

COMPARISON OF ULTRASONOGRAPHY AND COMPUTED TOMOGRAPHY SCAN AND SENTINEL NODE LYMPHOSCINTIGRAPHY IN DIAGNOSIS OF METASTATIC CERVICAL LYMPH NODES IN PATIENTS WITH ORAL SQUAMOUS CELL CARCINOMA

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ABSTRACT

Aim: Considering the importance of early of lymph node metastasis, we determine sensitivity and specificity of diagnosis in staging of metastatic cervical lymph nodes using 3 methods including Ultrasonography, Computed Tomography (CT) scan and Sentinel Node Lymphoscintigraphy (SNL) in patients with oral squamous cell carcinoma (OSCC) referred to Shahid Beheshti Hospital Babol.

Materials & Method: This study was conducted on 15 patients with squamous cell carcinoma of the oral cavity underwent surgical resection. Clinical diagnosis of all cases was specified with the initial sampling. One week before the surgery 3 methods of Ultrasonography, CT scan and SNL were used for assessment of cervical lymph nodes status.

Results: During two years of study, 15 patients with squamous cell carcinoma of the oral cavity underwent surgery. Squamous cell carcinoma of the tongue is the most common cancer of oral cavity. Sensitivity of Ultrasonography and SNL in the diagnosis of metastatic cervical lymph nodes was 100 %. Specificity of Ultrasonography and CT scan was 70 %. It should also be noted that Ultrasonography has given diagnosis of inflammatory lymph nodes in 3 patients.

Conclusion: Based on the results, of the 3 diagnostic methods diagnostic value of Ultrasonography and SNL in the diagnosis of real patients (sensitivity) was 100 %. However Ultrasonography and CT scan are superior to SNL in the diagnosis of healthy people (specificity).

Key words: Oral Squamous Cell Carcinoma, Computed Tomography, Sentinel Node Lymphoscintigraphy, Sensitivity.

Introduction

Oral cavity and neck cancers are the sixth common malignancy in the world. This kind of cancer in the world is spreading differently, so that in some regions of Asia its prevalence is reported to be up to 50%.¹ Oral squamous cell carcinoma (SCC) after melanoma is the second most common skin cancer and also the second cause of death.² Available information suggests that this type of malignancy is increasing recently, but in the last 30 years, the survival rate of these patients has improved, so that at present, less than 50% of these patients die. Oral SCC forms 95% of oral malignancies, most of which are spread through cervical lymph nodes. Lymphatic drainage area of the oral cavity is divided into 5 groups:

- Level 1 (submandibular and submandibular lymph nodes)
- Level 2 (Lymph nodes of the upper third of jugular vein)
- Level 3 (Lymph nodes of the middle third of jugular vein)
- Level 4 (Lymph nodes of the lower third of the jugular vein)
- Level 5 (Lumbar nodes of the posterior triangle).

One of the most important factors in determining the five-year survival rate of patients is metastasis to lymph nodes at diagnosis. This problem is currently one of the biggest problems that many physicians are involved in, and the method of detecting lymph node involvement or non-involvement remains as a challenging topic.³⁻⁵ Proper and timely diagnosis of metastatic lymph nodes is important in the treatment plan and the measures before and after treatment. Commonly used diagnostic methods for staggering neck lymph nodes are clinical evaluation,

ultrasonography, CT scan and Magnetic Resonance Imaging (MRI) and Positron Emission Tomography (PET) scan.⁶ Sentinel Node Lymphoscintigraphy (SNL) is another diagnostic method. Many studies have recently investigated the sensitivity and specificity of this method in comparison with other methods.⁷ A glance at these studies suggests that the question of which method is more sensitive and specific has remained as a controversy. Therefore, we decided to compare the sensitivity and specificity of diagnosis in staging lymph nodes using three ultrasonographic methods, CT scan and SNL in patients with head and neck SCC referred to Shahid Beheshti Hospital Babol.

Materials & Method

Patients studied includes 15 patients with oral squamous cell carcinoma undergoing surgery at 2014-2014 and the clinical diagnosis of all cases identified by initial sampling. Written consents were taken from patients in the study. This study was also approved by the Ethics Committee of Babol University of Medical Sciences. Inclusion criteria included no history of surgery and radiotherapy in the neck, multiple head and neck carcinomas and exit criteria including history of surgery and radiotherapy in the neck, multiple-facial carcinoma of the head and neck. Three methods of para clinic CT scan, ultrasonography and Lymphoscintigraphy were used to study the presence or absence of cervical lymph nodes metastases. In a CT scan of lymph nodes of heterogeneous density, rounded shape, a size greater than 10 mm, irregular margin and invasion to surrounding structures, are considered as metastatic. In ultrasonography, lymph nodes with a size greater than 9-8 mm, rounded shape, asymmetric cortex, have echinacea focal regions in the cortex and nodular vesicularity with peripheral origin are considered as metastatic. In a Sentinel

Node Lymphoscintigraphy study based on the Oral SCC lymphatic drainage pathway, after the injection of TC-99 into the site of intra-oral lymph nodes, the leading nodes, which were identified, were considered as suspected to be metastasis. Finally, after the diagnosis, cervical lymph nodes were under investigation of histopathologic technique of gold standard in diagnosis of lymph node complex metastasis. The pathologist did not know the results of paraclonics before surgery. At the end, the results of the studies were compared with each other. Finally, the sensitivity and specificity of these methods were compared by comparing the results with the histopathologic findings of the extracted lymph nodes calculated by cervical dyskinesia. Data was analyzed using SPSS V.22 software. Chi-Square tests were used for qualitative variables. The diagnostic value of the variables was calculated using catmaker software. P value less than 0.05 was considered significant.

Results

During the two years of study, 15 patients with squamous cell carcinoma of the oral cavity underwent surgery. 9 patients (60%) were male and 6 patients (40%) were female. The location of the squamous cell carcinoma is shown in Figure 1. According to this chart, tongue is the most commonly organ involved with SCC.

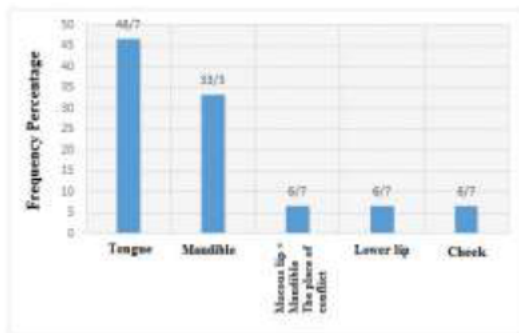


Figure 1: Distribution of the frequency percentage of SCC involvement among the patients studied

According to Table 1, 5 patients with pathology diagnosed with metastatic lymphedema diagnosed with ultrasonography and lymphocytic graft correctly diagnosed all 5 cases (100%) while CT scans were only 2 cases (40%) Correctly identified. Also, 10 cases that did not report metastatic lymph node pathology reported ultrasonography and CT scan correctly, each of which was 7 (70%).

Diagnosis of metastatic lymph node according to imaging methods	Diagnosis of metastatic lymph node based on pathology		p-value
	Yes (%)	No (%)	
Sonography	Yes	5 (100)	0.02
	No	-	
CT Scan	Yes	2 (40)	0.99
	No	3 (60)	
Lymphoscintigraphy	Yes	5 (100)	-
	No	-	

Table 1: Diagnosis of metastatic lymph node imaging methods based on pathology

The diagnostic accuracy of imaging methods in detecting metastatic cervical lymph nodes before surgery is discussed in Table 2. The sensitivity of ultrasonography and Lymphoscintigraphy to the pathology in the detection of lymph nodes is 100%. In other words, 100% sensitivity suggests that one in every 100 patients diagnosed with pathological metastatic cervical lymph nodes, ultrasonography and Lymphoscintigraphy detect all of the lymph nodes.

Imaging Methods	95% Confidence Interval Sensitivity	95% Confidence Interval Specificity	PPV* 95% Confidence Interval	NPV** 95% Confidence Interval	LR+ **** 95% Confidence Interval	LR- ***** 95% Confidence Interval
Sonography	100	70 42-98	63 29-96	100	3.33 1.29-8.59	-
CT Scan	40 3-83	70 42-98	40 3-83	70 42-98	1.33 0.32-5.58	0.86 0.38-1.95
Lymphoscintigraphy	100	-	33 9-57	-	1	-

* Positive predictive value; ** Negative predictive value; *** Positive exposure correlation; **** Negative exposure correlation

Table 2: Diagnostic value of ultrasonography, CT scan and Lymphoscintigraphy versus pathology

7 patients who did not have ultrasonography scan confirmed that lymph node involvement was consistent with the gold standard in this pathology study, with no lymph node involvement. Two patients diagnosed with metastatic lymph node-type ultrasonography at the IB level showed that the two cases had no metastatic lymph node. [Table 3] It should also be noted that in 3 of the patients, ultrasonography diagnosis was an inflammatory lymph node.

Lymph Nodes involved based on pathology	Ultrasonography Results					
	Lymph nodes were not involved	IB	III	I,II	I,II,IV	IB, II, III
Lymph nodes were not involved	7 (70)	2 (20)	-	-	1 (10)	-
I	-	-	-	2 (100)	-	-
III	-	-	1 (100)	-	-	-
I,II,III,IV	-	-	-	1 (100)	-	-
IB,II,III,IV	-	-	-	-	-	1 (100)

Table 3: Frequency distribution of pathologic differential ultrasonography results

Of the 2 pathologies diagnosed, lymph nodes involved in level I were diagnosed with CT scan correctly and the other is the lack of involvement of the lymph node. [Table 4]

Lymph Nodes involved based on pathology	CT Scan Results			
	Lymph nodes were not involved	I	II	III, IV, V
Lymph nodes were not involved	7 (70)	-	3 (30)	-
I	1 (50)	1 (50)	-	-
III	1 (100)	-	-	-
I,II,III,IV	-	-	-	1 (100)
IB,II,III,IV	1 (100)	-	-	-

Table 4: Frequency distribution of CT scan results divided pathological findings

Lymphoscintigraphy In this study, the only method of imaging was to detect all cases of lymph node involvement.

Of the 15 total cases, 10 cases of Lymphoscintigraphy detected by metastatic lymph nodes were based on pathological findings, they had no lymph node involvement. [Table 5]

Lymph Nodes involved based on pathology	Lymphoscintigraphy Results						
	I _B	I	II	III	I,II	I,II,III	II,IV
Lymph nodes were not involved	4 (40)	2 (20)	1 (10)	-	2 (20)	1 (10)	-
I	-	2 (100)	-	-	-	-	-
III	-	-	-	1 (100)	-	-	-
I,II,III,IV	-	-	-	-	-	-	1 (100)
IB,II,III,IV	-	-	1 (100)	-	-	-	-

Table 5: Frequency distribution of Lymphoscintigraphy results divided pathological findings

Discussion

In relation to the main objective of the study to compare the diagnostic methods of ultrasonography, CT scan and Lymphoscintigraphy, it was found that ultrasonography and lymphoscintigraphy methods have a high sensitivity in diagnosing metastatic neck lymph nodes in patients with cell carcinoma of oral cavity. However, as regards the characteristics of diagnostic methods, it should be stated that ultrasonography and CT scans have the same characteristics. However, the current study, along with a small number of other studies, is one of the few studies to compare the three diagnostic methods. One of the problems that has been plaguing in recent decades is for patients with cell carcinoma of oral cavity, timely diagnosis and treatment at the right time. Several studies have been conducted on diagnostic methods. The most important prognostic factor in survival of squamous cell carcinoma of the tongue, the presence of metastatic neck lymph nodes.

Conclusion

Based on the results obtained from the three diagnostic methods, the diagnostic value of ultrasonography and Lymphoscintigraphy is 100% in the diagnosis of true patients (sensitivity). But ultrasonography and CT scan in the diagnosis of healthy subjects (specificity) are superior to Lymphoscintigraphy.

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