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Original Article

Colonoscopic and Histopathological Evaluation of Incidental Colonic FDG Uptake on PET/CT

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ABSTRACT

Objective: This study aimed to evaluate the colonoscopic and histopathological findings in patients with incidental focal colonic FDG uptake detected on PET/CT and to investigate the correlation between PET/CT findings and colonoscopy results.

Methods: We retrospectively analyzed 37 patients (22 males, 15 females; mean age 64.2±9.5 years) who underwent colonoscopy within 6 weeks after detection of incidental focal colonic FDG uptake on PET/CT between January 2019 and March 2025. Patient demographics, PET/CT indications, localization of uptake, SUVmax values, and colonoscopy findings were recorded. Colonoscopy findings were classified according to histopathological results.

Results: The most common PET/CT indications were gastrointestinal malignancies (27.0%), lung cancer (24.3%), and gynecological cancer (18.9%). The mean SUVmax value was 10.2±4.9. Colonoscopic evaluation revealed malignant lesions in 9 patients (24.3%), adenomas in 16 patients (43.2%), and normal/benign findings in 12 patients (32.4%). Malignant lesions included adenocarcinoma (18.9%), non-Hodgkin's lymphoma (2.7%), and neuroendocrine tumor (2.7%). Among adenomas, tubular (18.9%), tubulovillous (13.5%), villous (5.4%), and serrated (5.4%) types were identified. The mean SUVmax value was significantly higher in patients with malignant lesions (13.5±5.1) compared to those with adenomas (8.6±3.5) and normal findings (6.1±2.3) ($p<0.001$). The correlation between PET/CT localization and colonoscopic findings was 100% for malignant lesions and 81.2% for adenomas.

Conclusion: Incidental focal colonic FDG uptake on PET/CT warrants colonoscopic evaluation as a significant proportion of these patients have malignant or premalignant lesions. Higher SUVmax values are associated with an increased risk of malignancy.

INTRODUCTION

18F-fluorodeoxyglucose Positron Emission Tomography/Computed Tomography (18F-FDG PET/CT) is a widely used imaging method worldwide for the diagnosis, staging, treatment response evaluation, and recurrence detection of oncological diseases.[1] Radioactively labeled glucose accumulates in tissues with increased metabolic activity, and this accumulation is observed as increased FDG uptake in PET imaging. Due to the increased metabolic activity in malignant cells, FDG uptake is increased in tumoral tissues, and this characteristic provides a diagnostic advantage in oncological imaging.[2]

Colorectal cancers (CRC) are the third most common cancer type worldwide and rank second in cancer-related deaths.[3] Early diagnosis and treatment significantly increase survival rates in CRC. Incidental colonic FDG uptake detected during PET/CT examinations performed for various reasons is reported in the literature at a rate of 1.95% - 2%.[4,5] These uptakes may represent various inflammatory pathologies such as malignancy and adenomas, inflammatory bowel disease, diverticulitis, infection, or physiological uptake may also be observed.

Studies in the literature have reported that patients with focal FDG uptake are more likely to have premalignant lesions such as malignancy or adenomatous polyps detected

during colonoscopic evaluation.[5] Therefore, colonoscopic evaluation is recommended for patients with incidental colonic FDG uptake on PET/CT.

In this study, we aimed to evaluate colonoscopic findings, correlation of PET/CT and colonoscopy findings, and investigate their clinical significance in patients who underwent PET/CT imaging for different indications and were found to have incidental focal colonic FDG uptake.

MATERIALS AND METHODS

Patients aged 18 years and older who had incidental focal colonic FDG uptake on PET/CT, underwent colonoscopic evaluation within 6 weeks after PET/CT, and had histopathological diagnosis from lesions detected during colonoscopy between January 2019 and March 2025 were included in the study. The demographic characteristics of the patients, PET/CT indications, localization, SUVmax values, and colonoscopy results were retrospectively screened and recorded. Patient data were obtained from the hospital information system.

All patients underwent total colonoscopy following standard bowel preparation after the detection of colonic FDG uptake on PET/CT. In patients where optimal examination could not be performed due to inadequate cleansing, the procedure was repeated, and findings under optimal cleansing were recorded. All lesions detected during colonoscopy were sampled by biopsy, and histopathological examination was performed on these lesions. Colonoscopy findings were classified as malignant/premalignant lesions and normal findings according to histopathological results.

Patients with a known history of colorectal cancer who underwent PET/CT for follow-up, patients who did not undergo colonoscopic evaluation despite colonic FDG uptake being indicated in the PET/CT report and/or whose colonoscopy results could not be accessed (n=7), and patients who showed diffuse colonic FDG uptake without focal uptake (n=3) were excluded from the study.

Data analysis was performed using SPSS 25.0 (IBM Corp., Armonk, NY, USA) program. Categorical data were presented as numbers and percentages, and continuous data as mean ± standard deviation. Mann-Whitney U test was used to evaluate the relationship between SUVmax values and colonoscopy findings. P value <0.05 was considered statistically significant.

Our study was approved by the our hospitals Ethics Committee with the file number 159/2025 and it is complied with the Declaration of Helsinki.

RESULTS

Of the 37 patients included in the study, 22 (59.5%) were male and 15 (40.5%) were female, with a mean age of 64.2±9.5 (range: 45-82). The mean time between PET/CT imaging and colonoscopy was determined as 19.4±7.54 days (range: 8-37). The indications for PET/CT of the patients are shown in Table 1. The most common indications were gastrointestinal system malignancy (29.7%), lung cancer (24.3%), and gynecological cancer (18.9%).

Colonic FDG uptake was observed in a focal pattern in all patients. The localization of FDG uptake was detected as cecum/ascending colon in 6 patients (16.2%), transverse colon in 8 patients (21.6%), splenic flexure/descending colon in 4 patients (10.8%), sigmoid colon in 14 patients (37.8%), and rectum in 5 patients (13.5%). The mean SUVmax value was 10.2±4.9 (range: 4.8-23.5).

As a result of colonoscopic evaluation, malignant lesions were detected in 9 patients (24.3%), adenomas in 16 patients (43.2%), and normal/benign findings in 12 patients (32.4%). The distribution of malignant lesions was as follows: 7 adenocarcinomas (18.9%), 1 non-Hodgkin lymphoma (2.7%), and 1 neuroendocrine tumor (2.7%). When the histological subtypes of adenomas were examined, they were found to be 7 tubular adenomas (18.9%), 5 tubulovillous adenomas (13.5%), 2 villous adenomas (5.4%), and 2 serrated adenomas (5.4%).

The relationship between SUVmax values and colonoscopy findings is shown in Table 2. The mean SUVmax value in patients with malignant lesions (13.5±5.1) was significantly higher than in patients with adenomas (8.6±3.5) and patients with normal colonoscopic findings (6.1±2.3) ($p<0.001$).

When SUVmax values were examined according to the histological subtypes of adenomas, the mean SUVmax value was found to be 10.4±3.8 in villous adenomas, 9.1±3.3 in tubulovillous adenomas, 8.2±2.9 in serrated adenomas, and 7.5±2.6 in tubular adenomas.

In patients with malignant lesions, 100% (9/9) concordance

Table 1. PET/CT indications of patients

Indication	n (%)
GI malignancy	10 (27.0)
Lung cancer	9 (24.3)
Gynecological cancer	7 (18.9)
Breast cancer	4 (10.8)
Lymphoma	4 (10.8)
Head and neck cancer	3 (8.1)
Total	37 (100)

Table 2. Relationship between SUVmax values and colonoscopy findings

Colonoscopy Findings	n (%)	SUVmax
Malignant Lesion	9 (24.3)	13.5±5.1
Adenoma	16 (43.2)	8.6±3.5
Normal Findings	12 (32.4)	6.1±2.3

was found between the localization of FDG uptake detected on PET/CT and the localization of the lesion detected on colonoscopy. In patients with adenomas, this concordance was found to be 81.2% (12/16).

DISCUSSION

In this study, we investigated the evaluation of colonoscopic findings and their correlation with PET/CT findings in patients who underwent PET/CT for various indications and had incidental colonic focal FDG uptake. In our study, malignant lesions were detected in 24.3% and adenomas in 43.2% of patients who had colonic focal FDG uptake on PET/CT and underwent colonoscopic evaluation. A total of 67.5% neoplastic lesions were detected, which is consistent with the rates of 60-75% reported in the literatüre.[5,6]

In our study, adenomas were detected in a significant proportion of patients with incidental colonic focal FDG uptake. When the histological subtypes of adenomas were examined, tubular adenoma (18.9%) was found most frequently, followed by tubulovillous adenoma (13.5%), villous adenoma (5.4%), and serrated adenoma (5.4%). This distribution is similar to the histological subtype distribution of adenomas reported in the literatüre.[7] In addition, it has been observed that there are differences in SUVmax values among histological subtypes, and SUVmax values are higher in adenomas containing villous components.[8] This finding can be associated with the higher risk of malignant transformation in adenomas containing villous components. Similarly, a statistically significant difference was detected between the SUVmax value and malignant lesions and other lesions detected in colonoscopy ($p<0.001$). There are various studies showing that the SUVmax value is associated with the risk of malignancy. In the study conducted by Luboldt et al.,[9] it was reported that focal FDG uptakes with SUVmax value ≥5 are more likely to be associated with malignancy. Similarly, Xu et al.[10] showed that the risk of malignancy significantly increased in patients with SUVmax value ≥6.45. In our study, an optimal cut-off value could not be determined due to the limited number of patients.

High concordance was found between the localization of focal FDG uptake detected on PET/CT and the localization of the lesion detected on colonoscopy, with 100% in malignant lesions and 81.2% in adenomas. This high concordance rate indicates that PET/CT is an effective method in determining the localization of colonic lesions. This finding is important in terms of determining the region to be focused on before colonoscopic evaluation and can enable the colonoscopy procedure to be performed in a targeted manner. Luboldt et al.[11] also found in their study that while PET/CT fully detected malignant lesions, the rate of detecting adenomas was 83%.

In patients with focal FDG uptake on PET/CT, benign pathologies such as mucosal inflammation and diverticulum can be seen; FDG uptake may have occurred due to physiological uptake without any findings in the mucosa, submucosal inflammatory changes, microscopic inflammation, or hyperplastic changes. In addition, the time difference between PET/CT imaging and colonoscopy may have caused no pathology to be seen.[12] In our study, the mean time between PET/CT imaging and colonoscopy was determined as 19.4±7.54 days. This period may have caused regression especially in inflammatory lesions. An optimal time between PET/CT and colonoscopy has not been specified in the literature, but it would be appropriate to perform colonoscopy as early as possible to start appropriate treatment for the patient.

In our study, the most frequent uptake and pathology were detected in the sigmoid colon with 37.8%. In similar studies in the literature, it is seen that incidental uptake is most frequently in the left colon and sigmoid colon.[13] The higher incidence of incidental uptake in the sigmoid colon can be explained by the fact that colorectal cancer is most commonly seen in the rectosigmoidal part of the colon.[14]

Our study has some limitations. First, the retrospective design and relatively small sample size (n=37) weaken the statistical power of the study. Especially in subgroup analyses (such as SUVmax values according to histological types), statistical significance could not be evaluated due to insufficient number of patients. In addition, only patients with focal FDG uptake were evaluated in our study, and patients with diffuse uptake were excluded. Studies with larger sample sizes that also include patients with diffuse uptake may be useful in evaluating the clinical significance of the uptake pattern. Finally, our study reflects the experience of a single center, and our findings need to be confirmed by multicenter studies to be generalizable.

Conclusion

In conclusion, in our study, malignant lesions were detected in 24.3% and adenomas in 43.2% of patients with incidental colonic focal FDG uptake on PET/CT. It has been shown that patients with high SUVmax values have a higher probability of malignancy, and SUVmax values are also higher in adenomas containing histologically villous components. These findings emphasize the importance of further investigation with colonoscopic evaluation in patients with incidental colonic focal FDG uptake on PET/CT.

Ethics Committee Approval

The study was approved by the Sancaktepe Sehit Prof. Dr. İlhan Varank Training and Research Hospital Ethics Committee (Date: 14.05.2025, Decision No: 159).

Informed Consent

Retrospective study.

Peer-review

Externally peer-reviewed.

Authorship Contributions

Concept: F.M., M.K.; Design: F.M., M.K., I.E.S.; Supervision: M.K.B., F.M., I.A.; Materials: M.K., M.K.B., I.E.S., I.A.; Data: F.M., M.K., M.K.B., I.E.S., I.A.; Analysis: M.K., M.K.B.; Literature search: I.E.S.; Writing: F.M., I.A.; Critical revision: F.M., I.A.

Conflict of Interest

None declared.

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PET/CT'de İnsidental Saptanan Kolonik FDG Tutulumlarının Kolonoskopik ve Histopatolojik Değerlendirilmesi

Amaç: Bu çalışma, PET/CT'de insidental olarak saptanan fokal kolonik FDG tutulumu olan hastalardaki kolonoskopik ve histopatolojik bulguları değerlendirmeyi ve PET/CT bulguları ile kolonoskopi sonuçları arasındaki korelasyonu araştırmayı amaçlamıştır.

Gereç ve Yöntem: Ocak 2019-Mart 2025 tarihleri arasında PET/CT'de insidental fokal kolonik FDG tutulumu saptanan ve 6 hafta içinde kolonoskopik değerlendirmesi yapılan 37 hasta (22 erkek, 15 kadın; ortalama yaş 64.2±9.5) retrospektif olarak incelendi. Hastaların demografik özellikleri, PET/CT endikasyonları, tutulum lokalizasyonu, SUVmax değerleri ve kolonoskopi bulguları kaydedildi. Kolonoskopi bulguları histopatolojik sonuçlara göre sınıflandırıldı.

Bulgular: En sık PET/CT endikasyonları gastrointestinal maligniteler (%27.0), akciğer kanseri (%24.3) ve jinekolojik kanserdi (%18.9). Ortalama SUVmax değeri 10.2±4.9 idi. Kolonoskopik değerlendirme sonucunda 9 hastada (%24.3) malign lezyon, 16 hastada (%43.2) adenom ve 12 hastada (%32.4) normal/benign bulgular tespit edildi. Malign lezyonlar arasında adenokarsinom (%18.9), non-Hodgkin lenfoma (%2.7) ve nöroendokrin tümör (%2.7) yer alıyordu. Adenomlar arasında tübüler (%18.9), tübülovillöz (%13.5), villöz (%5.4) ve serrated (%5.4) tipler belirlendi. Malign lezyonu olan hastalarda ortalama SUVmax değeri (13.5±5.1), adenomu olan (8.6±3.5) ve normal bulgular saptanan hastalara (6.1±2.3) göre anlamlı olarak daha yüksekti ($p<0.001$). PET/CT lokalizasyonu ile kolonoskopik bulgular arasındaki korelasyon malign lezyonlarda %100, adenomlarda %81.2 olarak bulundu.

Sonuç: PET/CT'de insidental fokal kolonik FDG tutulumu, hastaların önemli bir kısmında malign veya premalign lezyonlar saptanması nedeniyle kolonoskopik değerlendirme gerektirir. Yüksek SUVmax değerleri, artmış malignite riski ile ilişkilidir.

Anahtar Sözcükler: Kolonoskopi; malignite; PET/CT; tarama.