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Upper jugular lymph nodes (submuscular recess) in non-squamous-cell cancer of the head and neck: surgical considerations

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Abstract

Cervical lymphadenectomy of level II encompasses lymph nodes associated with the upper internal jugular vein and the spinal accessory nerve (SAN). Removal of tissue superior to the SAN (submuscular recess-(SMR)) was recently shown to be unwarranted in selected cases of squamous-cell cancer. Thirty-five patients with non-squamous-cell cancer (SCC) of the head and neck treated with cervical lymphadenectomy were prospectively evaluated. Thirty-seven neck dissection specimens were histologically analysed for the number of lymph nodes involved with cancer. At the time of surgery, level II was separated into the supraspinal accessory nerve component (IIa) and the component anterior to the SAN (IIb).

Neck dissections were most commonly performed for cancer of the thyroid gland (19) followed in frequency by the parotid gland (seven), skin: melanoma (five), basal-cell cancer (two), and other sites (four). Twenty-five neck dissections were modified-selective procedures and 12 were either radical or modified radical neck dissection. Twenty-nine necks were clinically N+ and eight N0. Histological staging was pathologically N+ in 32 neck dissection specimens. Level IIb contained an average of 12 nodes and the IIa component contained a mean of 5.0 nodes. Level II contained metastatic disease in 28 of 32 histologically node-positive specimens (87 per cent). Level IIa was involved with cancer in six cases (16 per cent), five of which were pre-operatively staged as clinically N+. All cases (100 per cent) with level IIa involvement had level IIb positive nodes. Three of the level IIa positive cases were cancer of the parotid gland comprising 43 per cent of this sub-group of patients.

Incidence of involvement of SMR in non-SCC cases is not uncommon. The additional time required and morbidity associated with dissection of the supraspinal accessory nerve component of level II are probably justified when performing neck dissection in cancer of the thyroid gland. The SMR should be excised in cancer of the parotid gland. Large-scale prospective controlled studies with long-term follow-up periods are necessary to support resection of level IIb only.

Key words: Carcinoma; Neck; Neoplasm Metastasis; Surgical Procedures, Operative

Introduction

Neck lymphatics removed in radical neck dissection (RND) or in modified neck (MND) are stratified into six levels.[1] Level II containing the upper jugular group of lymph nodes extends from the level of the carotid bifurcation (surgical landmark) or hyoid bone (clinical landmark) to the skull base. Its posterior boundary is the posterior border of the SCM and its anterior boundary is the lateral border of the sternohyoid muscle. An integral part of level II incorporating the upper jugular lymph nodes is defined as the submuscular recess (SMR). This lymph node bearing area in the upper neck is bordered: medially by the splenius capitis and levator scapula muscles, anteriorly and inferiorly by a plane at the level of the spinal accessory nerve, supero-laterally by the inferior border of the digastric muscle, superiorly by the skull base, and postero-laterally by the sternocleidomastoid muscle (SCM).[2]

Recently, two prospective studies were conducted, directly addressing the necessity for removal of the SMR contents in patients with squamous-cell cancer (SCC) of the head and neck.[2,8] Results of these studies indicate that resection of the SMR may possibly be obviated in N0 necks and perhaps also in selected N+ cases.

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TABLE I
TUMOUR LOCATION AND HISTOLOGY IN NECK DISSECTION PATIENTS (N = 35)

Site	Histology	Number	Positive SMR
Thyroid	Papillary	16	2
	Medulary	2	–
Parotid	Mucoepidermoid	2	1
	Acinic cell	2	2
	Adenoic cystic	2	–
	Adenocarcinoma	1	–
Skin	Melanoma	4	–
	BCC	2	1
Other sites		4	–

Patterns of regional spread of disease in non-SCC of the head and neck may differ and this issue should be studied separately. We prospectively evaluated patients undergoing neck dissection for non-squamous primary tumours for involvement of the SMR.

Patients and method

All patients undergoing neck dissections in the Departments of Otolaryngology – Head and Neck surgery and Oral and Maxillofacial surgery in the Sheba Medical Center in Israel from January 1995 to April 1998 were included in the study. Each patient's disease was re-staged according to the AJCC (1997) TNM system.[9] Patient age, gender, location of primary tumour, histology, prior treatment and procedure performed were recorded. The extent of disease was assessed by clinical palpation and with imaging studies. All procedures were performed or supervised by the authors. For the purpose of this study, the tissues of the SMR were dissected separately, detached from the bulk of the specimen and defined as level IIa. In modified procedures, duration of SMR contents removal was timed, and fresh specimens were weighed in the operating theatre. The remaining neck specimen was divided into levels (I–VI). Intended sacrifice or operative damage to the XI nerve were noted. The specimens were processed and number of nodes, both positive for tumour or reactive was noted.

Results

Thirty-seven neck dissections of 35 patients, of whom 20 were males and 15 females, were included in the study. The patients' age ranged from 15 to 82 years with a mean of 39 years.

All had non-SCC tumours either originating in the head and neck region (33 cases) or metastatic to the neck (two cases) (Table I). Neck dissections were most commonly performed for cancer of the thyroid gland (19) followed in frequency by the parotid gland (seven), skin (melanoma – five, basal-cell cancer – two), and other sites (four). These four tumours included one case each of liposarcoma of the neck, metastatic malignant fibrous histiocytoma of the maxilla, metastatic teratocarcinoma of the testis and melanoma of the lower back. Twenty-five neck dissections were selective and 12 were either radical or modified radical neck dissection. Twenty-nine necks were clinically N+ and eight were N0. Imaging consisted of computed tomography (CT) (32 cases), MR in six and ultrasound (three cases – all thyroid malignancies). Histological staging was N+ in 32 neck dissection specimens (86 per cent). Level IIb contained an average of 12 nodes and the IIa component contained an average of 5.0 nodes. Level II contained metastatic disease in 28 of 32 node-positive specimens (87 per cent). There was no specific correlation between tumour site and level involvement. Level IIa was involved with cancer in six cases (Table II), five of which were pre-operatively staged N+ and one (Case 2-Table II) was pre-operatively staged as N0. Three of level IIa positive cases were in cancer of the parotid gland, comprising 43 per cent of this sub-group of patients. Level IIa was positive in two of 18 thyroid cases (11 per cent). One case with positive nodes in the SMR was a basal-cell cancer of the midface and two were of papillary thyroid cancer. All cases of level IIa involvement had obvious level IIb involvement in five cases as well, or occult disease involving level IIb in one case.

According to the AJCC staging system (1997), 16 patients were staged as having Stage I tumours, two had stage II, four had stage III and eight had stage IV tumours. Three patients could not be staged and two had recurrent tumours. Data pertaining to extra-capsular spread was unavailable. The overall recorded number of nodes in the neck dissection specimens ranged from 12 to 84 with a mean of 35.6 nodes. These data reflect all necks including selective and non-selective specimens. SMR nodes (IIa) ranged from two to 11 with a mean of 5.0 nodes while IIb contained an average of 12 nodes. Weight of SMR specimens measured in 20 necks ranged from 1 to 5 g with a mean of 2.2 g. The mean time for dissection was 10 minutes (range 8–15) as recorded

TABLE II
PATIENTS WITH POSITIVE SMR NODES

No.	Patient	Age	Sex	Tumour location	Histology	Post-op staging	Number of + nodes (involved levels)	Number of + nodes in SMR
1	FI	61	M	Skin midface	BCC	$T(rec)N_2M_0$	5 (IIb)	3
2	LR	72	M	Parotid	Mucoep. Ca	$T(rec)N_2M_0$	4 (IIb)	2
3	NR	62	F	Parotid	Acinic cell	$T_3N_2M_0$	81 (I,IIb,III,IV,V)	11
4	RA	53	M	Parotid	Acinic cell	$T_4N_2M_0$	27 (I,IIb,III,IV)	1
5	SE	28	F	Thyroid	Papillary	T_1N_{1a}	3 (IIb,III,IV)	1
6	HI	15	M	Thyroid	Papillary	T_2N_{1b}	5 (IIb,III,IV,VI)	1

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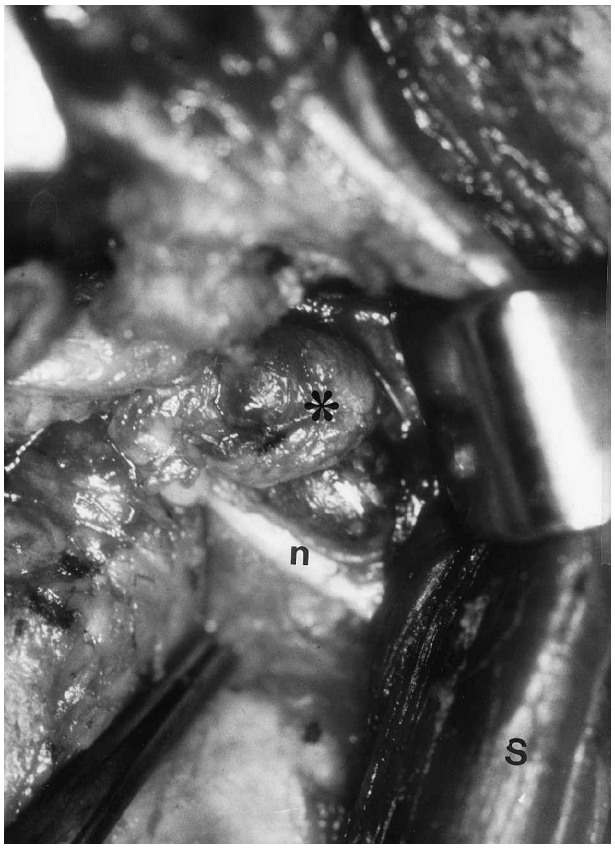

FIG. 1

SMR with a metastatic node (star) with papillary thyroid cancer. The sternocleidomastoid muscle (S) is retracted to allow exposure of the SMR contents and the spinal accessory nerve (n).

in modified neck dissections only. No obvious unintentional damage to the spinal accessory nerve was recorded. A few patients with a macroscopically intact nerve exhibited some shoulder dysfunction but this could not be quantified.

Discussion

While the majority of SCC cases reported in the two studies addressing the need for SMR resection were clinically N0,[2,8] the majority of our non-SCC cases were N+. This is expected, as prophylactic neck dissection is not indicated in the majority of tumours described herein. Also, there are fewer cases in this report and if some trends can be established from the thyroid and parotid cancer cases, the others were more anecdotal in nature and much more data should be accumulated before guidelines can safely be instituted.

Neck dissection in well-differentiated thyroid malignancies is indicated in the N+ neck and has been shown to significantly reduce the incidence of regional recurrence[10,11] and moreover, may have a favourable impact on survival.[12] In a series of 36 patients with N+ papillary carcinoma of the thyroid,[10] co-existing nodal involvement between level VI (37.5 per cent), level IV (11.1 per cent) and level II was evident without metastasis in intermediate levels. Level IV was most commonly involved followed by levels II and VI. These data amplified by the 56 per cent incidence of extracapsular spread found in this series support a more aggressive approach in treating the neck in papillary carcinoma of the thyroid. While resection of SMR contents in N0 cases if performed may probably be obviated, this decision should be withheld, especially in advanced N+ cases. We had positive SMR nodes in two of 16 neck cases (12.5 per cent) and believe SMR contents should be resected, at least until further large-scale studies are performed. The figure depicts the SMR with a 1.5 cm metastatic node from papillary thyroid carcinoma.

Frankenthaler *et al.*[13] determined the factors predictive of occult parotid metastases. Although low-grade tumours did not require elective neck dissection, overall, 12 per cent of 99 neck specimens contained tumour-positive nodes. Only four per cent of the primary tumours were staged as T_4. Three factors identified as increasing risk for neck disease were clinical nerve involvement, extra-parotid extention and perilymphatic invasion. Most predictive factors for occult disease were extracapsular parotid extention, patient age greater than 54 years and perilymphatic invasion. Contrary to our cases, acinic cell tumours were not found to harbour occult disease in this patient cohort. Six of our seven parotid cancer patients were clinically staged as N+ and all were histologically N+. While surgically addressing the positive neck is the accepted approach, management of the clinically negative neck remains a controversial issue. Kelley and Spiro[14] studied a series of 121 patients with parotid malignancies, 35 of whom underwent neck dissection. Fourteen patients had neck dissection for clinically positive nodes whereas 21 patients underwent the procedure for an N0 neck in high-risk cases. Clinical factors predictive of nodal involvement were pain, facial nerve palsy, advanced T stage and high-grade malignancy.[14] Six of our seven parotid cancer patients had a clinically positive neck and although all had advanced or recurrent tumours, facial paralysis and pain were seen in one case only.

O'Brien *et al.*[15] stressed the value of neck dissection in cases of malignant melanoma. These authors have shown good results for selective and modified neck dissection even when performed therapeutically. Only a few cases of melanoma are included in our series and although the SMR was not involved in any of them, no definite conclusions can be derived. The SMR was found to contain a mean of 5.0 nodes, which is a significant number compared to the overall number of neck nodes. We did not accumulate nodal data separately for selective *vs* non-selective necks, yet this number corresponds to 14 per cent of the overall number of nodes found in the neck dissection specimens in our pathologic studies. Byers[5] found an average of 17 nodes in what was defined as 'modified' neck dissection, 31 in 'functional' neck specimens and 44 in radical neck dissection (RND). Candela *et al.*[16] found an average of 37 nodes per RND, Kraus *et al.*[8] found a mean of 24 nodes per supra-omohyoid neck dissection and a

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mean of 25 nodes was formerly recorded in our SCC patients.[2] The mean number of nodes removed in this non-SCC series was 35.6. Although N+ necks are numerous in our series, overall, selective neck-dissection was performed in nearly two-thirds of cases and this difference cannot be thus explained. It could probably stem from a different tissue reaction to these tumours. A mean of 45 nodes was reported in thyroid cancer cases[10] but this larger number could be explained by dissection of level VI in all cases in this series while it was not performed by us routinely in most of our non-thyroid cancer cases.

The mean time for SMR excision was 10 minutes only and no inadvertent obvious damage to the spinal accessory nerve was recorded. The short duration of the procedure and lack of overt damage certainly support performing resection of the SMR if even remotely indicated.

Schuller *et al.*[17] prospectively evaluated the incidence of metastatic involvement of the spinal accessory lymph nodes defined as nodes adjacent to the nerve, in 50 cases of SCC of the head and neck. Spinal accessory node involvement was seen in 42 per cent of the total group or in 75 per cent of N+ necks. These results contradict recent findings[2,8] and possible reasons for these differences were discussed.[2]

Byers[5] found 23 of 29 recurrences in 967 cases to be in the submandibular, upper posterior cervical and subdigastric nodal areas. Only one patient had a recurrence in the middle or lower posterior cervical area. While again these findings imply careful consideration in the decision not to resect the SMR, recent data indicate it is oncologically sound in selected cases.[2,8]

Although Kelly and Spiro[14] limit neck dissection in parotid cancer cases to those with highest risk of nodal metastases, we recommend the SMR be excised even if neck dissection is performed in a clinically N0 neck in these patients.

Analysis as to where to 'draw the line' and assessment of recurrences is mandatory before further definite conclusions can be reached.

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