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FDG uptake in colonic villous adenomas

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Colonic adenomas constitute 70–80% of all colorectal polyps, and their clinical significance relates primarily to their relationship with colorectal cancer. The malignant potential of the polyps detected by FDG-PET is unknown, as not all the colonic lesions identified by FDG-PET represent colorectal malignancies. The purpose of this study was to investigate the rate of FDG-PET positivity within colonic villous adenomas. A pathology database search was performed to identify all patients diagnosed with colonic villous adenoma between June 1, 1996 and December 1, 2000. Patients with a pathologic diagnosis of colonic villous adenoma and who also had a FDG-PET study up to 1 month before colonoscopy were included in this study. FDG-PET findings were compared with pathological features. Of more than 4,000 patients, six patients were diagnosed with colonic adenoma on subsequent colonoscopy following FDG-PET study. Based on the pathological findings, these 6 patients had a total of 2 villous and 9 tubulovillous adenomas. Five of the 6 patients showed foci of increased FDG uptake in the region of the colon that corresponded to the villous adenoma(s) detected on colonoscopy, which accounted for a true-positive rate of 83.3% (5/6 subjects). Focal lesions in the colon seen on FDG-PET examinations need to be investigated further, even though some of these will prove to be villous adenomas rather than colorectal carcinomas. Future studies in a larger number of patients are needed to evaluate the relationship of histopathological features of colonic polyps and detectability of these lesions by FDG-PET.

Key words: colonic villous adenoma, FDG-PET, colorectal carcinoma, colonoscopy

INTRODUCTION

ADENOMATOUS POLYPS are the well-described precursor lesions of invasive colorectal carcinoma and can be effectively managed by endoscopic polypectomy. There are several types of benign colonic polyps—for example, adenomas, hyperplastic polyps, juvenile polyps, and inflammatory polyps. The risk of carcinoma in an individual polyp is related to its histological type (5% for tubular adenoma or simple adenomatous polyp, 23% for tubulovillous adenoma or villoglandular polyp, and 41% for villous adenoma), as well as to the size of the lesion and the degree of atypia.[1]

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Recently, increased FDG uptake has been reported in some colonic polyps.[2,3] However, the malignant potential of the polyps detected by FDG-PET is unknown, as not all the colonic lesions identified by FDG-PET represent colorectal malignancies. On the other hand, Tatlidil et al.[4] reported that intense, focal or multifocal FDG uptake implies at least a 79% chance that histopathologic examination will reveal an abnormality. Several benign conditions, including physiological bowel uptake, colitis or gastrointestinal lymphoid tissue, as well as colonic adenomas have been reported to be a potential cause for false-positive findings on FDG-PET.[2]

Atkins et al. reported that, after the removal of rectal or sigmoid polyps with villous or tubulovillous histology or size greater than 1 cm, the incidence of colon cancer was increased threefold over that of the general population.[5] Since villous and tubulovillous adenomas have a higher malignant potential and tubular adenomas are less likely to carry a risk of carcinoma, we have focused mainly on villous and tubulovillous adenomas in the present study.

MATERIALS AND METHODS

To study the rate of FDG positivity in colonic villous and tubulovillous adenomas, a pathology database search was performed for the period from June 1, 1996 through December 1, 2000. Among more than 4,000 patients, six patients (2 men, 4 women; mean age ± SD, 72.3 ± 10.8 y; age range 60–87 y) with a total of 16 colonic adenomas on subsequent colonoscopy were identified and are included in this study. Of the six patients, two had been referred for evaluation of possible recurrent colorectal carcinoma because of a rising CEA level, and the other four had been referred for staging of other cancers (Table 1). On the PET images, a distinct non-linear focal area of increased FDG accumulation in the region of the colon was interpreted as a positive finding.

RESULTS

Based on the pathological findings, these 6 patients had a total of 2 villous and 9 tubulovillous adenomas. The 2 villous adenomas were in the rectum; 5 of 9 tubulovillous adenomas were in the cecum, 3 were in the ascending colon, and one was in the transverse colon. The maximum diameter of the lesions on histopathologic examination ranged from 1.5 to 9.8 cm. Five of the 6 patients had positive FDG-PET; focally increased FDG uptake was seen in 1 of 2 villous adenomas and 4 of 9 tubulovillous

Table 1 Histopathological findings and FDG-PET results in patients with colonic villous adenoma

Case	Sex	Age (years)	Referring reason for FDG-PET	Clinical features of the villous adenomas detected on FDG-PET			FDG-PET result	SUV value
				Histopathological diagnosis (#)	Greatest size, cm	Location		
1	F	83	Colon CA	Villous adenoma (1)	2.5 × 1.5 × 1.3	Rectum	–	N/A
2	M	64	Esophageal CA	Tubulovillous adenoma (1)	4 × 3 × 3	Cecum	+	N/A
3	F	87	Cervix CA	Tubulovillous (1)	4 × 2.5	Ascending colon	+	6.1
				Tubulovillous (2)	0.4 and 0.6	Ascending colon	–	N/A
				Tubular adenomas (5)	Ranged from 0.4 to 0.6	Ascending colon	–	N/A
4	F	60	Lung CA	Villous adenoma (1)	1.5 × 1.3 × 1	Rectum	+	3.8
5	F	66	Lung nodule	Tubulovillous adenomas (1)	9.8 × 5.7 × 2	Cecum	+	4.8
				Tubulovillous adenomas (3)	1.1, 1.3 and 2	Cecum	–	N/A
6	M	74	Colon CA	Tubulovillous adenoma (1)	Biopsy only	Transverse colon	+	13.8

#: number of adenomas, +: positive, –: negative, N/A: not available

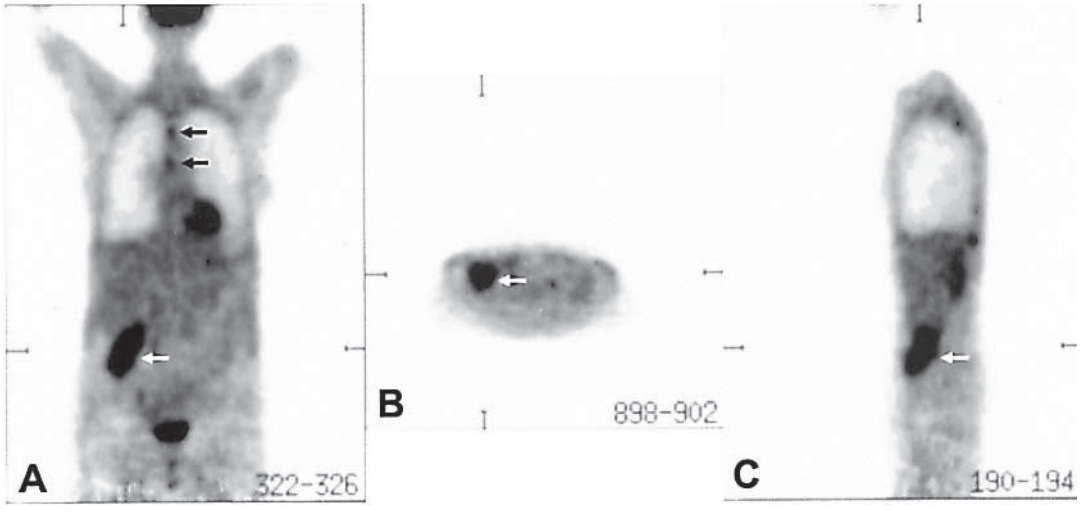

Fig. 1 Coronal (A), transaxial (B) and sagittal (C) FDG-PET images showed a focus of increased activity (SUV = 4.8) in the right lower abdomen (*white arrows*) in a 66-year-old woman (case 5), who underwent FDG-PET scan for evaluation of a suspicious lung nodule for lung cancer. On subsequent colonoscopy, multiple adenomatous polyps were detected in the cecum. Multiple tubulovillous adenomas, which ranged in size from 0.5 × 0.6 × 1.1 to 2 × 5.7 × 9.8 cm, were diagnosed on histopathologic examination. Multiple focal increased activity in the anterior mediastinum and paratracheal region (*black arrows*), which were suspicious for nodal metastases, were also detected on whole body PET imaging.

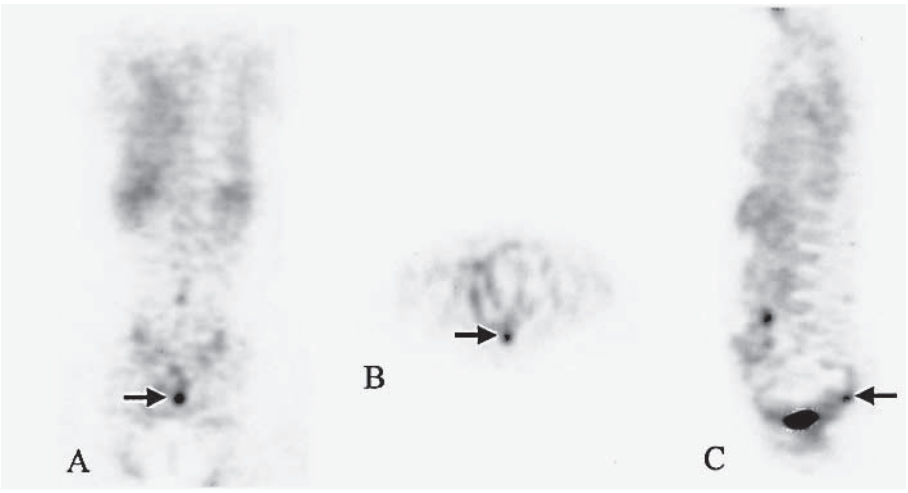

Fig. 2 Coronal (A), transaxial (B) and sagittal (C) FDG-PET images showed a focus of increased activity (SUV = 3.8) in the rectum (*arrows*) in a 60-year-old woman (case 4), who underwent FDG-PET scan for initial staging for a recently diagnosed squamous cell lung cancer. On subsequent colonoscopy, a snared polyp was detected in the rectum. A colonic villous adenoma (1.5 × 1.3 × 1 cm) was diagnosed on histopathologic examination.

adenomas (Table 1).

As previously reported,[2,3,6,7] we found a good correlation between the location of FDG uptake and the endoscopic findings. Five of 6 patients showed foci of increased FDG uptake in the region of the colon that corresponded to the villous adenoma(s) detected on colonoscopy (Figs. 1, 2). This finding accounted for a true-positive rate of 83.3% (5/6 subjects). Incidentally, histopathologic examination also showed 5 tubular adenomas (ranging from 0.4 to 0.6 cm in greatest diameter) in the ascending colon in one of the 6 patients (case 3); these lesions were negative on FDG-PET. This may be related to their small size and the limited resolution of PET. In another patient (case 5) with 4 tubulovillous adenomas, only the largest lesion (9.8 cm in maximum diameter) with high-grade dysplasia was seen on PET (Fig. 1). The remaining 3 tubulovillous adenomas (ranging from 1.1 to 2.2 cm in maximum diameter) without evidence of dysplasia were not seen on PET. Although, the last three lesions should have been large enough to be visualized on FDG-PET, we were unable to detect these lesions even on retrospective evaluation. The relationship of the degree of dysplasia and detectability rate on FDG-PET cannot be assessed in this study because of the small number of patients.

DISCUSSION

It has been suggested that adenomas in the cecum, ascending colon or descending colon are more likely to be visualized in comparison to lesions in the rectum, possibly due to the intense FDG activity in bladder.[3] Additionally, intense physiological bowel FDG uptake in some patients may obscure focally increased pathological uptake with small adenomas.[5]

This study has several limitations. We selected only those patients who underwent FDG-PET prior to colonoscopy with a maximum interval between the two studies of 1 month. We may have missed those patients with pathological FDG uptake in whom colonoscopy was not performed. Additionally, this study may be influenced by a potential selection bias leading to inclusion of patients at increased risk for metachronous malignant or premalignant colonic lesions, because the study population included only patients being evaluated with FDG-PET for known or suspected malignancy.

CONCLUSION

Our results confirm those of earlier studies and indicate that focal lesions in the colon seen on FDG-PET examinations need to be investigated further, even though some of these will prove to be villous adenomas rather than colorectal carcinomas. Future studies in a larger number of patients are needed to evaluate the relationship of histopathological features of colonic polyps and detectability of these lesions by FDG-PET.

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