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METASTATIC LYMPH NODES IN THE NECK: DIAGNOSTIC ACCURACY OF CLINICAL VS ULTRASOUND EXAMINATION.

Plastic Surgery

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ABSTRACT

The presence or absence of metastatic disease in the neck is the single most important factor determining the survival of patients with head and neck malignancy. The present study conducted in the department of Surgery, Medical College, Kozhikkode during 2007 to 2010 is an attempt to determine the sensitivity and specificity of clinical examination of neck metastasis and the justification of selective neck dissection. A total of thirty nine patient admitted in various wards of department of surgery and radiotherapy with clinically palpable nodes in the cervical region with primary head and neck malignancies or with a diagnosis of occult metastasis in the neck. Comparing the clinical and histological extent of metastasis, the sensitivity and specificity of clinical examination and the false positivity and false negativity rates of clinical neck examination were determined. All data were analyzed with GraphPad Instat 3 and R statistical environment

Of the thirty nine patients enrolled into this study, there were 26(66.7%) males and 13(33.33%) females. Among the clinically positive group, thirty(91%) had unilateral cervical metastasis, while three(9%) had bilateral cervical metastasis. The most common lymph node level affected was level Ibo(51.2%) followed by II (34.9%) whereas the least commonly affected were level IV and V(2.3%). In 10 (30.3%) out of the thirty three node positive cases, there was fixity to the deeper structures, whereas skin involvement was present in only three cases(9.1%). Our study results showed that clinical examination had a better sensitivity and ultrasonically examination had better specificity. Presence of nodes can be identified with clinical examination alone though it could result in increased number of false positives. However further investigation like ultrasound examination with better specificity and negative likelihood ratio in combination with clinical examination finding can direct the further management of the patients.

KEYWORDS:

Introduction

The presence or absence of metastatic disease in the neck is the single most important factor determining the survival of patients with head and neck malignancy1. More over, There are many controversies relating to assessment of neck disease, the prophylactic treatment of metastatic nodes, place of radical neck dissection as opposed to modified radical neck dissection and the role of radiothe rapy.2Correct determination of a neck node requires proper clinical examination combined with appropriate investigational diagnostic techniques3.

The assessment of cervical lymph nodes in a patient depends upon history, clinical examination and imaging. Despite development of sophisticated radiological investigations, clinical examination remains as an important method of assessing regional lymph nodes.

The drawback of clinical examination of neck is it lacks strict objectivity being affected by many factors like the thickness of patient's neck skin, the amount of subcutaneous fat and the width obscured by the sternomastoid muscle4.However, clinical examination of neck has a variable reliability. An enlarged node may be due to infection or reactive hyperplasia. On the other hand some nodes like the retropharyngeal and the parapharyngeal are almost impossible to detect by palpation. Patients with short thick neck and post radiotherapy necks are more difficult to examine. But the potential benefits of clinical examination far outweigh these drawbacks and it still remains as the most important method of assessing regional lymph nodes5.

The present study is an attempt to determine the sensitivity and specificity of clinical examination of neck metastasis. It is also proposed to study the influence of various factors of primary in determining cervical metastasis. Lastly, an attempt has also been made to determine the justification of selective neck dissection.

Materials and methods

We conducted this study in the department of Surgery, Medical College, Kozhikkode during 2007 to 2010.

Approval from the institutional research committee and ethics committee were obtained before recruiting the patients into the study. We strictly adhered to declaration of Helsinki in all phases of the research. Informed consents were taken from all patients before recruiting patients into the study.

We studied a total of thirty nine patient admitted in various wards of department of surgery and radiotherapy with clinically palpable nodes in the cervical region with primary head and neck malignancies or with a diagnosis of occult metastasis in the neck. Wide local excision of the primary combined with neck dissection with or without reconstruction of the primary tumors were done in these cases. We followed a consecutive sampling strategy in this study. Patients with age less than 13 were excluded from the study. In addition, we have not included patients given radiotherapy in this study. Other patients categories excluded were those with recurrent swelling and previous neck dissection. Sample size was calculated using standard formulas prior to starting the study.

A thorough clinical examination was done in all patients recruited into the study. Cervical nodes were examined as per the standard method discussed in the literature. All patients with No neck and those with fixity to underlying structures. CT scan was done if indicated as per the standard treatment protocol being followed in the institution. Immediately after the operation, the neck dissection specimen were separated as per the nodal level . Specimens both primary lesions and the nodes were sent for histopathological study were fixed in 10% buffered formalin. Haematoxylin-eosin stained tissue section were studied for the type and grade of malignancy and

presence or absence of perineural or lymphovascular invasion. Presence or absence of metastasis and extra capsular spread were studied in the neck dissection specimen. We collected all data a well designed and pretested case report form. Thereafter, all these data were entered into an excel based database for further analysis.

Comparing the clinical and histological extent of metastasis, the sensitivity and specificity of clinical examination and the false positivity and false negativity rates of clinical neck examination were determined.

All data were analyzed with GraphPad Instat 3 and R statistical environment. Continuous data were summarized with mean and standard deviation or median and interquartile range depending on the distribution of the data. All categorical data were summeriest with percentages and number. The sensitivity, specificity, positive predictive value,negative predictive value, positive likelihood ratio and negative likelihood ratio of both clinical and sonological examination were estimated. We compared the clinical and sonological examinations in terms of sensitivity, specificity, positive predictive value,negative predictive value, positive likelihood ratio and negative likelihood ratio and their corresponding confidence intervals with the histopathological findings taken as the gold standard.

Results

Of the thirty nine patients enrolled into this study, there were 26(66.7%) males and 13(33.33%) females. The mean age was 58.7(10.7). Thirty three of the 39 patients had clinically palpable cervical node while six(15.4%) were clinically node negative. Among the clinically positive group, thirty(91%) had unilateral cervical metastasis, while three(9%) had bilateral cervical metastasis. The most common lymph node level affected was level Ibo(51.2%) followed by II (34.9%) whereas the least commonly affected were level IV and V(2.3%). In 10 (30.3%) out of the thirty three node positive cases, there was fixity to the deeper structures, whereas skin involvement was present in only three cases(9.1%). On TNM staging, majority of the patients(46.1%) were in the N1 stage, twelve in N2, six patients in N0 and only three in N3 stage. In those patients with sonological results available, all the six patients with N0 neck clinically were found to be N0 after ultrasound examination also. In one patient with clinically N3 unilateral node, ultrasound detected nodes on the opposite side, while in another patient with N3 node, ultrasound detected multiple nodes on the same side. One of the two patients with N1 neck in whom ultrasound was done had multiple nodes on the same side while in the other ultrasound confirmed the clinical finding of single unilateral node(table 1).

Table 1 : clinical and sonological features in the study population [ALL] N=39

stage:

2	21 (53.8%)
3	11 (28.2%)
4	7 (17.9%)

usg:

N0	6 (60.0%)
N1	1 (10.0%)
N2a	1 (10.0%)
N3	2 (20.0%)

Histopathological examination of cervical nodes from the block dissection specimen revealed pathological evidence of metastasis in twenty one of the thirty nine cases(53.8%). The details of lymph node level with pathologically positive lymph node metastasis is shown in table 2. Most common level of node affected by metastasis was level II which was positive in seventeen neck dissections (75%) either singly or in combination with nodes at other levels. This was followed by level Ib which was positive in twelve neck dissections. The least affected was level Ia which was involved in only four cases. In no case,metastasis bypassed level I, II or III to involve level IV or V(table2).

Table 2: level of neck nodes involved [ALL]N=21

Neck level:N(%)
Ia 1 (4.8)
Ib 5 (23.8)
II 5(4.8)
III 1 (4.8)
Ia and Ib1 (4.8)
Ia and II1 (4.8)
II and III1 (4.8)
Ib, II and III2 (9.5)
Ib, III and V1(4.8)
II, III, IV and V3(14.3)
Ia, Ib, II, III, IV and V2(9.5)

Extracapsular involvement was present in seven of the twenty one pathologically positive neck dissections while it was absent in the rest.Five of the six clinically negative neck were negative pathologically also, while the other patient with T2 tongue lesion had metastasis at level Ib and II. Nine of the eighteen N1 and four of the twelve clinically N2 patients were pathologically negative for metastasis. But all the clinically N3 were pathologically positive.

Details of clinical examination and sonological examination and comparison of various point estimates with confidence interval is shown in tables 3 and 4. On clinical examination,84.6 percent nodes were diagnosed positive with a sensitivity of 0.95 and specificity of 27.8 percent. However on sonological examination,only 40 percent were picked up as positive with a sensitivity of 67 percent and specificity of 71 percent.

Table 3 : clinical and sonological features in the study population

Method [ALL] N=39	Positive n()	Negative n(%)
Clinical examination 39	33(84.6)	6(15.3)
Ultrasonological evaluation 10	4(40%)	6(60)
Histopathological examination 39	21(53.8)	18(46.1)

Table 4: Comparison of sensitivity, specificity, positive predictive value, negative predictive value, and likelihood ratios between clinical examination and ultrasonography

	Clinical examination	Ultrasound examination
sensitivity	0.952 (0.762, 0.999)	0.67 (0.094, 0.992)
Specificity	0.278 (0.097, 0.535)	0.71 (0.29, 0.963)
Positive predictive value	0.606 (0.421, 0.771)	0.50 (0.068, 0.932)
Negative predictive value	0.833 (0.359, 0.996)	0.83 (0.359, 0.996)
Positive likelihood ratio	1.319 (0.975, 1.784)	2.33 (0.565, 9.639)
Negative likelihood ratio	0.171 (0.022, 1.335)	0.47 (0.088, 2.473)

Discussion

We undertook this study to compare the diagnostic accuracy of clinical and sonological examination in the assessment of metastatic lymph nodes in the cervical region. Accurate assessment of metastasis to lymph nodes is of paramount importance in the staging and treatment of head and neck tumors and rarely tumors from lung and gastrointestinal tract. Moreover, the commonest cause of treatment failure in head and neck is undetected nodal metastasis. Therefore regional control of nodal metastasis in the neck is very important factor in predicting the clinical course and outcome of the patient with head and neck malignancy6. Detection of involved nodes are important from this perspective. In our study, clinical examination reported a sensitivity of 95%, higher than reported by Indian authors. The study by Geetha et all reported a comparatively less sensitivity of 83% for the clinical examination7. Similarly Sureshkannan showed that clinical examination has a sensitivity of 68.7% only.8 The reason for the higher sensitivity in our patients may be due to standardization of examination methods. Moreover this study was conducted in an academic institution which

could have resulted in better results. In our study, the specificity of clinical examination was on 27.8%,PPV0.61,NPV0.83,LR+ 1.3 and LR-0.17.Shah J P et al., (1990)40 in a retrospective study of cervical lymph node metastasis from oral squamous cell carcinoma found the sensitivity, specificity and overall accuracy of clinical examination of neck node to be 70%, 65% and 68% respectively9. Woolgar et al., (1997)53 reported 41% sensitivity, 28% specificity and an overall accuracy 56% of clinical examination10. Dhawan et al., (199313, Mishra et al., (1999)31, and Brugere J M et al., (1996)5 too showed similar sensitivity and specificity of clinical examination11,12.In the present study the sensitivity of clinical examination was a high 95.2% but the specificity was only 27.8%. The percentage of false positives and false negatives were 72.8% and 4.8% respectively. This is due to increased number of lymph nodes showing follicular hyperplasia, the provoking factors may be bad oral hygiene associated with tobacco chewing. This finding would indicate the need for confirmation of the presence of metastasis either by ultrasound examination of the neck; which can be combined with fine needle aspiration cytology or histological confirmation by a frozen section at the time of surgery before proceeding with a complete neck dissection.

In this study the sensitivity and specificity of ultrasound examination were 67% and 71% respectively. The PPV was 0.50,NPV 0.83 ,positive likelihood ratio 2.33 and negative likelihood ratio 0.47. The false positive and false negative values were 28.6% and 33.3% respectively. It is clearly evident that ultrasound examination increases the specificity of preoperative assessment of cervical metastasis. However, this increase is at the cost of sensitivity which is lower than clinical examination in the present series.

Takashima et al., (1997)48 found the sensitivity and specificity of ultrasound examination to be more than 90%13. But, Baatenburg R J et al., (1993) found the specificity to be low, though the sensitivity was more than 90%14. This is contrary to our results. They recommended ultrasound examination to be combined with ultrasound guided fine needle aspiration biopsy. The combined approach they found, was characterized by 95.7% sensitivity and 92.9% specificity.

The ultrasound features suggestive of malignant node were laid down by Takashima et al., (1997)13. These are calcification within a node, absence of central echogenic hilus and a minimal to maximal diameter of more than 0.55.

Sato et al., (1998) found the diagnostic accuracy of the central echogenic hilus to be high as 82%15. But again the intranodal hyperechogenic appearance may be present in some metastatic nodes due to ischemic degeneration or extensive keratinisation. Hence, it was suggested that colour Doppler flow studies should be carried out to confirm whether a node is metastatic or not. The reactively enlarged nodes shows greater hilar perfusion, whereas metastatic nodes tend to show increased peripheral perfusion.

Thus ultrasound can decrease the number of unnecessary neck treatments by increasing the specificity of preoperative assessment of cervical metastasis, can detect contralateral spread and can change a prophylactive neck treatment to a therapeutic one.

In the present study,the most common lymph node level affected on clinical examination was found to be Ibo,followed by level II. The least commonly affected were level IV and V. These findings compares with other studies in the literature like shaw et all 9. In their retrospective study, the majority of metastatic lymph nodes were present as in our study. In another study by Woolgar et all, similar pattern of initial metastatic focus was found at level I or II16.

One limitation of this study was the low sample size. Ultrasonloglical examination was done only in a limited number of cases. This could have affected the results. Representative nature of the sample was questionable. As this study was conducted in the hospital set up, there could be potential referral bias. This study was observational in nature. As the sonological reporting was not standardized, it could have affected the results. Moreover, ultrasound examinations were done by different sonologists. This would have introduced further bias in the result.

One unexpected finding in this study was that clinical examination showed higher sensitivity than the ultra sound results. This would have resulted from the above mentioned reasons.

In summary, our study results showed that clinical examination had a better sensitivity and ultrasonically examination had better specificity. Presence of nodes can be identified with clinical examination alone though it could result in increased number of false positives. However further investigation like ultrasound examination with better specificity and negative likelihood ratio in combination with clinical examination finding can direct the further management of the patients.

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References

1. Martin H. Cancer of the head and neck. Journal of the American Medical Association 1948; 137(16): 1366-76.
2. Kowalski LP, Bagietto R, Lara JR, Santos RL, Silva JF, Magrin J. Prognostic significance of the distribution of neck node metastasis from oral carcinoma. Head & neck 2000; 22(3): 207-14.
3. Sakaguchi T, Yamashita Y, Katahira K, et al. Differential diagnosis of small round cervical lymph nodes: comparison of power Doppler US with contrast-enhanced CT and pathologic results. Radiation medicine 2001; 19(3): 119-25.
4. Anand N, Chaudhary N, Mittal MK, Prasad R. Comparison of the efficacy of clinical examination, ultrasound neck and computed tomography in detection and staging of cervical lymph node metastasis in head and neck cancers. Indian journal of otolaryngology and head and neck surgery : official publication of the Association of Otolaryngologists of India 2007; 59(1): 19-23.
5. Kallalli BN, Rawson K, Kumari V, Patil S, Singh A, Sulaga S. Comparison between clinical examination, ultrasonography, and computed tomography in assessment of cervical lymph node metastasis in oral squamous cell carcinoma. Journal of Indian Academy of Oral Medicine and Radiology 2016; 28(4): 364.
6. Hibbert J, Marks N, Winter P, Shaheen O. Prognostic factors in oral squamous carcinoma and their relation to clinical staging. Clinical Otolaryngology 1983; 8(3): 197-203.
7. Geetha NT, Hallur N, Goudar G, Sikkerimath BC, Gudi SS. Cervical lymph node metastasis in oral squamous carcinoma preoperative assessment and histopathology after neck dissection. Journal of Maxillofacial & Oral Surgery 2010; 9(1): 42-7.
8. Sureshkannan P, John R. Role of ultrasound in detection of metastatic neck nodes in patients with oral cancer. Indian journal of dental research : official publication of Indian Society for Dental Research 2011; 22(3): 419-23.
9. Shah JP. Patterns of cervical lymph node metastasis from squamous carcinomas of the upper aerodigestive tract. The American journal of surgery 1990; 160(4): 405-9.
10. Woolgar JA, Scott J. Prediction of cervical lymph node metastasis in squamous cell carcinoma of the tongue/floor of mouth. Head & neck 1995; 17(6): 463-72.
11. Mishra R, Parida G, Mishra T, Mohanty S. Tumour thickness and relationship to locoregional failurein cancer of the buccal mucosa. European Journal of Surgical Oncology (EJSO) 1999; 25(2): 186-9.
12. Brugère JM, Mosseri VF, Mamelle G, et al. Nodal failures in patients with N0 N+ oral squamous cell carcinoma without capsular rupture. Head & neck 1996; 18(2): 133-7.
13. Takashima S, Sone S, Nomura N, Tomiyama N, Kobayashi T, Nakamura H. Nonpalpable lymph nodes of the neck: Assessment with US and US-guided fine-needle aspiration biopsy. Journal of clinical ultrasound 1997; 25(6): 283-92.
14. de Jong RJB, Knegt P, Verwoerd CD. Reduction of the number of neck treatments in patients with head and neck cancer. Cancer 1993; 71(7): 2312-8.
15. Sato N, Kawabe R, Fujita K, Omura S. Differential diagnosis of cervical lymphadenopathy with intranodal color Doppler flow signals in patients with oral squamous cell carcinoma. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology 1998; 86(4): 482-8.
16. Woolgar J. T2 carcinoma of the tongue: the histopathologist's perspective. British Journal of Oral and Maxillofacial Surgery 1999; 37(3): 187-93.