Fluoro-18 fluorodeoxyglucose positron emission tomography / computerized tomography scans in a patient with penile cancer for appropriate therapeutic strategy

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Abstract

In patients with penile cancer, positron emission tomography (PET) is important for identifying metastatic lesions and for therapeutic strategy planning. By using PET / coumputerized tomography – CT scanning, more precise localization and attenuation correction is provided by CT as an additional advantage for diagnosis. A 78-year-old man with squamous cell cancer of the glans penis diagnosed after histopathological examination was referred to our Nuclear Medicine Department PET/CT unit by the Urology Department of our Hospital, for investigation of metastases and for therapeutic strategy planning. There was significantly increased focal fluoro-18 fluorodeoxyglucose (^{18}F-FDG) activity (SUV: 18.2) in the glans penile area and slightly increased activity in the right inguinal region which was described as inflammation by the histopathological examination. There was no other increased abnormal ^{18}F-FDG activity. ^{18}F-FDG PET or PET/CT may be used in squamous cell cancer of the penis for the detection of metastases and for therapeutic strategy planning. Finally, invasive procedures such as total bilateral inguinal lymphadenectomy, having a high morbidity, may be avoided.

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Introduction

A quamous cell cancer of the penis is an unusual disease [1]. Poor penile hygiene and phimosis are strong risk factors for the development of penile carcinoma [1-2]. Circumcision done in childhood offers the greatest protection against this disease. Early disease can be treated by conventional resection of the penis, chemotherapy and radiotherapy [2-4]. Squamous cell cancer of the penis is usually diagnosed in the sixth decade of life but earlier in areas of higher incidence [5]. The importance of early diagnosis of squamous cell cancer of the penis is well known; however, up to 50% of the patients can have symptoms for more than one year before the diagnosis is made and approximately 40% to 50% of the patients develop lymph node metastases during the course of the disease. The diagnosis of lymph node involvement is difficult, because palpable nodes are found to contain cancer in only 50% of the cases and clinically normal nodes may contain unsuspected metastases in about 15% of the cases [6].

We present this case to indicate to physicians that fluor-18 fluorodeoxyglucose, positron emission tomography (^{18}F-FDG, PET) or PET combined with computerized tomography (CT) imaging in cases of squamous cell cancer of the penis may be crucial for identifying metastases and for planning the appropriate therapeutic strategy. Furthermore, invasive procedures with a high morbidity rate, such as total bilateral lymphadenectomy, may be avoided.

Case report

A 78-year-old male presented to his urology physician with a lesion on his glans penis. The patient was debilitated by pain and soaked in warm water to palliate his symptoms. He was initially diagnosed as having a bacterial infection and treated for that. Two months later, the patient presented with an abscess in his glans penis, which was drained. A biopsy was obtained that showed squamous cell cancer of the penis (Fig. 1). The patient was referred by the

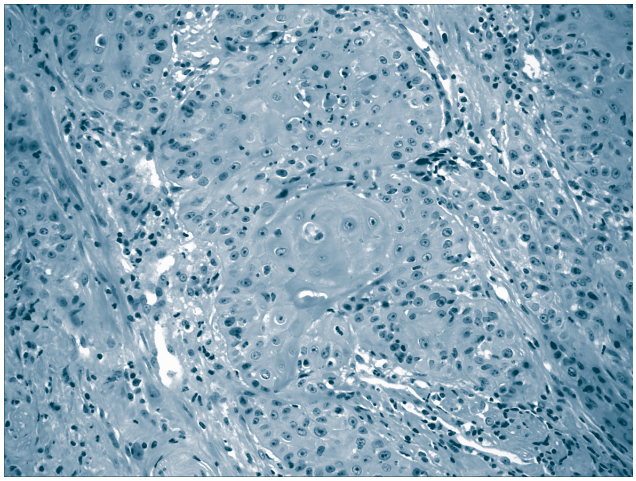

Figure 1. Biopsy specimen from penile lesion showed squamous cell carcinoma that includes keratinizing nest of squamous cells with moderate atypia (H+E.200X).

urology department to our Nuclear Medicine Department PET/CT center for the investigation of possible metastases and for appropriate therapeutic strategy planning. The patient was imaged using a dedicated Siemens Biograph LSO HI-REZ entegre PET/CT camera. The additional use of a CT unit for more precise localization and attenuation correction as compared to only the PET scan was useful for this purpose. There was significantly increased focal ^{18}F-FDG activity (SUV: 18.2) in the glans penile area and slightly increased activity in the right inguinal lymph nodes (Fig. 2). There was no other increased abnormal ^{18}F-FDG activity. The histopathological examination of primer penile lesion was defined as moderately differentiated squamous cell carcinoma (Fig. 3). The histopathological examination of inguinal lymph nodes reported inflammation.

Discussion

Squamous cell penile carcinoma is rare in the western countries [1]. This may be the reason that treatment standards have been only partially established. Although this cancer is not radiation and chemotherapy resistant, surgery generally is the first preference. The most problematic issue is the indication for inguinal lymphadenectomy in patients with not enlarged lymph nodes. Between 10% and 20% of these patients have nodal micrometastases and are known to benefit from early bilateral inguinal lymphadenectomy [5-7]. Some consensus has been reached to perform prophylactic inguinal lymphadenectomy in patients with stage T3-T4 and grade 3 penile cancer [8]. Inguinal lymphadenectomy, however, has a mortality rate of 3%, morbidity, including wound infections of 20%, skin necrosis of 60%, subcutaneous seroma formation in 23%, and lower limb lymphedema in 25% of the cases [9]. A standard procedure to detect regional lymph node metastases that have escaped clinical examination has not yet been established. Bipedal lymphangiography, abdominal and pelvic computed tomography scans, fine needle aspiration cytology,

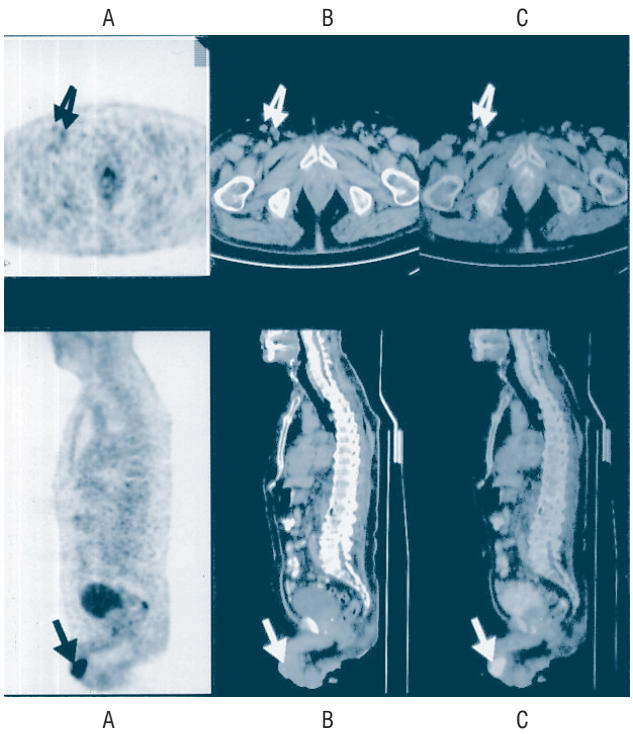

Figure 2. Whole-body ^{18}F-FDG-PET scan was performed one hour after 555 MBq of ^{18}F-FDG were injected intravenously. A PET/CT scan was also performed one hour later. ^{18}F-FDG-PET images showed significantly increased accumulation of ^{18}F-FDG (SUV: 18.2) on the glans penis. Lower row, sagittal slice: A: PET, B: CT and C: PET/CT images. In the images of the upper row, transaxial slice: Slightly increased accumulation of ^{18}F-FDG (SUV: 2.2) was shown in the right inguinal region: A: PET, B: CT and C: PET/CT images.

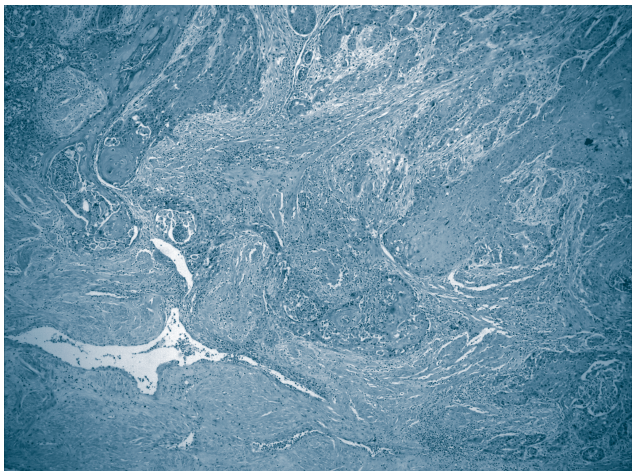

Figure 3. The penectomy specimen showed a moderately differentiated squamous cell carcinoma that infiltrated corpus cavernosum (H+E.40X).

and sentinel node biopsy which is performed by lymphoscintigraphy, gamma probe and blue dye were all similarly unable to reliable detection of nodal metastases in this setting. Because when the regional lymph nodes were categorized simply as positive or negative, 80% of the tumors were classified correctly and 20% incorrectly (13% were false positive and 7% were false negative) [10]. The sensitivity of PET

has been described as superior compared with CT [11]. In a patient with recurrent, well-differentiated penile cancer, PET has also been shown to be more sensitive than CT for the localization of metastatic lesions [11]. The use of a PET/CT unit provides more precise localization of metastatic lesions than PET and is especially useful for this purpose. *In conclusion*, we present this patient because of the rarity of squamous cell carcinoma of the penis and note the importance of PET/CT in diagnosis. It thus seems possible to improve regional lymph node metastases screening and prevent unnecessary lymphadenectomy in patients with localized disease by using the ^{18}F-FDG PET/CT scan [12-13]. In this manner, invasive surgical procedures with a high morbidity rate, such as total bilateral lymphadenectomy, may be avoided.

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