Clinical Utility of 18F-FDG PET-CT and CT/MRI for Detecting Nodal Metastasis in Oropharyngeal Squamous Cell Carcinoma Patients with N0 Neck

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Directed by Professor Jinna Kim

The Master's Thesis
submitted to the Department of Medicine,
the Graduate School of Yonsei University
in partial fulfillment of the requirements for the degree
of Master of Medical Science

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December 2013

This certifies that the Master's Thesis of Beomseok Sohn is approved.

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December 2013

ACKNOWLEDGEMENTS

I acknowledge my deep gratitude to Professor Jinna Kim, who is my thesis director, for supporting my efforts with total commitment and facilitating every step of the process. My appreciation for her guidance and encouragement is tremendous. I am also indebted to Professor Yoon Woo Koh and Won Jun Kang, for their help for pertinent advice to assure the superior quality of this paper. Additionally, I am grateful to Jung Hwa Hong and Dong Wook Kim, (Biostatistics Collaboration Unit, Yonsei University College of Medicine, Seoul, Korea) for their help with the statistical support.

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ABSTRACT

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PURPOSE: To investigate the clinical utility of [18F]fluorodeoxyglucose positron emission tomography-computed tomography ([18F]FDG PET-CT) compared with CT or magnetic resonance imaging (MRI) for detecting nodal metastasis in oropharyngeal squamous cell carcinoma (SCC) patients with N0 neck and to investigate whether various pretreatment imaging modalities support the rationale for elective neck treatment in patients with oropharyngeal SCC.

MATERIALS AND METHODS: A total of 49 patients with clinically negative (N0) neck (42 men and 7 women; average age, 59.1 years) underwent primary tumor resection and neck dissection as a primary treatment. All patients were preoperatively evaluated with PET-CT and CT/MRI, and the diagnostic accuracy of each imaging modality was assessed by correlation with histopathologic results of the surgical specimen.

RESULTS: Twenty-five (51.0%) of our 49 patients were found to have neck metastases. On a level-by-level analysis, the sensitivity of PET-CT, CT/MRI, and a combination of PET-CT and CT/MRI was 54.6%, 54.6%, and 60.6%, respectively, at all neck levels. False negative results were found in 15 (9.3%) of 162 neck levels on each of PET-CT and CT/MRI. On a patient-by-patient analysis, the sensitivity of PET-CT for neck metastases was 64.0% and increased slightly to 68.0% after combined interpretation with CT/MRI.

CONCLUSION: Addition of PET-CT examination to CT/MRI was found to be helpful for detecting nodal metastasis in the preoperative evaluation of patients with oropharyngeal SCC and N0 neck. However, PET-CT with CT/MRI showed still low sensitivity in the assessment of nodal metastasis in clinically N0 neck; therefore, preoperative imaging modalities may not abrogate the need for elective neck management in these patients.

Key words : oropharyngeal carcinoma, neck node metastasis, CT, MRI, PET-CT

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I. INTRODUCTION

The presence of cervical node metastasis is one of the most significant prognostic factors in patients with oropharyngeal squamous cell carcinoma (SCC), reducing predicted patient survival by nearly 50% [1,2].

Treatment of the clinically negative (N0) neck is an important issue in all head and neck SCCs. Because approximately 15% of N0 necks eventually develop metastatic disease, it is extremely important to identify such cases of oropharyngeal SCC and to perform prophylactic treatment at initial presentation [1,3-5]. Therefore, patients at risk of nodal metastases usually undergo an elective neck treatment, either neck dissection or radiotherapy.

Currently, computed tomography (CT) or magnetic resonance imaging (MRI) is widely used for preoperative assessment of primary tumor and cervical nodes in patients with head and neck cancer. However, several collective studies have reported that CT and MRI might be of limited value for accurate staging of cervical lymph nodes in head and neck cancer, and there is controversy regarding their clinical implications [1,6-8]. In addition, functional imaging with [^{18}F]fluorodeoxyglucose (FDG) positron emission tomography (PET) or PET-CT has also frequently been used in tumor staging and treatment planning of patients with head and neck SCC and has shown a tendency to be more accurate than CT/MRI in identifying cervical nodal metastases in several studies [9-13].

However, previous studies consisted of tumors with heterogeneous primary sites of the head and neck, although head and neck cancer shows quite variable clinical manifestations and different prognosis according to the primary site [8,13,14]. In addition, these studies have reported a large range of sensitivities and specificities of imaging modalities [15,16], and there is little information in the literature regarding the correlation of histopathologic analysis following neck dissection with imaging results in oropharyngeal SCC. Thus, the routine application of these imaging techniques has been a subject of debate, and there are no guidelines about the use of preoperative imaging studies for the management of head and neck cancer patients [16,17].

Therefore, the aims of our study were to correlate CT/MRI and [^{18}F]FDG PET-CT results of cervical nodal metastasis with histopathology for the preoperative evaluation of oropharyngeal SCC patients with N0 neck and to investigate whether various pretreatment imaging modalities support the rationale for elective neck treatment in patients with oropharyngeal SCC.

II. MATERIALS AND METHODS

1. Patients

We retrospectively reviewed 118 consecutive patients with pathologically diagnosed oropharyngeal SCC who were surgically treated at a single institution from January 2006 to December 2012. This study was approved by the Institutional Review Board of our hospital, and the requirement to obtain informed consent was waived. Among these patients, a total of 49 patients with clinically negative neck were enrolled in our study (42 men and 7 women; average age 59.1 years, range 31 to 85 years). All patients underwent primary tumor resection and neck dissection as a primary treatment. Patients with a history of prior treatment to the head and neck region, known distant metastasis, or second primary tumors were excluded. Among our 49 patients with clinical N0, the tumors originated from the following sites: tonsil (n = 29; 59.2%), base of tongue (n = 16; 32.7%), posterior pharyngeal wall (n = 3; 6.1%), and soft palate (n = 1; 2.0%). Sixteen patients (32.7%) had a tumor stage of T1, 23 patients (46.9%) had stage T2, 6 patients (12.2%) had stage T3, and 4 patients (8.2%) had stage T4. Preoperative imaging evaluation was accomplished within 2 weeks before surgery. All 49 patients were imaged using PET-CT; 42 patients also received both CT and MRI, and the remaining 7 received either CT or MRI.

2. Image acquisition

Contrast material-enhanced CT examinations were performed with one of two CT scanners (Somatom Sensation 16 or 64; Siemens, Erlangen, Germany) using a standard CT protocol for the neck. Contiguous 3-mm scans of the neck were acquired in the axial plane from the skull base to the carina, and then coronal images were reformatted at 2- to 3-mm increments. A total of 80-100 mL of contrast medium, iopromide (Ultravist 300; Bayer Schering Pharma, Berlin, Germany), was administered intravenously at 3 mL/s using an automated injector. Contrast-enhanced images were obtained 40–60 seconds after the initiation of contrast agent administration.

MRI was performed with a 1.5-T or 3.0-T magnet (Intera or Achieva; Philips Medical Systems, Best, the Netherlands) and a head and neck coil. Conventional MR imaging consisting of axial spin-echo (SE) T1-weighted and fat-saturated fast SE T2-weighted imaging was performed according to our routine protocol for the head and neck area with a TR/TE of 560/10 and 6480/70, respectively. All images were obtained with a 22-25 cm field of view and a section thickness of 3-5 mm. Gadopentetate dimeglumine (Magnevist; Bayer Schering Pharma, Berlin, Germany) was then administered intravenously at a dose of 0.2 mL/kg body weight and a rate of 2 mL/sec. Forty seconds after administering contrast material, fat-saturated axial and coronal SE T1-weighted images were obtained sequentially.

[18]F]FDG PET-CT images were acquired with a PET-CT unit (Discovery STE; GE Healthcare, Milwaukee, WI, USA or Biograph TruePoint 40; Siemens Medical Solutions, Malvern, PA, USA). All patients fasted for at least 6 hours before imaging, and the glucose level in peripheral blood was confirmed to be 140 mg/dL or less before FDG injection. A FDG dose of approximately 5.5 MBq/kg of body weight was administered intravenously 1 hour before image acquisition. After the initial low-dose CT study (Discovery STE, 30 mA, 130 kVp or Biograph TruePoint, 36 mA, 120 kVp), a standard PET protocol was used to scan from the neck to the proximal thighs with an acquisition time of 3 minutes per bed position in the three-dimensional mode. Images were reconstructed using ordered subset expectation maximization (2 iterations, 20 subsets).

3. Image interpretation

For correlative analysis of nodal staging of PET-CT, CT/MRI, and histopathologic examinations, the neck was divided into levels based on the imaging-based nodal classification [18]. Level-by-level and patient-by-patient analyses were performed for each imaging modality.

CT and MRI were interpreted in a blinded fashion by two head and neck radiologists, and any disagreement was resolved by consensus. Nodes were considered metastatic when one of the following criteria was fulfilled: shortest axial diameter >11 mm in the jugulodigastric region or >10 mm in other cervical regions, round shape (length/width <2), central necrosis, absence of fatty hilum or hilar vessel enhancement, or grouping of three or more nodes of borderline size.

[^{18}F]FDG PET-CT images were interpreted at interactive workstations by two nuclear medicine physicians and any equivocal case was resolved by consensus. Readers were blinded to the results of the other imaging modalities and to pathologic results at the time of review. Image interpretation was based on visual and semiquantitative analysis using the attenuation-corrected PET emission images. For visual analysis, any focal FDG uptake greater than background activity and corresponding to nodular structures on CT, regardless of lymph node size, was considered abnormal. For semiquantitative analysis, a region of interest (ROI) was drawn for the lymph node of focal FDG uptake on the transverse section. The intensity of focal FDG uptake was expressed as the maximum standardized uptake value (SUVmax), corrected for the injected radioactivity and patient body weight. Only hypermetabolic lesions with strong focal uptake (SUVmax $\geq$2.5) were considered malignant.

4. Surgery and histopathology

We used histopathologic results after neck dissection as the gold standard for assessing the diagnostic performance of each image modality. The neck dissection was either elective or therapeutic, based on the absence or presence of clinically metastatic lymph nodes, respectively, and included 16 elective ipsilateral, 11 elective bilateral, 12 ipsilateral therapeutic, and 10 ipsilateral therapeutic and contralateral elective procedures. The lymph nodes were dissected and labeled by the surgeons according to the imaging-based nodal classification [18] and stained with hematoxylin and eosin for histologic analysis.

5. Statistical analysis

For the combined interpretation of PET-CT with CT/MRI, a lymph node suspicious for positivity on CT/MRI or PET-CT was deemed positive. Statistical analyses were performed using the Statistical Analysis System (version 9.2, SAS Institute Inc.; Cary, NC, USA). We used a logistic regression model with a generalized estimating equation method to compare the dependent diagnostic performance and area under the curve (AUC) between the imaging modalities in clinically N0 patients. The Delong method was used to compare receiver operating characteristic (ROC) curves. Continuous variables were presented as mean and standard deviation. All tests were two-sided. P values <0.05 were considered statistically significant.

III. RESULTS

Nineteen patients underwent bilateral neck dissection and 30 patients underwent unilateral neck dissection. Of the 162 neck levels (1,858 nodes) resected in all 49 patients, 33 neck levels (62 nodes) in 25 patients (51.0%) contained metastatic disease. Among the 33 affected neck levels, 24 (72.7%)

occurred at the ipsilateral level II, 8 (24.2%) at the ipsilateral level III, and one (3.0%) at the ipsilateral level IV.

The results of CT/MRI, [^{18}F]FDG PET-CT, and combined interpretation of CT/MRI and [^{18}F]FDG PET-CT in identifying metastatic neck nodes of our patients are listed in Table 1.

Table 1. Diagnostic performance of CT/MRI, [^{18}F]FDG PET-CT, and their combined interpretation for detecting nodal metastasis in oropharyngeal SCC patients with clinically negative neck (N = 49)

	TP (No.)	TN (No.)	FP (No.)	FN (No.)	Sensitivity		Specificity		Accuracy		PPV		NPV	
					%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
All neck levels (n=162)														
CT/MRI	18	123	6	15	54.6	37.6-71.5	95.4	91.7-98.9	87.0	81.9-92.2	75.0	57.7-92.3	89.1	83.9-94.3
[^{18}F]FDG PET-CT	18	127	2	15	54.6	37.6-71.5	98.5	96.3-100.6	89.5	84.8-94.2	90.0	76.9-103.2	89.4	84.4-94.5
CT/MRI + [^{18}F]FDG PET-CT	20	123	6	13	60.6	43.9-77.3	95.4	91.7-99.0	88.3	83.3-93.2	76.9	60.7-93.1	90.4	85.5-95.4
Patients (n=49)														
CT/MRI	15	19	5	10	60.0	40.8-79.2	79.2	62.9-95.4	69.4	56.5-82.3	75.0	56.0-93.9	65.5	48.2-82.8
[^{18}F]FDG PET-CT	16	22	2	9	64.0	45.2-82.8	91.7	80.6-102.7	77.6	65.9-89.2	88.9	74.4-103.4	71.0	54.9-86.9
CT/MRI + [^{18}F]FDG PET-CT	17	19	5	8	68.0	49.7-86.3	79.2	62.9-95.4	73.5	61.1-85.8	77.3	59.7-94.8	70.4	53.2-87.6

On a level-by-level basis, there was no difference between the sensitivities of PET-CT and CT/MRI, and the specificity and PPV of PET-CT were significantly higher than those of CT/MRI (98.5% vs. 91.7%, respectively; P = 0.046; 90.0% vs. 75.0%, respectively; P = 0.049) in total neck levels. Combined interpretation of CT/MRI and PET-CT yielded modestly higher sensitivity than either imaging modality alone (60.6% vs. 54.6%, *P* = 0.158). However, the specificity of the combined interpretation of CT/MRI and PET-CT was significantly lower than that of PET/CT alone (95.4% vs. 98.5%, *P* = 0.046).

The area under the ROC showed that the diagnostic performance of the combined interpretation was better than that of CT/MRI alone (0.780 vs. 0.750, respectively; P = 0.158) and PET-CT alone (0.780 vs. 0.765, respectively; P = 0.501) but without statistical significance.

CT/MRI findings were positive in 24 neck levels, of which 18 were true positives and 6 were false positives (5 in level II and 1 in level IV). Among the 6 false positive levels on CT/MRI, PET-CT showed true negative findings in 4. On the other hand, PET-CT showed positive findings in 18 neck levels, of which 16 were true positives and 2 were false positives (all in level II). All false-positive PET-CT results were caused by reactive or inflammatory nodes.

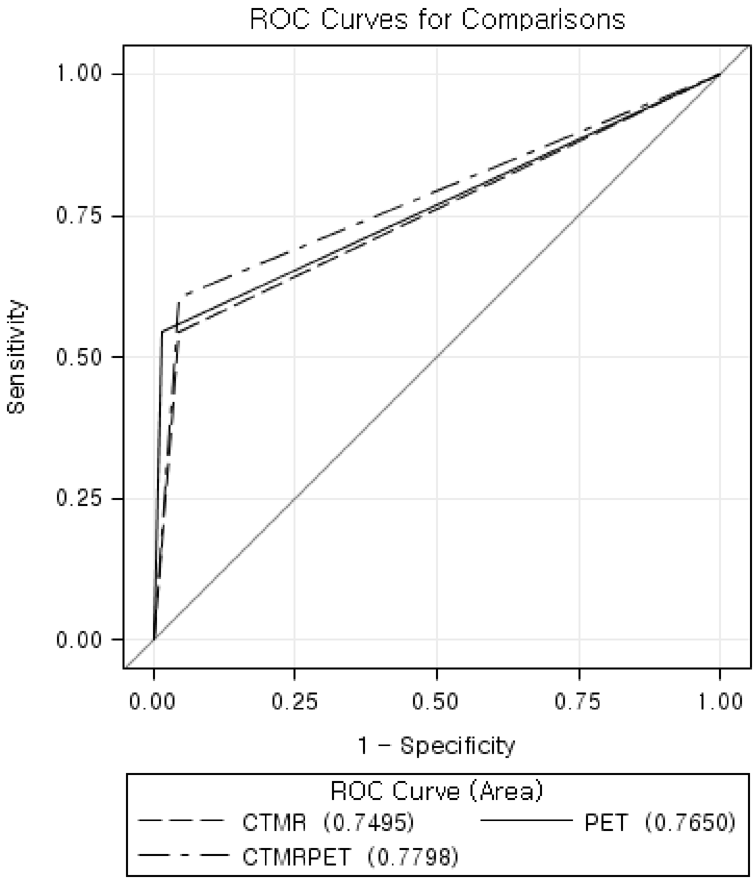

Figure 1. ROC curve shows that the diagnostic performance of the combined interpretation is slightly better than that of CT/MRI alone or PET-CT alone for detecting nodal metastasis in oropharyngeal SCC patients.

CT/MRI and PET-CT each showed false negative findings in 15 levels. The mean size of microscopic intranodal tumor deposits of the PET-CT false-negative nodes was significantly (78.7%) smaller than that of PET-CT true-positive nodes (4.0 vs. 18.8 mm, respectively; P <0.01). Of the 15 neck levels where PET-CT showed false negativity for metastatic neck disease, CT/MRI showed true-positive findings at 2 levels that harbored metastatic nodes with central necrosis.

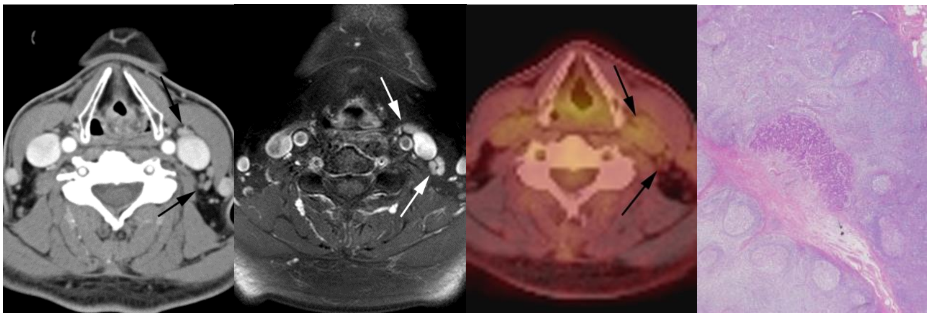

Figure 2. (A) Contrast-enhanced CT and (B) contrast-enhanced fat-suppressed T1-weighted MR images show a few elongated nodes in left level III (arrows), falsely suggesting benign nodes based on size. (C) PET-CT shows a false-negative finding in the corresponding area (arrows). (D) Intranodal tumor deposit measuring 3 mm in maximal dimension (arrows) was confirmed by histopathologic examination (hematoxylin and eosin).

On a patient-by-patient basis, the sensitivity, specificity, and accuracy of [^{18}F]FDG PET-CT for neck metastasis were slightly higher than those of CT/MRI (64.0% vs. 60.0%, respectively, *P* = 0.564; 91.7% vs. 79.2%, respectively, *P* = 0.084; and 77.6% vs. 69.4%, respectively, *P* = 0.103). Combined interpretation of CT/MRI and PET-CT also yielded slightly higher sensitivity than PET/CT alone (68.0% vs. 64.0%, P = 0.318) and CT/MRI alone (68.0% vs. 60.0%, P = 0.158), but the specificity of the combined interpretation of CT/MRI and PET-CT was lower than that of PET-CT alone (79.2% vs. 91.7%, P = 0.251).

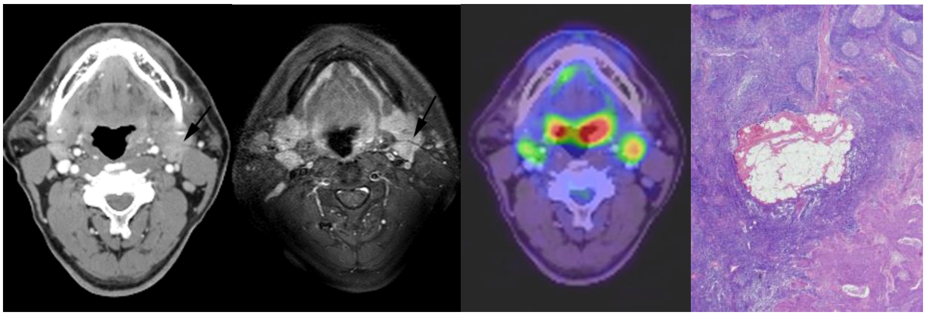

Figure 3. (A) Contrast-enhanced CT and (B) contrast-enhanced fat-suppressed T1-weighted MR images show an oval node in left level II (arrows), falsely suggesting a benign node by its borderline size and hilar vessel enhancement. (C) PET-CT shows a true-positive finding, as indicated by asymmetric strong FDG uptake. (D) Metastatic carcinoma measuring 9 mm in maximal dimension (arrows) was confirmed by histopathologic examination (hematoxylin and eosin).

The risk of occult neck metastasis and false negative results on imaging according to each T stage is shown in Table 2. Among the 25 patients with pathologically positive nodes, the frequency of palpably occult neck metastasis showed an increasing trend according to the T stage (50.0% in T1, 43.5% in T2, 66.7% in T3, 75% in T4). The number of patients with false-negative results for identifying metastatic cervical nodes on CT/MRI, PET-CT, or their combination was 9 (18.4%), 10 (20.4%), and 8 (16.3%) respectively among our 49 patients. In addition, the false-negative rates of CT/MRI, PET-CT, and their combination were each 50.0% among the 4 patients with T4 tumor, much higher than in other T stages.

Table 2. Risk of occult neck metastasis on imaging studies according to the tumor stage of oropharyngeal SCC patients with palpably negative neck

Tumor Stage	No. of Patients	Pathologic Neck-Positive Patients	False Negative Results on Imaging		
			[^{18}F]FDG PET-CT	CT/MRI	CT/MRI + [^{18}F]FDG PET-CT
		No. (%)	No. (%)	No. (%)	No. (%)
T1	16	8 (50.0)	2 (12.5)	2 (12.5)	2 (12.5)
T2	23	10 (43.5)	4 (17.4)	5 (19.2)	4 (17.4)
T3	6	4 (66.7)	1 (16.7)	1 (16.7)	0 (0)
T4	4	3 (75.0)	2 (50.0)	2 (50.0)	2 (50.0)
Total	49	25 (51.0)	9 (18.4)	10 (20.4)	8 (16.3)

IV. DISCUSSION

This is the first correlation study of imaging interpretation results for cervical nodal metastasis with histopathology in patients with oropharyngeal

SCC and N0 neck who underwent neck dissection as a primary elective neck treatment. With the recent development of imaging techniques, clinically "occult" lymph node metastasis might include normal-appearing lymph nodes on imaging as well as non-palpable lymph nodes on clinical palpation. In our study, more than half of the patients (25 of 49 patients, 51.0%) with negative neck on clinical palpation subsequently revealed cervical nodal metastases after surgery, and 16-20% of the patients had "occult" lymph nodes on histopathologic analysis despite negative results on preoperative imaging. This indicates that current imaging method should change the concept of "occult lymph node metastasis" and possibly decrease the percentage of lymph nodes that should be treated but are currently missed preoperatively.

In patients with head and neck SCC, treatment polices for the clinically negative neck have been determined by considering the probability of nodal metastasis, although the proper management remains controversial. Thus, if the risk of occult neck metastasis is judged to be greater than 15-20%, elective neck treatment such as selective neck dissection or irradiation should be considered as a standard strategy [19,20]. However, the disadvantage of this strategy is that many patients who do not harbor metastases undergo unnecessary treatment with additional costs and morbidity. We hoped that currently available imaging techniques would be able to detect all of the nodal metastasis missed by physical examination of cancer patients before treatment. However, our study showed that CT/MRI and [^{18}F]FDG PET-CT could not provide satisfactory sensitivity (less than 70%) for the evaluation of cervical nodal metastasis in patients with oropharyngeal SCC on a patient-by-patient basis or on a level-by-level basis. In addition, these techniques showed a relatively high false negative rate, which is an unacceptable diagnostic performance in clinical practice. This means that, despite complete preoperative imaging evaluation, patients with oropharyngeal cancer cannot avoid the well-established elective neck treatment. Furthermore, in addition to the trend for increased frequency of palpably occult neck metastasis according to the T stage (ranging from 43.5% to 75.0%), patients with T4 stage cancer also showed much higher false-negative rates (reaching approximately 50%) on CT/MRI and PET-CT than those with other stages, suggesting that neck treatment should be mandatory, especially in patients with higher stage oropharyngeal cancer.

Ng et al. investigated 134 patients with oral cavity SCC and clinical N0 and found that 35 (26.1%) patients had occult neck metastases on histopathologic analysis after neck dissection [21]. We found that a much higher percentage (51.0%, 25/49 patients) of patients with oropharyngeal cancer and clinical N0 had metastastic cervical nodes, suggesting that these two tumors are different disease entities, with quite different nodal presentation and prognosis according to the primary site. Therefore, we also have to recognize that more aggressive treatment strategies for the neck should be applied in oropharyngeal SCC patients because they show a higher tendency for occult neck metastases even after imaging evaluation. Furthermore, from the radiologist's perspective, imaging evaluation of oropharyngeal SCC patients is more challenging, and a higher sensitivity and lower false negative rate are needed for imaging evaluation of cervical lymph nodes in such patients.

In our patient group, occult metastases occurred predominantly at ipsilateral neck level II and III, accounting for 96.9% of cases, and were rarely found at level IV (3.0%). There was no occult metastasis at level I or V or in the contralateral neck. In addition, with the exception of one case, all false negative and false positive results were obtained at ipsilateral neck levels II and III. Detection of cervical lymph nodes based only on size criteria and SUVmax is not easy at levels II and III because these are the primary drainage nodes for the upper aerodigestive tract. In our study, as reported previously, false-positive PET results were predominantly due to the inherent inability of PET to differentiate some inflammatory processes from tumor infiltration. Moreover, the mean dimension of tumor deposits of true positive and false negative cases on PET-CT was 18.8 mm and 4.0 mm, respectively, which suggests that decreased sensitivity caused by small intranodal tumor deposits rather than tumor necrosis is the main diagnostic dilemma on both CT/MRI and PET-CT. Therefore, although recent imaging studies have shown high diagnostic performance, it is important for radiologists to recognize that the pretreatment imaging evaluation of nodal metastasis in oropharyngeal cancer patients has limited value.

Our results showed that PET-CT was slightly more sensitive than CT/MRI for detecting cervical nodal metastasis of oropharyngeal SCC patients with palpably negative neck on patient-by-patient analysis. In addition, we analyzed whether the combination of PET-CT with CT/MRI yields an additional benefit in diagnostic performance for detecting subclinical neck metastases because this consideration is more clinically relevant. In our study, the combined interpretation of PET-CT with CT/MRI showed a slightly higher sensitivity than PET-CT alone and CT/MRI alone; however, this improvement was not statistically significant. We believe that the combined interpretation showed higher sensitivity but lower specificity than CT/MRI or PET-CT alone because we considered a result to be positive when the lymph node was suspicious for positivity on only one of the two imaging methods. To avoid missing a patient who needs elective treatment, especially in oropharyngeal cancer patient with N0 neck, we need to detect subclinical nodal metastases and make a deliberate effort to achieve high sensitivity, even at the possible expense of lower specificity. Therefore, although our data do not support the routine use of PET-CT for the preoperative evaluation of lymph nodes in oropharyngeal cancer patients, a combination of PET-CT with anatomic imaging could play an additional role and might be selectively used for patients with N0 neck.

This study has several limitations. First, it included only 49 oropharyngeal cancer patients with clinical N0, and further study with a larger number of patients is needed. Second, we analyzed lymph node metastasis on a neck level basis and did not perform a node-by-node analysis. We cannot be completely sure that suspected metastatic nodes depicted on imaging exactly matched the same node in the neck dissection, but we believe that this limitation did not significantly affect the diagnostic accuracy of imaging. Lastly, we did not include follow-up results such as nodal recurrence after surgery and clinical outcome to support the necessity of elective neck treatment, which might reveal additional false negative cases.

V. CONCLUSION

In conclusion, the addition of PET-CT examination to CT/MRI was found to be beneficial for the detection of metastatic lymph nodes during the preoperative evaluation of oropharyngeal SCC patients with N0 neck. However, as it was unable to provide accurate prediction and reduce the risk of occult neck metastasis to less than 20%, neck treatment should still be mandatory in clinical N0 oropharyngeal SCC patients.

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ABSTRACT(IN KOREAN)

경부 림프절 0기 구인두 편평상피세포암종 환자에서 림프절 전이의 발견에 대한 컴퓨터 단층촬영/자기공명영상과 양전자방출 단층촬영술-컴퓨터 단층촬영의 임상적 유용성

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목적: 임상적으로 경부 림프절 병기가 0기인 구인두 편평상피세포암종 환자에서 림프절 전이를 발견하는데 있어 양전자방출 단층촬영술-컴퓨터 단층촬영의 임상적 유용성을 컴퓨터 단층촬영 또는 자기공명영상과 비교하고, 여러 종류의 치료 전 영상 검사들이 구인두 편평상피세포암종 환자에 대한 선택적 경부 치료의 시행을 지지할 수 있는지 평가한다.

대상 및 방법: 총 49명의 임상적으로 경부 림프절 병기가 0기인 환자들 (42명의 남환과 7명의 여환; 평균 59.1세)이 일차 치료로서 구인두 종양 절제와 경부 림프절 곽청술을 시행 받았다. 모든 환자들은 수술 전에 양전자방출 단층촬영술-컴퓨터 단층촬영과

컴퓨터 단층촬영/자기공명영상을 시행 받았으며, 각 영상검사들의 진단적 정확도를 수술 검체의 병리결과와 비교하여 평가하였다.

결과: 총 49명의 환자 중 25명(51.0%)에서 경부 림프절 전이가 발견되었다. 모든 경부 림프절 층에 대한 층별 분석에서, 양전자방출 단층촬영술-컴퓨터 단층촬영의 림프절 전이 진단에 대한 민감도는 54.6% 였고, 컴퓨터 단층촬영/자기공명영상은 54.6%, 컴퓨터 단층촬영/자기공명영상과 양전자방출 단층촬영술-컴퓨터 단층촬영을 함께 조합한 경우에는 60.6%의 민감도를 보였다. 전체 162개의 경부 림프절 층 중에서 컴퓨터 단층촬영/자기공명영상과 양전자방출 단층촬영술-컴퓨터 단층촬영이 각각 15개 층(9.3%) 에서 위음성을 보였다. 환자별 분석에서는, 양전자방출 단층촬영술-컴퓨터 단층촬영이 경부 림프절 전이를 진단하는데 64.0%의 민감도를 보였으며, 컴퓨터 단층촬영/자기공명영상과 조합할 경우에는 민감도가 68.0%로 약간 상승하는 결과를 보였다.

결론: 임상적으로 림프절 병기 0기인 구인두 편평상피세포암종 환자에서 림프절 전이를 평가하고자 할 경우에 컴퓨터 단층촬영/자기공명영상과 함께 양전자방출 단층촬영술-컴퓨터 단층촬영을 시행하는 것이 도움이 된다. 그러나, 양전자방출

단층촬영술-컴퓨터 단층촬영과 컴퓨터 단층촬영/자기공명영상 모두 임상적 림프절 병기 0기에서의 림프절 전이 진단에 있어서 낮은 민감도를 보이므로, 이와 같은 환자군에서 선택적 경부 치료를 생략하기는 어려울 것으로 판단된다.

핵심되는 말: 구인두 편평상피세포암종, 경부 림프절 전이, 컴퓨터 단층촬영, 자기공명영상, 양전자방출 단층촬영술