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Pathological findings in clinically false-negative and false-positive neck dissections for oral carcinoma

Julia A Woolgar MRCPath
Lecturer in Oral Pathology

J Scott PhD FRCPath
Professor of Oral Diseases

The University of Liverpool School of Dentistry

E D Vaughan FDS FRCS
Consultant Maxillofacial Surgeon

J S Brown FDS FRCS
Consultant Maxillofacial Surgeon

Mersey Region Maxillofacial Unit, Walton Hospital, Liverpool

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A series of 86 patients presenting with oral cancer underwent neck dissection (114 sides of neck), after preoperative staging by palpation under general anaesthesia and CT imaging. Detailed histopathological assessment of the surgical neck dissection specimens showed the incidence of clinically false-negative and false-positive assessments was 27% and 40%, respectively.

Extranodal spread of metastatic carcinoma was present in 16% of clinically negative necks.

The pathological findings provided plausible explanations for the clinical misdiagnosis in all 19 of the false-positive necks and in 13 of the 18 false-negative necks, where micrometastases or metastasis to nodes measuring less than 1.7 cm accounted for five and seven misdiagnosed cases, respectively.

We conclude that the most stringent clinical protocols, even when supplemented by CT scanning, cannot be expected to achieve 100% accuracy. Detailed histopathological assessment provides the most reliable, currently available method of diagnosing cervical metastatic disease.

Preoperative assessment of the metastatic status of the cervical lymph nodes is a well-recognised problem in the management of patients with oral cancer. In most previous reports, the accuracy rate ranges from 70–76% *(1–3)*, but, recently, several authorities *(4–6)*, have shown that the accuracy can be improved substantially when clinical palpation of the neck is supplemented by radiological imaging of the cervical nodes. To date, few authors *(3,7,8)* have commented on the extent of metastatic involvement in clinically negative necks. Also, few studies have addressed the reasons for inaccuracies in the clinical assessment of neck nodes. Where explanations have been proffered, these have mostly been reliant on anecdotal information *(3,9–11)*. We report the detailed histopathological findings in a series of false-negative and false-positive neck dissections and, on this basis, we present likely explanations for the inaccurate preoperative assessment.

Correspondence to: Dr J A Woolgar, Oral Pathology Laboratory, Liverpool University Dental Hospital, Pembroke Place, Liverpool L3 5PS

Materials and methods

Surgical cases

Between November 1989 and May 1993, neck dissection procedures were performed in 177 patients at the Mersey Regional Maxillofacial Unit, at Walton Hospital, Liverpool, UK. The surgical specimens (213 sides of neck dissection) were submitted to the Oral Pathology Diagnostic Service at the Liverpool University Dental Hospital, where all the gross dissections and histological examinations were made and reported by one of the authors (JAW). Only neck dissections which were performed simultaneously with resection of a primary intraoral/oropharyngeal squamous cell carcinoma, in a patient with no history of chemotherapy, radiotherapy or

surgery to the head and neck (other than routine dento-alveolar procedures and/or a recent diagnostic biopsy procedure) were considered for entry into the present study. A total of 86 patients fulfilled these criteria and form the basis of the present report. Of the 86 patients, 28 underwent bilateral neck dissection. In the latter patients, each side of the neck was assessed separately. Hence, in total, 114 sides of the neck were available for clinical and pathological assessment. Of the 114 neck dissections, 17 (15%) were standard radical procedures; 57 (50%) were functional procedures, and the remaining 40 (35%) were supraomohyoid procedures. Of the sides of neck dissection, 98 (86%) were in continuity with the intraoral/oropharyngeal resection.

Of the 86 patients, 55 (64%) were male, with a mean age of 58 years (SD 11.5, range 37–88 years). The mean age of the 31 female patients was 64 years (SD 10.5, range 33–81 years). The site *(12)* of the primary tumour was buccal mucosa in nine patients (10%); lower alveolar ridge in 11 (13%); retromolar trigone in 3 (3%); oral tongue in 26 (30%); floor of the mouth in 26 (30%), and oropharynx in the remaining 11 patients (13%). The buccal mucosa, lower alveolar ridge and retromolar trigone were designated sites at low risk of metastasis (23 cases, 27%). Oral tongue, floor of the mouth and oropharynx were designated as high-risk sites (63 cases, 73%). The primary tumour was staged *(12)* as T_1 in 25 patients (29%); T_2 in 28 patients (32%); T_3 in nine patients (10%), and T_4 in the remaining 24 patients (28%).

The clinical (that is, the preoperative) metastatic status of the cervical lymph nodes was determined by examination of the neck under general anaesthesia and radiological imaging by computed tomography (CT). The neck was recorded as clinically positive if either or both investigations suggested that metastatic disease was present. All other necks were recorded as clinically negative.

Histopathological methods

In order to ensure that the surgical specimens reached the laboratory in a well-preserved state, with the minimum of tissue distortion, the specimen was sutured to a polystyrene sheet before fixation in 10% buffered formalin. The specimens were examined in the laboratory after 24–48 h of fixation. Lymph nodes larger than 0.3 cm diameter were identified by palpation and visual inspection, measured and dissected out from each of the five main anatomical groups: submandibular/submental (anatomical level I); superior, mid and inferior cervical (levels II–IV), and posterior triangle (level V). In nodes with obvious metastatic involvement, any fixation to perinodal adipose tissue or adjacent structures, fusion of adjacent nodes or spread into extranodal tissues was recorded (macroscopic extracapsular spread), and blocks of tissue showing the maximum extent of spread were processed. Lymph nodes larger than 0.5 cm. were bisected in their long axis, and smaller nodes were processed whole.

Initial histological assessment of each lymph node was made on a single section stained with haematoxylin and eosin. Step-serial sections (100 μ apart) were prepared of those nodes >2.4 cm that appeared free of tumour on initial assessment. All nodes were recorded as negative or positive for metastatic carcinoma and charted on a topographical diagram. In positive nodes, the extent to which the normal nodal architecture had been replaced by the metastatic deposit was subjectively graded as minimal (up to 5% replacement); partial (5–80% replacement), or total (more than 80% replacement). Step-serial sections were prepared of those nodes showing minimal replacement on initial assessment, and, if necessary, the grade was adjusted. The extent of extracapsular spread, when present, was recorded as: microscopic embolisation and permeation of perinodal lymphatics; microscopic extracapsular spread to perinodal tissues or anatomical structures, or macroscopic extracapsular spread.

In addition to lymph nodes, representative blocks of the submandibular salivary glands were processed for histological assessment.

Statistical methods

Statistical analysis was performed using the χ^2 test, or if the expected cell frequency was less than five, the Yates' corrected χ^2 test *(13)*.

Results

Accuracy of the preoperative assessment of the metastatic status

The clinical assessment of the metastatic status was in agreement with the pathological assessment in 77 (68%) of the 114 sides of neck available for clinical and pathological evaluation. As shown in Fig. 1, false-negative assessments were made in 18 (27%) of the 67 clinically negative necks, and false-positive assessments were made in 19 (40%) of the 47 clinically positive necks. There was no significant difference in the accuracy rate in patients undergoing unilateral and bilateral neck dissection procedures (60% and 75%, respectively; $\chi^2 = 2.79$, 1 d.f., $P = 0.09$).

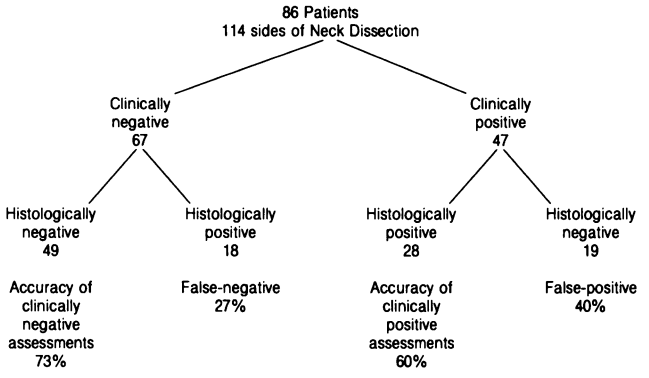

Figure 1. Accuracy of clinical assessment of metastatic status of the cervical nodes in simultaneous procedure neck dissection patients.

The accuracy of the preoperative assessment in relation to the site and stage of the primary tumour is shown in Table I. There was no significant difference in the accuracy in relation to the metastatic risk of the site of the primary tumour ($\chi^2 = 0.47$, 1 d.f., $P=0.49$). False-negative assessments were made in 2 (8%) of the 26 tumours at low-risk sites and in 16 (18%) of the 88 tumours at high-risk sites ($\chi^2_{Yates} = 0.97$, 1 d.f., $P=0.33$). False-positive assessments were made in 5 (19%) of tumours at low-risk sites and in 14 (16%) of tumours at high-risk sites ($\chi^2_{Yates}=0.009$, 1 d.f., $P=0.92$). However, there was a significant difference in the accuracy of the clinical assessment in relation to the T stage of the primary tumour ($\chi^2 = 7.67$, 3 d.f., $P=0.05$). False-negative assessments were made in 35% of T_2 tumours, but in only 6–9% of T_1, T_3 and T_4 tumours. False-positive assessments were made in 27% of both T_3 and T_4 tumours, but in only 9% and 11%, respectively, of T_1 and T_2 tumours.

Pathological findings in the clinically false-negative neck dissections

A summary of the pathological findings in the 18 false-negative neck dissections is presented in Table II. A total of 38 metastatic nodes were recovered.

The number of positive nodes per dissection ranged from 1 to 9 (mean 2.1, SD 1.99, median 1.5), but nine necks contained only a single positive node. This was located at anatomical level I in three cases and at level II in six cases. Multiple anatomical levels were involved in five of the nine necks with multiple positive nodes. In one case, the positive nodes were located at four different anatomical levels, but none of the false-negative dissections showed involvement of the posterior triangle (level V).

The size of the 38 positive nodes ranged from 0.3 cm to 2.5 cm (mean 1.3 cm, SD 0.62 cm), but 16 (42%) measured 1.0 cm or less, and the median size was 1.25 cm.

Histological examination showed that 10 (26%) of the 38 nodes were totally replaced by the metastatic deposit; 17 nodes (45%) were partially replaced, and 11 nodes (29%) showed minimal replacement (Fig. 2).

Extracapsular spread of metastatic carcinoma was present in 11 of the 18 positive neck dissections—16% of the 67 clinically negative necks. Macroscopic extracapsular spread was diagnosed in one dissection: tumour infiltration of the adipose tissue around four nodes (at three different anatomical levels) was detected on assessment of the gross specimen. Microscopic extracapsular spread was diagnosed in ten dissections: in eight, infiltration of the pericapsular fibrofatty tissue was evident (Fig. 3) and, in two, spread was limited to embolisation/permeation of the perinodal lymphatics (Fig. 4). Microscopic extracapsular spread from nodes at multiple anatomical levels was present in two necks. In total, 22 (58%) of the 38 positive nodes showed extracapsular spread (macroscopic, four nodes; microscopic, 13 nodes; involvement of perinodal lymphatics, five nodes).

Pathological findings in the clinically false-positive neck dissections

A summary of the pathological findings in the 19 false-positive neck dissections is presented in Table III. As shown here, metastasis was diagnosed clinically at anatomical level I in 14 cases and at anatomical level II in the other five cases. Table III also indicates additional pathological findings revealed at laboratory dissection, but not evident clinically, which might have contributed to the clinical impression of nodal involvement by carcinoma. In particular, reactive hyperplasia was confirmed histologically in 12 (63%) of the 19 sides of the neck. Other cases showed direct extension of the primary tumour (two cases) or salivary gland pathology (five cases).

Table I. Accuracy of clinical assessment of metastatic status in relation to site and T stage of primary tumour

T site/ T stage	*Clin. N+ Hist. N+*	*Clin. N+ Hist. N−*	*Clin. N− Hist. N−*	*Clin. N− Hist. N+*	*Accuracy*
Low-risk sites[a] ($n=26$)	3	5	16	2	19/26 (73%)
High-risk sites[b] ($n=88$)	25	14	33	16	58/88 (66%)
T_1 ($n=33$)	7	3	21	2	28/33 (85%)
T_2 ($n=37$)	8	4	12	13	20/37 (54%)
T_3 ($n=11$)	2	3	5	1	7/11 (64%)
T_4 ($n=33$)	11	9	11	2	22/33 (67%)
All T sites/ T stages ($n=114$)	28	19	49	18	77/114 (68%)

(a) Lower alveolar ridge/retromolar trigone/buccal mucosa
(b) Oral tongue/floor of mouth/oropharynx

Table II. Clinical and pathological findings in clinically false-negative neck dissections

		Histologically positive node(s)			
T site	*T stage*	*Node level*	*Node size*	*Degree of replacement*	*Other features*
Buccal mucosa	T_2	I	2.3 cm	Total	In bony depression
Buccal mucosa	T_2	I	1.6 cm	Minimal	
		I	2.3 cm	Minimal	
Oral tongue	T_2	I	0.3 cm	Total	Microscopic ECS
		I	0.7 cm	Partial	
Oral tongue	T_2	II	1.7 cm	Partial	
Oral tongue	T_2	I	0.5 cm	Partial	Microscopic ECS
		II	0.6 cm	Minimal	
		III	1.3 cm	Partial	Microscopic ECS
Oral tongue	T_2	I	1.0 cm	Minimal	
		II	1.2 cm	Partial	
		II	1.4 cm	Partial	Emboli in perinodal lymphatics
		II	2.1 cm	Total	Microscopic ECS
		III	0.9 cm	Partial	Microscopic ECS
Oral tongue	T_3	II	2.1 cm	Minimal	
		IV	2.0 cm	Minimal	
Floor of mouth*	T_1	I	1.2 cm	Partial	Microscopic ECS
Floor of mouth*	T_1	I	0.7 cm	Partial	Microscopic ECS
		I	1.3 cm	Partial	Microscopic ECS
Floor of mouth	T_2	I	0.8 cm	Minimal	
Floor of mouth	T_2	II	1.2 cm	Minimal	
Floor of mouth	T_2	II	1.4 cm	Minimal	Emboli in perinodal lymphatics
Floor of mouth	T_2	II	2.0 cm	Partial	Emboli in perinodal lymphatics
Floor of mouth	T_2	II	1.4 cm	Partial	
		II	2.1 cm	Total	Microscopic ECS
Floor of mouth	T_2	I	0.8 cm	Partial	Emboli in perinodal lymphatics
		II	0.6 cm	Minimal	Emboli in perinodal lymphatics
		II	0.6 cm	Total	Macroscopic ECS
		III	0.5 cm	Minimal	
		III	2.2 cm	Total	Macroscopic ECS
		IV	0.6 cm	Partial	
		IV	0.6 cm	Total	Microscopic ECS
		IV	1.0 cm	Total	Macroscopic ECS
		IV	1.0 cm	Total	Macroscopic ECS
Floor of mouth	T_4	II	1.6 cm	Partial	
Floor of mouth	T_4	II	2.5 cm	Total	Microscopic ECS
Oropharynx	T_2	II	1.6 cm	Partial	Microscopic ECS
		III	1.3 cm	Partial	Microscopic ECS

* One patient had bilateral false-negative clinical assessments
ECS, extracapsular spread

Discussion

This study sought to determine with a high level of accuracy the validity of the preclinical assessment of positive or negative cervical nodes in patients presenting with oral cancer. The neck was recorded as clinically N-positive if examination under general anaesthesia and/or CT imaging suggested metastatic disease was present. The study also included a large number of cases, clinically assessed as N-negative in which elective neck dissections were performed to allow pathological staging of the metastatic status and for access to the neck for microvascular anastomosis.

The pathological assessment was in agreement with the clinical assessment in 77 (68%) of the 114 sides of the neck in the present study. The accuracy of the clinically positive assessment was slightly lower than the accuracy of the clinically negative assessment (60% and 73%, respectively).

When the primary sites of carcinoma were grouped according to high or low risk of metastasis, we found no statistical relationship between the metastatic risk for the

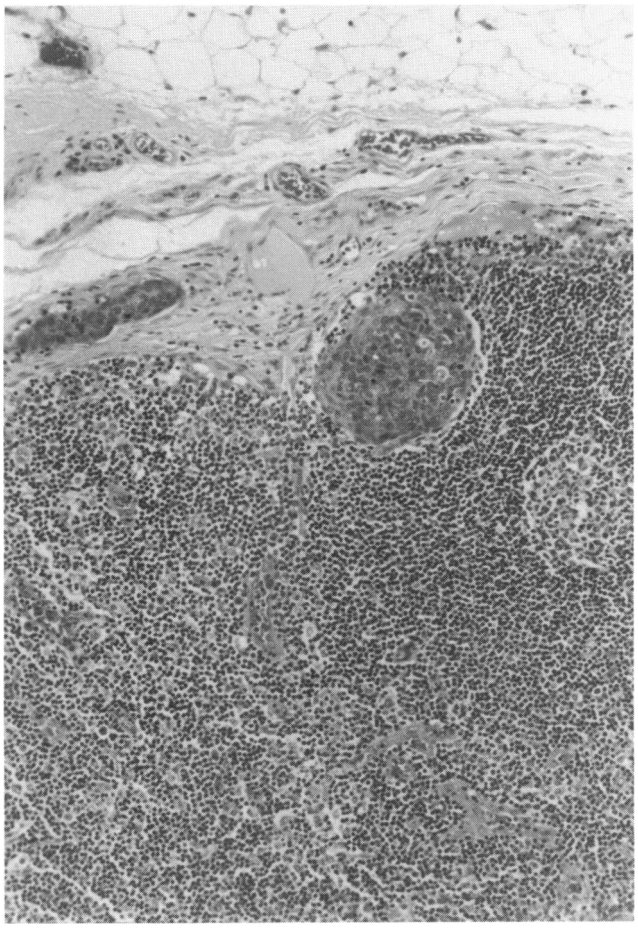

Figure 2. Metastatic carcinoma is seen as small islands of tumour cells within the peripheral sinuses of the node, with minimal replacement of normal nodal architecture. Haematoxylin and eosin. Original magnification, ×100.

site and the accuracy of the clinical assessment. This is in agreement with a previous report *(14)*. However, in the present study, in contrast to the latter authorities, the accuracy of the clinical assessment showed a significant relationship to the T stage of the primary tumour. Moore *et al. (15)* suggested that false-positive assessments are more likely in patients with large tumours, because of the examiner's expectation of metastatic nodes, as well as the increased likelihood of reactive hyperplasia due to local factors. This is borne out to a certain extent by our findings. However, the high incidence of clinically occult metastases in T_2 tumours had a more important influence in the relationship between accuracy of the preoperative assessment and tumour stage, in the present study.

In the present study, none of the patients had received previous therapy, either at the site of the primary tumour or in the neck, hence, scarring and fibrosis can be eliminated as potential causes of an inaccurate preoperative assessment. As shown in Fig. 1, false-positive assessments were made in 19 (40%) of the 47 clinically positive necks. In most reports of studies confined to previously untreated patients, the incidence of false-positive assessments is between 19.5% and 39% *(14, 16, 17)*. However, Crissman *et al. (9)* reported a very high incidence of false-positive assessments (56%) in their series of patients with carcinoma of the floor of the mouth, and it was suggested that sialadenitis of the submandibular gland was the usual cause of discrepancy in their patients. In the present study, false-positive assessments were made more often in relation to submandibular nodes (14 cases), than in relation to nodes of the deep cervical chain (five cases). However, as shown in Table III, histological evidence of sialadentitis was present in only four of the 14 necks with false-positive assessments at level I. In these four cases, the submandibular gland was noted to be firm and shrunken during macroscopic assessment of the gross specimen. Hence, it is likely that a firm structure had been palpable on clinical examination, giving rise to the preoperative diagnosis of nodal metastasis. Histologically, acinar atrophy and fibrosis of the gland was seen and this was complicated by pus and mucus plugs in one case and by multiple calculi in interlobular ducts in a further case. In another patient with a false-positive assessment at level I, a large mucous extravasation cyst, located deep to the sublingual gland, was the likely cause of the clinical misdiagnosis. In a further two patients, direct spread of the primary tumour into the submandibular salivary gland was demonstrated pathologically and, in one case, this was complicated by a large abscess which had formed within necrotic/cystic areas of the tumour. We consider that in all these cases the pathological changes in anatomical structures in the

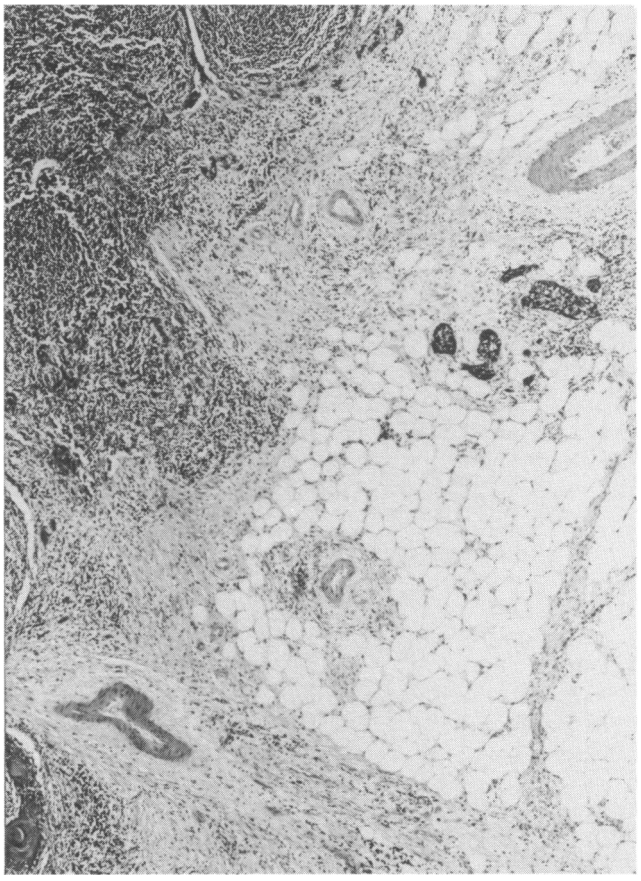

Figure 3. Small islands of tumour are seen infiltrating perinodal fibroadipose tissue. Islands of tumour are seen, also, within the capsule and periphery of the node. Haematoxylin and eosin. Original magnification, ×40.

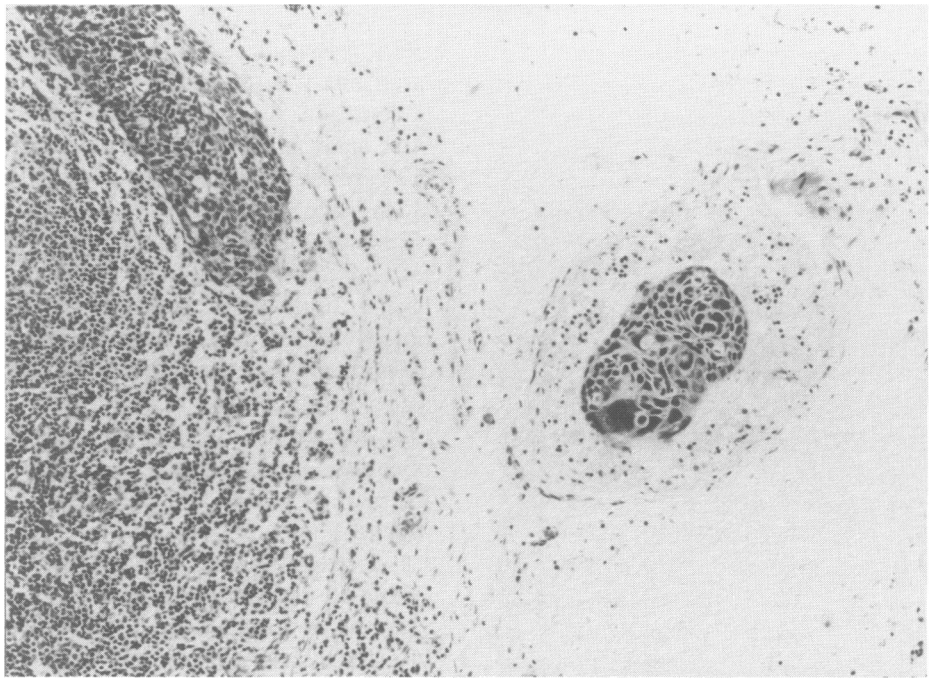

Figure 4. Tumour cells are seen within a lymphatic vessel in the fibroadipose tissue surrounding the node. Haematoxylin and eosin. Original magnification, ×100.

submandibular triangle led the clinician to an erroneous conclusion that carcinoma was present in nodes at this site.

In the remaining cases in which metastasis was erroneously diagnosed preoperatively at level I (seven cases), and at level II (five cases), pathological assessment of the gross specimen revealed multiple, enlarged lymph nodes (Table III). In one patient, one node was densely calcified, and a histological diagnosis of inactive tuberculosis was made. In the other cases, the histological diagnosis was reactive hyperplasia of the lymph node. Follicular hyperplasia was the dominant histological

Table III Clinical and pathological findings in clinically false-positive neck dissections

T site	*T stage*	*Level of clinically positive node*	*Pathological findings*
Oral tongue	T_3	I	Chronic sialadenitis/fibrosis of SMG
Oral tongue	T_3	I	Chronic sialadenitis/multiple calculi of SMG
Floor of mouth	T_2	I	Acute-on-chronic sialadenitis of SMG
Floor of mouth*	T_4	I	Chronic sialadenitis/fibrosis of SMG
Floor of mouth	T_1	I	Mucous extravasation cyst deep to sublingual gland
Lower ridge	T_4	I	Direct spread of primary tumour
Lower ridge	T_4	I	Direct spread of primary tumour
Lower ridge	T_4	I	Reactive hyperplasia (granulomatous): six nodes (0.5–1.3 cm)
Buccal mucosa	T_1	I	Reactive hyperplasia: four nodes (0.4–1.7 cm)
Oral tongue	T_2	I	Reactive hyperplasia: four nodes (1.2–1.5 cm)
Oral tongue	T_4	I	Reactive hyperplasia: nine nodes (0.9–2.4 cm)
Floor of mouth*	T_4	I	Reactive hyperplasia: three nodes (2.0 cm)
Floor of mouth**	T_4	I	Reactive hyperplasia: five nodes (0.4–1.5 cm)
Floor of mouth**	T_4	I	Reactive hyperplasia: two nodes (1.0–1.7 cm)
Buccal mucosa	T_4	II	Calcified node (4.5 cm). Reactive hyperplasia: five nodes (1.0–2.7 cm)
Oral tongue	T_2	II	Reactive hyperplasia: 12 nodes (0.5–3.5 cm)
Oral tongue	T_2	II	Reactive hyperplasia (granulomatous): 13 nodes (0.5–2.4 cm)
Oropharynx	T_1	II	Reactive hyperplasia: three nodes (2.0–2.2 cm)
Oropharynx	T_3	II	Reactive hyperplasia: 11 nodes (0.5–2.5 cm)

*/** Two patients had bilateral false-positive clinical assessments
SMG, submandibular gland

pattern in most nodes. However, in two patients, the paracortex of some nodes contained discrete, non-caseating epithelioid-cell granulomas, similar to the sarcoid type of granulomatous reaction reported as an occasional finding in head and neck cancer by Lennert *(18)* and by Noone *et al. (19)*. Neither of the two patients with granulomatous changes in the present study had any evidence of systemic sarcoidosis.

The number and the size range of the lymph nodes in the 12 dissections in which non-metastatic nodal enlargement was considered to be the cause of the clinical misdiagnosis is shown in Table III. In each case in our series, the largest node exceeded the normal parameters of 0.7 cm and 2.0 cm cited as the upper limit for the size of normal submandibular and superior cervical nodes, respectively *(20)*. Even though the diagnosis of metastasis by clinical palpation and CT imaging does not depend solely on the size of the node *(11,21)*, the extent of the nodal enlargement and/or the number and grouping of nodes in these patients were suggestive of metastatic disease. Patients were not treated routinely with antibiotics before the clinical assessment was made, and ulceration and sepsis of the primary tumour, or sepsis elsewhere in the mouth or pharynx, are probably responsible for the reactive hyperplasia of the nodes that occurs so frequently in these patients. Passage of tumour antigens, or even the presence of occult micrometastases are other possible explanations for the reactive changes.

False-negative clinical assessments were made in 18 (27%) of the 67 clinically negative necks in the present study. The reported incidence of false-negative clinical assessments for similar series of previously untreated patients is wide and ranges from 15% to 49% *(1,22)*. However, three recent studies, each based on a large series of patients, have reported a false-negative incidence rate of between 25% and 34% *(7,8,17)*.

In the present study, metastasis to nodes in the posterior triangle (level V) was not identified in any of the 67 patients with clinically negative necks, but node(s) at level IV (inferior cervical) were positive in two cases (3% of clinically negative necks). Shah *et al. (17)* reported a similar incidence of metastatic involvement of level IV nodes in clinically negative necks.

In the present study, extracapsular spread of metastatic carcinoma was seen in 11 (16%) of the 67 clinically negative necks. In most previous reports, the incidence of extracapsular spread in clinically negative necks has ranged from 4% to 6% *(2,7,8)*. However, Grandi *et al. (3)* reported a higher incidence (12%), more in keeping with our findings. In the previous reports, the extent of the extracapsular spread was not specified. In the present study, in one patient with a clinically negative neck, extracapsular spread of macroscopic extent involved nodes at three different anatomical levels and, on histological examination, carcinoma was seen infiltrating adipose tissue up to 0.5 cm distant from the involved nodes. In the ten patients with microscopic extracapsular spread, tumour was confined to the immediate pericapsular fibrofatty tissue. Hence, spread into adjacent structures, such as major veins and muscles, was not demonstrated in any patient with a clinically negative neck in the present study, despite meticulous assessment at the histological level. However, an important finding in the present study is that extracapsular spread of microscopic extent is frequently seen in small nodes and in nodes only partially replaced by metastatic tumour (Table II). Our findings, in relation to extracapsular spread and the anatomical level of positive nodes, have several important clinical implications in relation to selection protocols for elective neck dissection, the use of standard radical or modified neck dissection procedures, and indications for postoperative radiotherapy.

The histopathological assessment provided possible explanations for the inaccurate preoperative assessment in 13 (72%) of the 18 false-negative neck dissections in the present study. In one patient, the positive node occupied a depression within the lingual aspect of the mandible and it is likely that the node was not detected due to this unusual anatomical arrangement. In five cases, the positive node(s) contained only micrometastases; tumour was seen as emboli within the peripheral sinuses with minimal replacement of normal nodal architecture (Fig. 2). It is most unlikely that these positive nodes could be detected preoperatively owing to the small size of the deposit. In another seven cases, the positive node(s) were partially or totally replaced by metastatic carcinoma. However, the nodes were not enlarged (all measured less than 1.7 cm in maximum dimension) and, therefore, it is likely that they escaped detection because of their small size. In the remaining five false-negative neck dissections, the largest positive node measured 2.0 cm or more, and no features were identified during the pathological assessment to account for the clinical misdiagnosis.

All the patients in the present study underwent CT imaging of the neck as part of the preoperative assessment. Recently, several authorities *(4–6)* have reported a low incidence of false-negative assessments (between 12% and 16%) after CT imaging. It is possible that the CT scans in the present study were less accurate than the scans in the studies reported by Close *et al. (4)*, Friedman *et al. (5)* and Hillsamer *et al. (6)* owing to technical differences, such as the thickness of the image sections. However, another possible explanation for the low incidence of false-negative assessments reported by some authors *(4–6)* is that, in their studies, the pathological assessment was less thorough than in the present study and, hence, some microscopic metastatic deposits may have missed detection in their patients. It is generally accepted that detection by CT imaging is impossible when the tumour deposits within a node are only microscopic in extent *(21,23,24)*. It has been estimated that more than 1 million malignant cells are needed to create a mass of 1 mm^3 *(25)*. Although a deposit of this size is easily visible using the light microscope, it is unlikely to be detectable on gross examination and, in practical terms, impossible to detect by sectional imaging of lymph nodes in the clinical setting. Therefore, CT imaging is only useful in

identifying gross (that is, macroscopic) metastatic disease and for detecting and delineating extracapsular spread *(21,23,24,26)*. Hence, a detailed histological assessment of all the lymph nodes removed during a neck dissection procedure is the most reliable, currently available method of assessing the actual metastatic status of the cervical nodes.

We conclude that the pattern of metastatic spread, and particularly the frequency of micrometastases, within the cervical lymph nodes, as revealed here by detailed histopathological examination, may explain why metastatic disease is frequently not detected during the preoperative assessment of patients presenting with oral cancer. Our results show, also, how non-metastatic enlargement of lymph nodes or anatomically related structures may frequently be misinterpreted as metastatic carcinoma. Thus, despite meticulous protocols for physical examination of the neck in oral cancer patients, the reliability of such preoperative assessments should always be treated cautiously. Our results confirm the limited levels of accuracy of this area of preoperative assessment, even when palpation of the neck is supplemented by CT imaging.

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