

A Clinical, Radiological, and Histopathological Correlation of Neck Nodes in Patients Undergoing Neck Dissection

Abstract

Objectives: Management of neck metastases in terms of diagnosis and treatment has always been a controversial issue in patients of head and neck malignancy. The main area of debate in case of diagnosis lies with the fact that whether we should rely on ultrasound, as a diagnostic modality for diagnosing micrometastases in the neck in head and neck malignancy patients? The second controversial issue is the management of N0 neck, whether to be radical or conservative?

Materials and Methods: This study was conducted on 70 diagnosed patients of head and neck carcinoma who were planned for resection of the primary. An appropriate neck dissection was performed in all the patients, and their clinical, ultrasonography, and postoperative histopathological neck findings were correlated. **Results:** In our center, the most common site of the primary tumor was oral cavity with most involving buccal mucosa. As expected, T4 lesions were commonly associated with nodal metastasis (71%). The sensitivity of clinical examination and ultrasound was 80% and 93.3%, respectively, and specificity of clinical examination and ultrasound was 57% and 27.2%, respectively. Histopathologically positive but clinically nonpalpable metastases in the study group were more frequent in levels Ib, II, and III, respectively. **Conclusion:** We concluded that ultrasonography being a low cost and a highly sensitive investigation can act in tandem with clinical examination for diagnosing the neck for metastases preoperatively in head and neck malignancy patients. However, due to its low specificity, we cannot completely rely on it, hence doing a neck dissection in selective form, will definitely improve the clinical course of the disease in N0 necks.

Keywords: Histopathology, neck dissection, neck metastasis, palpation, ultrasonography

Introduction

Head and neck cancer is a very common entity encountered in a country like India where tobacco use in different forms is popular. More than 90% of these carcinomas are squamous cell, where besides surgery, radiotherapy and chemotherapy and their combinations form the treatment modalities. The lymphogenic metastasis represents the most important independent prognostic factor for squamous cell carcinomas of the upper aerodigestive tract.^[1] Especially the presence of lymph node metastases is associated with a dramatic reduction of the survival rate. The gold standard for the diagnosis of lymph node metastases is still the histological examination of the neck dissection specimen. Management of head and neck malignancy is multimodal and includes surgery of the primary site with or without neck dissection, radiotherapy, chemotherapy, and the combinations of the above three.

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Management of clinically N0 neck is controversial. The concept of the conservative procedure with careful follow-up examination in the sense of wait-and-see policy is opposed to the performance of elective neck dissection. The problem of clinical N0 neck results from the partly insufficient sensitivity and specificity of noninvasive examination techniques. If neither clinically nor after the performance of imaging diagnosis no hint for the presence of lymphogenic metastases can be found, occult metastases must nonetheless be expected in 12%–50% of the cases, depending on the location of the primary tumor.^[2] However, if the probability of neck metastases is low or nil, neck dissection simply acts as an overtreatment, where the morbidity of the neck procedure only offers a decrease in quality of life and functional deficits.^[3] Hence, the aim of this study was to evaluate the clinical presentation of locoregional nodal metastases in head and neck malignancy, to correlate clinical, ultrasonographic features, fine-needle aspiration cytology and postoperative

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histopathological observations of lymph nodes in head and neck malignancy and to contribute in making valid criteria for therapeutic decision-making in these cases with high morbidity and mortality.

Materials and Methods

This study was carried out at our institute after obtaining approval from research ethics committee. All patients of head and neck malignancy who were posted for surgery of the primary tumor and neck dissection irrespective of cervical lymph node status were included in the study. Patients those were previously irradiated or had received chemotherapy before surgery were excluded from the study. A detailed clinical history was obtained and a complete otolaryngologic and systemic examination was performed. An ultrasonographical assessment of neck was performed for neck nodes. Surgery in the form of wide local excision of the primary with or without reconstruction along with an appropriate neck dissection was done. Specimen from neck dissection was labeled according to neck levels, and primary was labeled according to its margins. Ultrasonographic findings and histopathological results were correlated with the preoperative clinical examination.

Analysis

Univariate analysis was performed using Chi-Squared test to analyze the relationships among the clinical variables using SPSS statistical package software version 16.0 (IBM, United States). The value of $P < 0.05$ was considered statistically significant. Sensitivity, specificity, and diagnostic accuracy of clinical examination and ultrasonography (USG) were calculated.

Results

The patients who underwent excision of the primary and neck dissection formed the study group and mostly were in the third and fifth decade of life (34% each) followed

by fifth decade (23%). Out of 70 patients, 55 were operated >6 months after onset of their first symptom. Majority of the patients (70%) were males.

Types of neck dissections and primary site operated

Neck dissections carried out were grouped as selective or comprehensive and they were further classified according to the levels removed. In our study, modified radical neck dissection Type 1 was the most commonly performed neck dissection ($n = 35$) followed by supraomohyoid ($n = 25$).

The most common primary site in our study group was an oral cavity. Of these, 33 were from buccal mucosa and 17 were from the tongue [Table 1].

Histopathology and lymph node metastases

The decision of performing the type of neck dissection depends on the nodal status of the neck, primary stage of tumor and site of the tumor. Table 2 shows pattern of lymph node involvement according the primary stage. Irrespective of primary stage most common level to be involved was level Ib and as the staging of the primary tumor increased the lymph node level involvement progressed to level III, IV, and V.

There are many factors that predict the chances of neck metastases among all the factors primary tumor stage and grade are the most important ones [Table 3].

Correlation of clinical and histopathological examination

Out of all the 70 patients, 56 patients had histopathologically proven nodes but only 45 patients had clinically palpable nodes. Hence, clinical examination missed 11 patients. The sensitivity of clinical examination was 80%, specificity was 57.14%, and the diagnostic accuracy was 75.71% [Table 4]. We also calculated sensitivity and specificity of ultrasound, and it was observed to be 93.3% and 27.2%, respectively.

Correlation of clinical, ultrasonographical, and histopathological examination

Clinical palpation of nodes has its obvious drawbacks of being unreliable and infallible, so ultrasound has always been a preferred radiological modality to further detect lymph node metastasis. We studied the ultrasonographic features of malignant lymph nodes and found that shape of the nodes was highly significant in determining metastasis. Nodes those were round were more likely to metastatic than the oval-shaped as shown in Table 5. Ultrasound could pick all the nodes which were missed on clinical examination.

Table 1: Sites of primary lesion

Site of lesion	n (%) patients
Buccal mucosa	33 (47)
Tongue	17 (24)
Thyroid	8 (11.4)
Lip	5 (7.14)
Larynx	4 (5.7)
Parotid	3 (4.2)

Table 2: Patient wise distribution of lymph node metastases according to primary stage

	Histopathological pattern of lymph node metastasis in relation to primary						Incidence of nodal metastasis Total (%)
	level Ia	level Ib	level II	level III	level IV	level V	
T1	-	-	-	-	-	-	-
T2	2	5	2	3	-	1	13 (57.14)
T3	-	2	1	-	-	-	3 (40)
T4	-	2	1	2	3	3	11 (71)

Table 3: Correlation of grading and staging of primary with lymph node metastasis

Characteristic of primary	Total number of patients	Number of patients with neck metastasis	Percentage of patients with neck metastasis (%)	P value
Grade				<i>P</i> =0.086 (not significant)
Moderately differentiated carcinoma	20	16	80	
Well-differentiated carcinoma	35	20	57	
Staging				<i>P</i> =0.024 (significant)
T1	-	-	-	
T2	32	15	46.8	
T3	15	8	53.3	
T4	23	19	82.6	

Table 4: Comparison of ultrasonography and clinical examination

	Sensitivity (%)	Specificity (%)	PPV	NPV	Accuracy (%)
Preoperative examination	80.30	57.14	88.24	42	75.71
Ultrasonography	93.30	27.20	63.60	75	65.38

PPV: Positive predictive value; NPV: Negative predictive value

Table 5: Correlation between ultrasonography features of nodes and metastasis

Parameter	Total number of nodes picked on USG	Number of nodes histologically positive	P value
Size of node on USG			<i>P</i> =0.157 (not significant)
5×9 mm	18	6	
10×15 mm	18	9	
15×19 mm	3	2	
>19 mm	2	1	
Shape of node			<i>P</i> =0.558 (not significant)
Round	15	13	
Oval	26	19	

USG: Ultrasonography

Discussion

Nodal involvement is the most important prognostic factor in the management of head and neck cancers. Regardless of the site of primary tumor, the presence of single ipsilateral or contralateral metastatic node reduces survival by 50% and bilateral disease by a further 50%.^[4] The management of the N + neck is well-defined. The management of N0 neck remains controversial; it is important to accurately evaluate the neck for any occult metastasis before classifying as a N0. We studied the pattern of neck metastasis, correlated the diagnostic performance of preoperative clinical examination, ultrasonography for the nodal metastasis and their role in the management of the head and neck cancers in a group. Out of 70 subjects, 56 (80% of patients) were male, and 14 (20% of patients) were females with a male:female ratio of 3:1, showing a male predominance which corresponds to earlier studies by Essig *et al.*^[1] The male predominance is attributed to tobacco-related habits which are more common among men as compared to women in Southeast Asian countries.

Among the total 70 patients reported in our study, mean age was 45.5 years.

Similar results have been reported by Nithya *et al.* where they found that head and neck malignancy is a disease of middle age from third to fifth decades.^[5]

At our institute, patients commonly presented in advanced stages of primary (T3 and T4). In our study group of surgical patients, the majority of the patients were from T2 group, followed by T4 and T3. T2 being 45.7% (*n* = 32), T4 being 32.85% (*n* = 23), T3 being 21.4% (*n* = 15).

The most common level of the lymph node to be involved histopathologically was level I which was similar to a study by Essig *et al.*, who found an incidence of level I involvement to be 66.7%.^[4] In contrast, few authors have reported that level II was the most commonly involved site for neck metastases.^[5-7] Moreover, Byers *et al.* showed that 16% of patients with oral cancer had metastasis in level IV without nodes in level I, II, or III.^[8] In our study, level IV involvement in oral cancer alone was seen in around 10% of cases. This different presentation of lymph node involvement could be attributed to varied pattern of lymphatics in individual neck and anatomical distribution of lymphatics.^[9] Oral cavity lymphatics, especially the anterior half of tongue, lip and buccal mucosa drains primarily into the level I group and in our study 88% of patients were of the oral cavity cancer. Nodal metastasis incidence was highest in T4 lesions (71%) in our cases which were similar in a study by Jin.^[10]

The reliability of preoperative clinical examination in cervical lymph node metastasis depends on the experience of the examiner and the anatomy of the individual neck. Reliability also depends on the fat and muscle present above the lymph node. Sometimes even the mandible also hinders the palpation. Preoperative clinical examination of patients though easy and inexpensive has estimated

that around 27%–38% are false-negative.^[11] In our study, clinical examination yielded 15.7% of false-negative results and a sensitivity of 80.3% suggesting that simply relying on clinical examination may not be adequate in predicting cervical nodal metastasis. This is in accord some other previous reported studies.^[11-13] The reactive lymph node can also achieve the same dimensions as metastatic nodes, and hence, false-positive results are inevitable. The accuracy of 65.38% for palpation in our study is comparable to other studies.^[14-17] Due to the low sensitivity of clinical palpation, one option would be to look for more reliable methods to assess the neck one of which would be ultrasonography. Sajeeda *et al.* documented that ultrasonography is not only useful in detecting neck nodes but also useful in assessing the nodal characteristic and the degree of vascular invasion.^[18]

We observed that ultrasonography had the sensitivity of 93.3% and specificity of 27.7% in our study indicating that USG can detect more number of cases but lacks the ability to confirm those cases. The detection of more number of lymph nodes; however, inevitably leads to a lower specificity and as the differentiation between reactive and metastatic is based on morphologic criteria, this leads to low specificity.^[19] The accuracy of ultrasound in our study can be compared to previous studies conducted where they got the accuracy of 70%, 72.7%, and 72.2%, respectively.^[14,15,20]

Management of clinical N0 neck is always controversial. In literature, three types of strategies have been reviewed for N0 neck: 1) Elective neck dissection, 2) “Watchful Waiting” with salvage treatment for neck recurrences, 3) neck irradiation.

The problem of clinical N0 neck results from the partly insufficient sensitivity and specificity of noninvasive examination techniques. In literature, 12%–50% chance of occult metastasis has been documented even after no evidence of metastasis clinically and on imaging.^[2]

Hence, a conservative procedure in the sense of wait-and-see policy bears the risk to overlook these subclinical metastases. The most reliable procedure for definitive assessment of the lymph node status is the histopathological examination.^[21]

In our study, younger patients in third to the fourth decade of life were the most affected group, which gave us the advantage of acting aggressively rather than opting for a conservative approach. The clinical course of the disease in our patients has shown that as the stage of primary tumor becomes higher the level of lymph node involvement progresses further down to level III, IV, and V thus warranting an extensive surgical approach toward neck in higher primary stage lesions.

We also concluded that USG has slightly better sensitivity than clinical examination for neck node assessment

(93% vs. 80%). Furthermore, USG being a low-cost investigation can act in tandem with clinical examination for evaluating the neck for metastases.

Adding a USG as an adjunctive tool in clinically N0 neck has shown to upgrade the neck staging and may influence the surgical decision making in neck management that is from a conservative approach to a more radical approach. In centers where the only excision of the primary is done doing a USG preoperatively will stress on performing a neck dissection or referring the patient to a higher center for further management.

Our protocol was to perform a neck dissection in all patients of head and neck malignancy. Based on the outcomes, we recommend that at least a selective neck dissection should be performed in clinically N0 necks because it causes minimal morbidity and gives definitive staging. A comprehensive approach to the neck can be applied in higher stages and in certain sites of oral cavity such as the tongue.

Conclusion

We concluded that USG being a low cost and a highly sensitive investigation can act in tandem with clinical examination for diagnosing the neck for metastases preoperatively in Head and Neck malignancy patients. However, due its low specificity we cannot completely rely on it, hence doing a Neck dissection in Selective form, will definitely improve the clinical course of the disease in N0 necks.

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Conflicts of interest

There are no conflicts of interest.

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