pp. 958–963.
14. J.D. Spiro, R.H. Spiro, J.P. Shah et al., Critical assessment of supraomohyoid neck dissection. Am J Surg 156 (1988), pp. 286–289.
15. M.H. Weiss, L.B. Harrison and R.S. Isaacs, Use of decision analysis in planning a management strategy for the stage N0 neck. Arch Otolaryngol Head Neck Surg 120 (1994), pp. 699–702.
16. B.J. Davidson, V. Kulkarny, M.D. Delacure and J.P. Shah, Posterior triangle metastases of squamous cell carcinoma of the upper aerodigestive tract. Am J Surg 166 (1993), pp. 395–398.
17. C.R. Leemans, G.B. Snow, Is selective neck dissection really as efficacious as modified radical neck dissection for elective treatment of the clinically negative neck in patients with squamous cell carcinoma of the upper respiratory and digestive tract. Arch Otolaryngol Head Neck Surg 124 (1998):1042
18. R.M. Byers, Modified neck dissection: a study of 967 cases from 1970 to 1980. Am J Surg 150 (1985), pp. 414–421.
19. B. Leipzig, J.Y. Suen, J.L. English et al., Functional evaluation of the spinal acessory nerve after neck dissection. Am J Surg 146 (1983), pp. 526–530.