Determination of Cervical Metastases by Lymphoscintigraphy in Patients with Oral Cancer : A Single Institute Experience

[1]Md. Ahsan Habib, [1]Quazi Billur Rahman, [2]Pupree Mutsuddy, [2]Shamim M F Begum, [2]Sadia Sultana, [2]Azmal Kabir Sarker, [2]Khokon Kumar Nath and [2]Rokeya Begum

[1] Oral and Maxillofacial Surgery Department, BSMMU

[2] National Institute of Nuclear Medicine & Allied Sciences

Correspondence Address : Dr. Md. Ahsan Habib MS, Oral & Maxillofacial Surgeon, Dhaka Email: Sheyas2011@yahoo.com

ABSTRACT

Objectives: **Oral cancer is the sixth most common cancer in the world. Cervical metastasis is an important adverse prognostic factor and about 40% of the patients with oral cancer develop lymphatic metastasis. Lymphoscintigraphy is the minimally invasive method for the detection of cervical nodal metastasis. The aim of the study was to detect the lymphatic involvement with the aid of lymphoscnitigraphy in patient with oral cancer undergoing surgical procedure and to find out the accuracy of the findings with the post operative histopathological diagnosis.**

Patients and methods: A total of 30 patients with histologically proven oral cancer underwent lymphoseintigraphy evaluation to detect the lymphatic spread of the tumor. The findings and results of lymphoscintigraphy were compared with the postoperative histopathological diagnosis.

Results: **Among the 30 patients, lymphatic obstruction was observed in 19 patients of whom 15 patients had perfusion defect and 4 patients had gap defect. No lymphatic obstruction was evident in the rest of 11 patients by lymphoscintigraphy. The calculated sensitivity of lymphoscintigraphy in diagnosis of cervical lymph node metastasis was 100%, specificity 78.6%, accuracy 90% and positive predictive value was 84.2% and negative predictive value was 100%.**

Conclusion: **Lymphoscintigraphy was found to be an effective method in detecting lymph node involvement and can be used as an alternative to identify regional lymph nodes metastases pre-operatively in oral cancer patients. Thereby, it will help the surgeon to plan the extent of dissection before surgery which may decrease postoperative complications related to unnecessary extensive lymph node dissection and morbidity.**

Key words: **Oral cancer, Lymphoscintigraphy.**

INTRODUCTION

Oral cancer, also referred as mouth cancer are part of a group of head & neck cancer and comprise about 85% of that category (1). More than 90% of all oral cancers are squamous cell carcinoma (2). It is one of the most common forms of cancer in the Indian subcontinent and in other parts of Asia due to prevalent habits of chewing tobacco, betel quid and areca-nut (3).

Oral cancer frequently metastasizes to cervical lymph nodes and metastatic tumours occur in about 40% of patients. Lymph node involvement is considered as the first indication for spread and a strong prognostic factor. Five years survival rate is 25% to 40% of patients with lymph node metastasis and in contrast 90% of patients without metastasis. Elective neck dissection (END) is the current gold-standard staging procedure for the clinically node-negative neck (4).

Lymphoscintigraphy is a minimally invasive nuclear medicine technique to detect the lymphatic spread and level of obstruction or extent of metastasis in patient with oral cancer. The aim of this study was to detect the diagnostic accuracy of lymphoscintigraphy in oral cancer patient to detect cervical lymph node metastasis.

PATIENS AND METHODS

This cross sectional observational type of study was carried out in National Institute of Nuclear Medicine and Allied Sciences and Oral and Maxillofacial Surgery Department of BSMMU from the period of January 2016 to June 2016. A total of 30 patients with histologically proven oral squamous cell carcinoma i.e. oral cancer were enrolled and lymphoscintigraphy was performed in those patients before undergoing the surgical removal and elective neck dissection.

Two injection doses one m Ci each of 99mTc- labelled nanocolloid containing were injected intra-dermally over the skin of mastoid process on both sides and an immediate gentle massage was given. Anterior & posterior delayed spot images were obtained using a large field of view gamma camera with low energy high resolution collimator. Fiducial marker was placed at the level of hyoid bone and cricoid cartilage.

The accepted gamma camera images were assessed as: 1) normal pattern (no obstruction): symmetrical patterns of presence of lymph nodes activities bilaterally at the root of neck, 2) abnormal pattern (obstruction): a) perfusion defect: no lymph node activity was apparent at the root of the neck (Figure 1) & b) gap defect: lymph node activity was apparent at the root of the neck, but an area of reduced activity above this level, this side was considered abnormal (Figure 2) (5). Statistical analysis was done by SPSS version 22. Sensitivity, accuracy, specificity, positive predictive value and negative predictive value were calculated by comparing histopathological reports on post surgical tissue with positive lymphoscintigraphy findings.

RESULT

A total of 30 patients with male female ratio was 1:1.3 and mean age was 56.8 ± 15.4 years. Majority (43.3%) of the patient was below 50 years of age. According to the site of lesion, 33.3% of the patients had cancer in buccal mucosa and 23.3% of the lesions were found in tongue. Among the patients 33.3% of the patient had T3 tumor and 30% of the patient had tumor of T4 size.

Out of the 30 patients, abnormal image was found in 19 (63.3%) patients and among them perfusion defect was found in 15 patients and gap defect was observed in four patients. Normal image pattern was observed in 11 (36.7%) patients (Table-1).

Table 1: Distribution of the patients on lymphoscintigraphic scan (n=30)

Image pattern	Number of patients	Percentage (%)
Perfusion defect	15	50
Gap defect	4	13.3
Normal	11	36.7
Total	30	100

Among the 19 patients majority (59%) had obstruction at level I and 26% patients found obstruction at level II (Table-2).

Table 2: Level of obstruction by lymphoscintigraphical analysis (n=19)

Level of obstruction	Number of patients	Percentage (%)
I	11	59
II	5	26
III	3	15
Total	19	100

Table 3 shows the relationship of lymphoscintigraphical analysis with post-operative histopathology report. Among the 11 patients who were found normal pattern image post operative histopathological report was found no lymph node involvement or metastasis. In case of 11 patients among whom obstruction was found at level I; histopathologically nine patients found metastases at this level and two patients were found no nodal metastasis.

Table 3: Relationship between results of lymphoscintigraphy and post operative histopathology report (n=30)

		Metastatic level by histopathology		
		No metastasis	level I	level II
Obstruction level by lymphoscintigraphy	No obstruction (n=11)	11	0	0
	level I (n=11)	2	9	0
	level II (n=5)	0	3	2
	level III (n=3)	1	0	2
	Total (n=30)	14	12	4

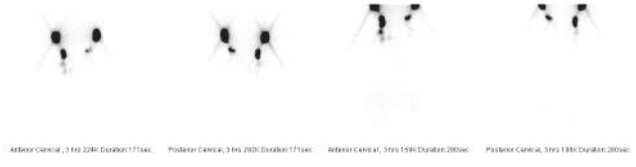

Figure 1: Perfusion defect at level I on left side

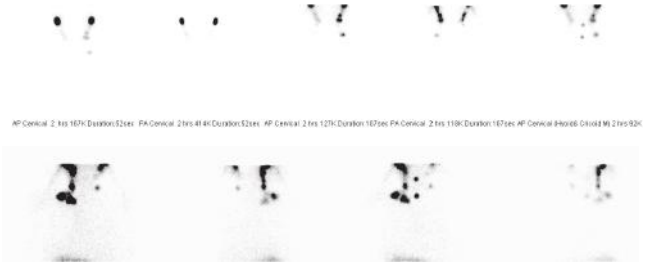

Figure 2: Gap defect at level I on left side

In five patients, lymphoscintigraphycally obstruction was found at level II; but on histopathological analysis three patients found metastases at level I and two patients were found nodal involvement at level II. Three patients were found obstruction at level III by lymphoscintigraphy and post operative histopathology report revealed metastases in two patients at level II and one patient was found no nodal infiltration.

In this study, there was no false negative case. True positive cases were diagnosed in 16 patients. False positive case was found in three cases and true negative was found in 11cases. From these data, calculated sensitivity was 100%, specificity 78.6%, accuracy 90%, positive predictive value 84.2% and negative predictive value 100%.

DISCUSSION

Lymphoscintigraphy has been shown to be helpful in predicting the lymphatic drainage pattern of oral cancer. In cases of patient management, therapeutic outcome is mainly influenced by the presence of nodal metastases. Traditional ultrasound scan, CT, MRI cannot give a detailed staging of clinically node-negative neck (N0) and the specificity ranges from 75-92% (6). 18F-FDG PET is useful in patients with T3-T4 head and neck cancer, but less accurate in patients with T1-T2 N0 cancer (7). So, the current gold standard for treatment of oral cancer is elective neck dissection and routine pathological examination of the surgical specimen. As a result, 60-70% of the patients with N0 neck underwent unnecessary extensive operative intervention (6).

Sentinel lymph node biopsy (SNB) is increasing used for the head and neck squamous cell cancer. A sentinel node (SN) is defined as the first node to spread metastases via the lymphatic system (8). SNB is an accurate method for the staging of lymphatic involvement in oral cancer patients and it can detect the micro-metastases more accurately. In a study by Vigili et al, the success rate of identifying SN was 100% and in 83% of the cases the SN was detected at ipsilateral neck in level I-II (6).

Pathmanathan et al. carried out a study to assess the role of a lymphoscintigraphic technique in the detection of cervical metastatic disease in histologically diagnosed oral squamous cell carcinoma patients. Total 16 patients underwent lymphoscintigraphy and later the results were evaluated in the light of surgical findings and the clinical progress of the disease. The images of 14 patients were considered diagnostic and out of the 28 lymphatic chains imaged, 13 (46.4%) were considered to be normal, perfusion defect was observed in eight (28.6%) chains and seven (25%) chains were diagnosed as gap defect. The initial clinical assessment found 28 chains seven (25%) were positive and 21 (75%) negative. The results of the clinical assessment at 6 months or after radical neck dissection finally it was found that among 28 lymphatic chains; six (21%) were positive and 22 (70%) negative. There was no false negative case but nine (32%) false positive cases were reported by lymphoscintigraphy whereas the initial clinical diagnosis produced one (3.5%) false negative and two (7%) false positive cases (5). In this present study, there were 16 true positive cases and three false positive cases. Eleven true negative cases were recorded who were free from lymph node metastasis or lymphatic channel obstruction but no false negative case was found. In this study the calculated sensitivity was 100%, specificity 78.6%, accuracy 90%, positive predictive value 84.2% and negative predictive value 100%.

CONCLUSION

Lymphoscintigraphy was found a useful diagnostic tool for pre-operative detection of lymphatic spread of metastases in patients with oral cancer. This procedure will guide the surgeon in clinically neck node negative patients to plan the surgical procedure and thereby limiting the extent of dissection. Thereby the associated morbidity and complications from the overtreatment of elective neck dissection can be reduced.

REFERENCES

1. Jordan W (April 3, 2013) Oral Cancer. Retrieved from salt lake smiles. Website: https://www.saltlakesmiles.net/blog/post/oral-cancer.html
2. Choi S, Myers JN. Molecular pathogenesis of oral squamous cell carcinoma: implications for therapy. J Dent Res 2008;87:14–32.
3. Subapriya R, Thangavelu A, Mathavan B, Ramachandran CR, Nagini S. Assessment of risk factors for oral squamous cell

carcinoma in Chidambaram,Southern India: a case-control study. Eur J Cancer Prev 2007;16:251–6.

4. Noguti J, De Moura CF, De Jesus GP, Da Silva VH, Hossaka TA, Oshima CT, et al. Metastasis from oral cancer: an overview. Cancer Genomics Proteomics 2012;9(5):329-35.
5. Pathmanathan RS, Railton R. Lymphoscintigraphy in the detection of cervical metastases from oral carcinoma: a pilot study. Ann R Coll Surg Engl 1989;71(5): 281–4.
6. Vigili MG. Tartaglione G, Rahimi S, Mafera B, Pagan M. Lymphoscintigraphy and radioguided sentinel node biopsy in oral cavity squamous cell carcinoma: same day protocol. Eur Arch Otorhinolaryngol 2007;264(2,):163-7.
7. Hyde NC, Prvulovich E, Newman L, Waddington WA, Visvikis D, Ell P. A new approach to pre-treatment assessment of the N0 neck in oral squamous cell carcinoma: The role of sentinel node biopsy and positron emission tomography. Oral Oncol 2003;39:350–60.
8. Nieweg OE, Tanis PJ, Kroon BB. The definition of a sentinel node. Ann Surg Oncol 2001 Jul;8(6):538-41.