

CASE REPORT

A rare case of extrapulmonary small cell carcinoma in prostate and its clinical course using serial ^{18}F-FDG PET-CT images

Muhammad Kashif Rahim[1,2], Hyo Jung Seo[1,3,*], Durr-e-Sabih[2], Dong Soo Lee[1,3], June-Key Chung[1]

[1]Department of Nuclear Medicine,
Seoul National University Hospital, Seoul, Korea

[2]Department of Nuclear Medicine, Multan Institute of Nuclear Medicine and Radiotherapy, Multan, Pakistan

[3]Department of Molecular Medicine and Biopharmaceutical Sciences, Graduate School of Convergence Science and Technology, Seoul National University College of Medicine, Seoul, Korea

Abstract

Extrapulmonary small cell cancer (ESCC) of the prostate represents less than 1% of the prostate carcinomas and has a poor prognosis. A 63-year-old male patient presented with dysuria and nocturia and the initial ultrasonography and CT revealed a prostatic mass. On initial ^{18}F-FDG PET-CT, the prostatic mass showed intense FDG uptake and multiple abdominal lymph nodes (LNs) with intense uptake were visualized. Prostatectomy wasdone and ESCC of prostate was diagnosed pathologically. First follow-up ^{18}F-FDG PET-CT after chemo-radiation therapy showed near complete remission of the disease. However, second follow-up ^{18}F-FDG PET-CT showed multiple distant metastases in lung, LNs, bone and brain.

Key words: *D-shaped left ventricle, Movahed's sign, pulmonary embolism, pulmonary hypertension, right ventricle hypertrophy*

***Correspondence**

Hyo Jung Seo, MD
Department of Molecular Medicine & Biopharmaceutical Sciences,
Seoul National University College of Medicine,
101 Daehangno, Jongro-gu, Seoul 110-744,
Seoul, Korea
Tel: 82-2-2072-3793
Email: : sihun12@snu.ac.kr

Introduction

Extrapulmonary small cell carcinoma (ESCC) is a rare tumor as only 2 - 5% of small cell carcinomas (SCC) arise from extrabronchial sites, thus representing 0.1-0.4% of all cancers [1]. ESCC is recognized as a distinct pathology since its initial description by Duguid and Kennedy in 1930 [2]. In the beginning it was considered to have a

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neuroendocrine origin but now it is believed that the origin is from multipotent stem cells, which also explains the cellular heterogeneity [3]. The common sites of ESSC are gastrointestinal and genitourinary tracts. However, the primary focus has been identified only in 30% of the cases [4]. The disease stage and the primary site of tumour are the most important prognostic factors in ESCC. Limited stage showed longer three year survival rate (28%) than extensive stage (9%) [2].

ESCC of prostate is very rare, representing less than 1% of all prostatic malignancies. The median age of disease presentation is 65 years in prostatic SCC, and the prognosis is usually poor due to extensive lymph node, bone or other organ metastases [5]. ESCC of prostate is highly aggressive and the average survival rate is 7 months [3]. The morphological features of prostatic SCC mimics small cell carcinoma of the lung. Most common complaints are associated with prostatic enlargement. However some patients may present with symptoms related to metastasis; rarely it may cause paraneoplastic syndromes resulting from ectopic production of ACTH or abnormal ADH release [5].

^{18}F-fluorodeoxyglucose positron emission tomography/computed tomography (^{18}F-FDG PET-CT) is a well-established modality in oncology. ESSC shows avid FDG uptake, therefore ^{18}F-FDG PET-CT is useful for evaluating primary tumour and metastatic disease. Usefulness of ^{18}F-FDG PET-CT in diagnosis, staging and restaging has already been reported [2, 6]. Here, we report a case of ESSC of prostate using serial ^{18}F-FDG PET-CT imaging. ^{18}F-FDG PET-CT was found useful to evaluate staging, treatment response and recurrence in ESSC.

Case report

A 63-year-old man was seen at an outside hospital in September 2012 for urologic symptoms. Ultrasonography and conventional CT revealed a large prostatic mass. He underwent ^{18}F-FDG PET-CT at our hospital (Figure 1). There was a large mass involving prostate with intense FDG uptake (SUV_{max} = 16.5). This mass abutted on to and compressed the rectum. Other intense FDG uptake lesions were shown in multiple LNs along the right external iliac and pre-sacral spaces ($SUV_{max} \leq$ 11.5). Mild FDG uptake lesion was interpreted as shoulder joint arthritis (SUV_{max} = 3.4). The rest of imaged body, showed no significant uptake to suggest other distant metastasis. Prostectomy and LN dissection was performed and small round cell tumour was confirmed histopathologically. The results of immuno histochemistry revealed positive vimentin, synaptophysin, chromogranin-A, CD99 and CD56 stains but negative prostate specific antigen. Therefore, the final diagnosis was made as extrapulmonary small cell cancer (ESCC) originating from prostate. The treatment employed was intensity modulated radiotherapy (IMRT) and six cycles of chemotherapy with etoposide and cisplatin during 4 months.

Second ^{18}F-FDG PET-CT was performed 4 weeks later after 6 cycles of chemotherapy. It showed marked regression of disease both in the primary site and LNs along right external iliac and pre-sacral area. The SUV_{max} of involving primary site was 2.9. (Figure 2).

Third ^{18}F-FDG PET-CT was performed 1 year later at the end of chemotherapy (Figure 3). The patient complained of sacral pain. Extensive distant metastases were shown on ^{18}F-FDG PET-CT. A lesion with intense FDG uptake lesion involving sacral bone (SUV_{max} = 17.5) was a bone metastasis. There were multifocal lesions with FDG uptake involving sacral level and at level of 11th thoracic vertebra ($SUV_{max} \leq$ 7.4): these were leptomeningeal seedings. Also, multiple masses with intense FDG uptake in the right lung ($SUV_{max} \leq$ 17.4) were lung metastases. Multiple enlarged LNs with intense FDG uptake along right interlobar, right lower paratracheal and highest mediastinum ($SUV_{max} \sim$ 17.9) were LN metastases. Moreover, significantly intense uptake in the right occipital lobe of brain was brain metastasis.

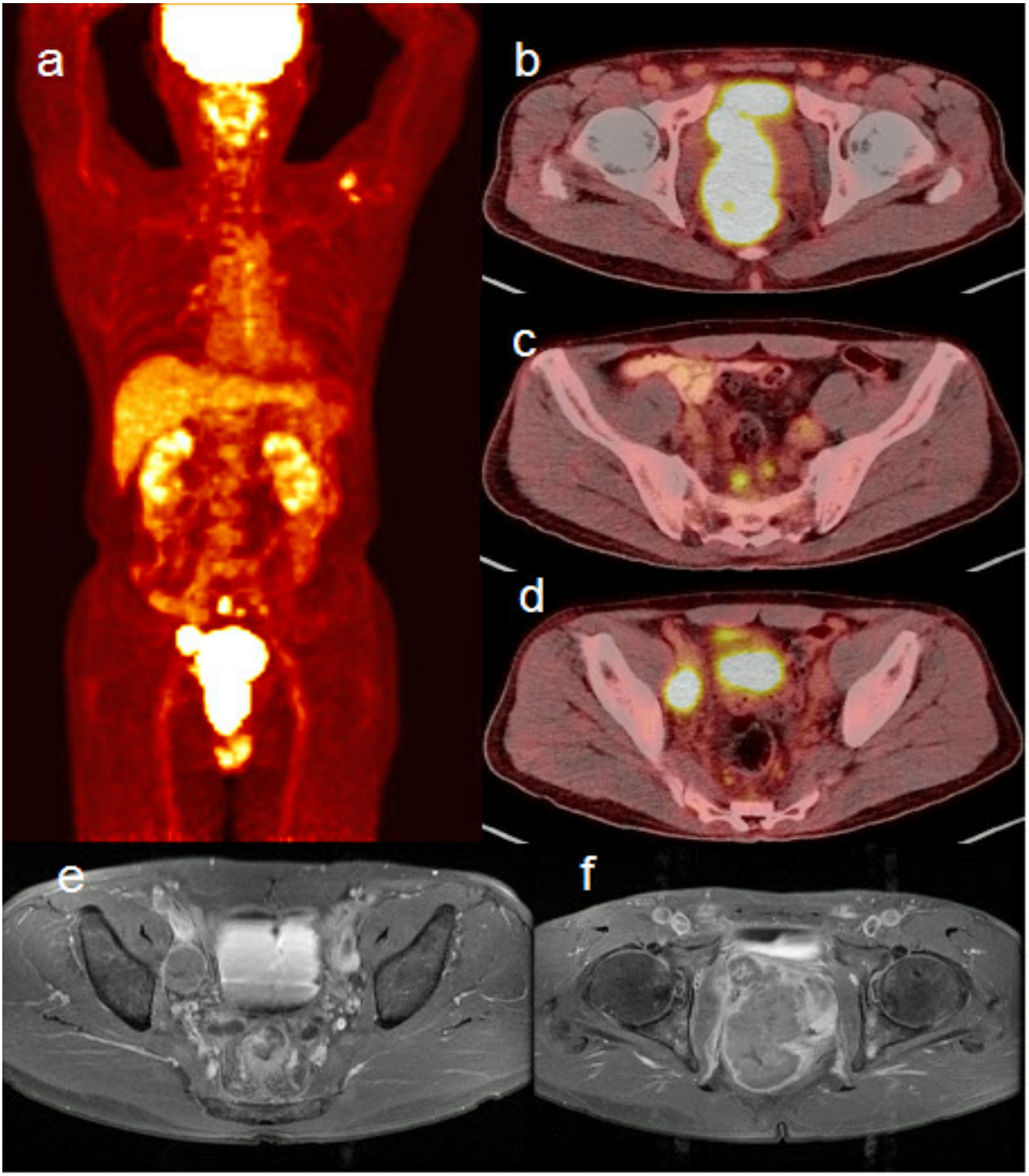

Figure 1 *(a-d) ^{18}F-FDG PET/CT images at the time of diagnosis, showing large hypermetabolic lesion in prostate and hypermetabolic lymph nodes in right external iliac and pre-sacral spaces. (a = anterior MIP projection, b to d = transverse PET-CT fused images); e and f are gadolinium enhanced MRI images showing well-enhancing metastatic lymph node in the right external iliac area and well-enhancing large mass replacing prostate with internal necrotic portion and involvement of anterior rectal wall*

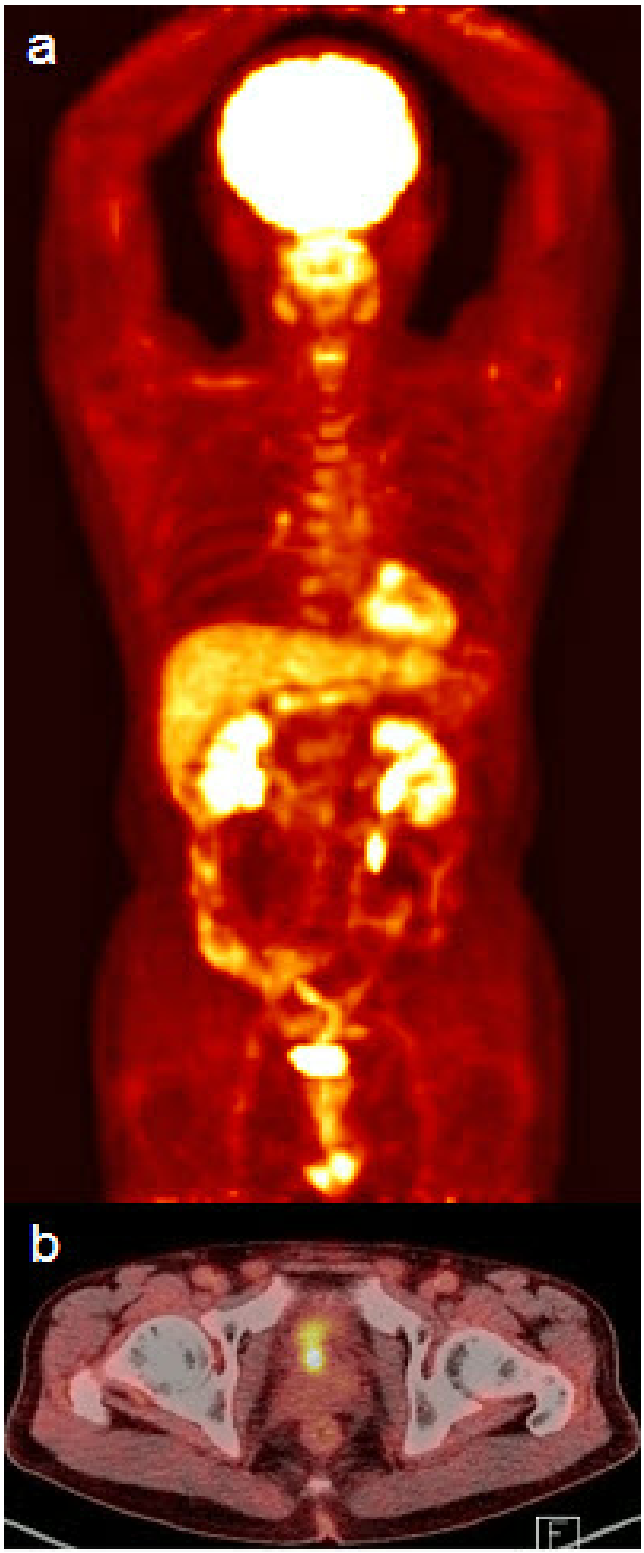

Figure 2 *^{18}F-FDG PET-CT after chemo radiotherapy, showing marked regression of the disease. (a = anterior MIP projection, b = fused transverse image at the level of primary lesion)*

Discussion

ESSC of the prostate is considered as a rare and an aggressive neoplasm with a generally unfavourable outcome even after surgery and chemoradiotherapy [3], as seen in our case. ^{18}F-FDG PET scintigraphy has a low sensitivity in adenocarcinoma of the prostate. Therefore, ^{11}C choline or acetate for PET image is usually recommended for the evaluation of prostate cancer rather than ^{18}F-FDG [7, 8]. However ^{18}F-FDG PET imaging is useful to evaluate lung cancer and extra-pulmonary metastasis in staging and management of SCC [9, 10]. Similarly there is an established relationship between image quantification in the form of SUV_{max} and the disease outcome as there is a small number of survival of patients associated with high SUV_{max} in case of SCC of lung [11].

The role of ^{18}F-FDG PET-CT in the management of ESSC is not clear in literature due to rarity of the disease and paucity of published reports, however available data suggests the use of this imaging modality in the management of ESSC. Spieth et al. reported that ^{18}F-FDG PET-CT can decide the treatment response and distant metastases during monitoring patients with ESCC of prostate and it was superior to bone scan for the detecting bone metastasis [12]. Numerous other reports have also shown that ^{18}F-FDG PET-CT is a useful imaging modality for staging and evaluating treatment of ESSC [13-15].

In our case, the diagnosis of ESSC of prostate was confirmed by histopathology and immunohistochemical stains. The disease stage was established based on ^{18}F-FDG PET-CT at the time of diagnosis and it was clear that it was an extensive stage disease. First, the patient represented favorable treatment response after surgery and chemoradiotharepy but the patient complained of bone pain 1 year later after the end of therapy. ^{18}F-FDG PET-CT revealed extensive LNs, lung, brain metastasis and leptomeningeal seedings.

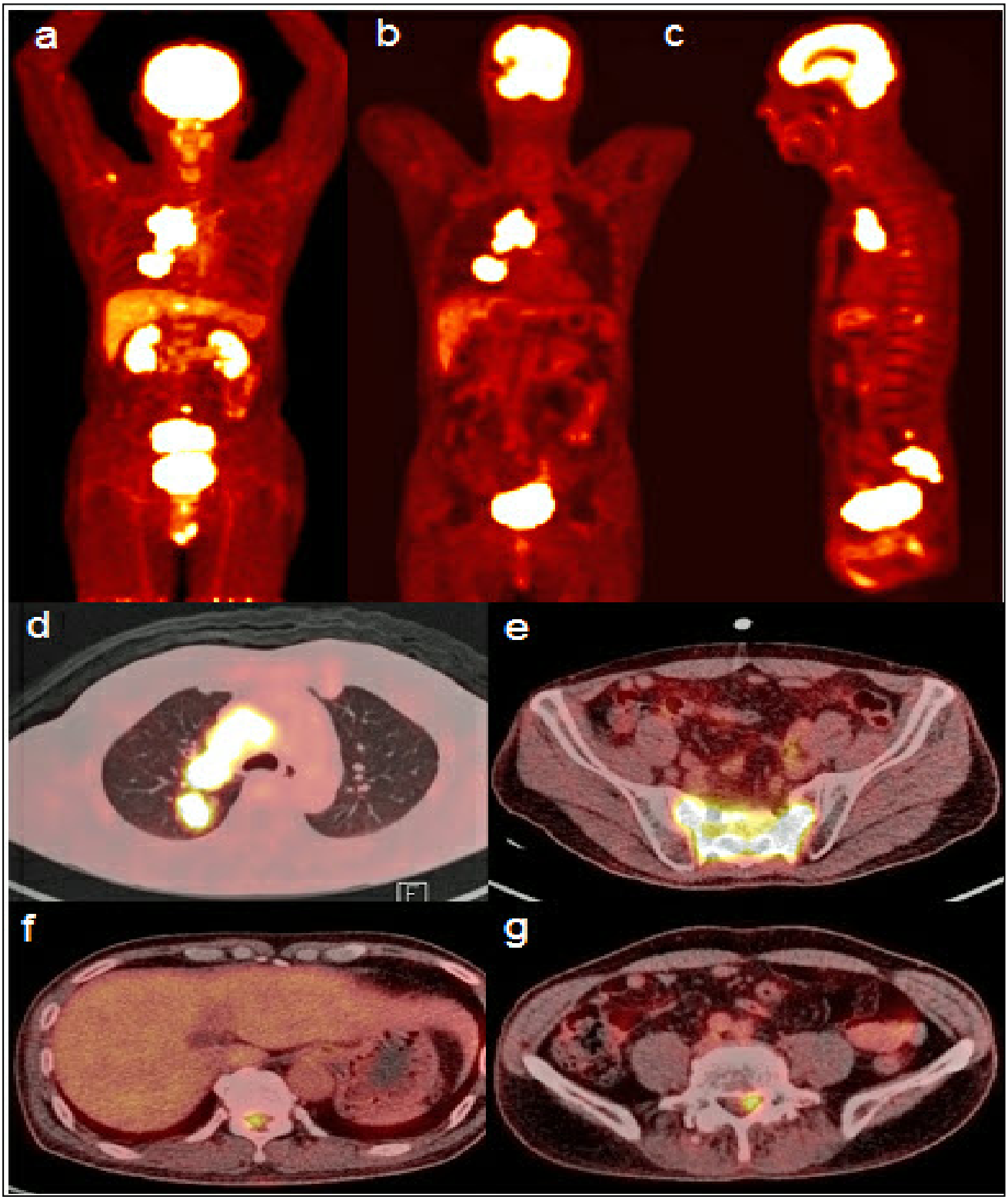

Figure 3 *^{18}F-FDG PET-CT after relapse, showing large sacral bone lesion, multiple leptomeningeal seeding at the level of sacrum and T11 vertebra, multiple hypermetabolic lesions involving upper lobe of the right lung and enlarged hypermetabolic lymph nodes involving right interlobar, right lower paratracheal and highest mediastinum. (a = anterior MIP projection, b = coronal view, c = sagittal view and d to g = PET/CT transverse images)*

Our report indicates that ^{18}F-FDG PET-CT is a useful imaging modality for the initial diagnosis and staging of the disease and subsequently for the evaluation of treatment response and recurrence in cases of ESCC of prostate.

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