

Psoas muscle metastasis from cervical carcinoma: Correlation and comparison of diagnostic features on FDG- PET/CT and diffusion-weighted MRI

Sandip Basu, Abhishek Mahajan

Sandip Basu, Radiation Medicine Centre, Bhabha Atomic Research Centre, Tata Memorial Hospital Annexe, Parel, Mumbai 400012, India

Abhishek Mahajan, Department of Radiology, Tata Memorial Hospital, Mumbai 400012, India

Author contributions: Basu S and Mahajan A designed the study and wrote the manuscript.

Correspondence to: Dr. Sandip Basu, Radiation Medicine Centre, Bhabha Atomic Research Centre, Tata Memorial Hospital Annexe, Parel, Mumbai 400012, India drsarb@yahoo.com

Telephone: +91-22-24149428 Fax: +91-22-24157098

Received: November 30, 2013 Revised: March 10, 2014

Accepted: March 17, 2014

Published online: April 28, 2014

Abstract

Psoas muscle metastasis, though rare, is the commonest site of skeletal muscle involvement in cervical carcinoma. The appropriate clinical management of this condition, particularly of the pain related to malignant psoas syndrome, is still evolving and the diagnostic features on conventional morphological imaging modalities are often non specific, with the differential diagnosis lying between sarcoma, hematoma, and abscess. In this report, a comparison of various morphofunctional imaging modalities was made. Fluorodeoxyglucose-positron emission tomography (FDG-PET)/computed tomography (CT) was the first to suspect disease involvement of the psoas muscle, demonstrating intense FDG uptake (compared with the contralateral muscle), while ultrasound showed heterogeneous echotexture, and magnetic resonance imaging (MRI) showed subtle altered signal intensity in the right psoas muscle. Both anatomical imaging modalities and non contrast CT of the PET-CT examination demonstrated a bulky psoas muscle, without any focal abnormality. On diffusion-weighted imaging of MRI (DWI-MRI), restricted diffusion of the involved muscle was an important observa-

tion. The psoas muscle metastatic involvement was proven histopathologically. Thus, enhanced glucose metabolism and restricted diffusion in the newer non-invasive molecular imaging modalities (*e.g.*, PET/CT and DWI-MRI) could serve as valuable adjunctive parameters in diagnosing this entity in the absence of a focal abnormality in the anatomical modalities. In the treatment response monitoring scenario, FDG-PET/CT demonstrated near complete resolution following administration of 3 cycles of systemic chemotherapy and local external radiotherapy.

© 2014 Baishideng Publishing Group Co., Limited. All rights reserved.

Key words: Psoas muscle metastasis; Carcinoma cervix; Fludeoxyglucose-positron emission tomography/Computed tomography; Diffusion weighted magnetic resonance imaging

Core tip: Psoas muscle metastasis, though unusual, forms the commonest site of skeletal muscle involvement in cervical carcinoma. The present communication describes the comparative diagnostic features of this relatively unusual but important entity on newer non-invasive molecular imaging modalities such as fluorodeoxyglucose-positron emission tomography/computed tomography (CT) and diffusion-weighted imaging of magnetic resonance imaging (MRI) as well as the conventional imaging modalities (*e.g.*, ultrasound, CT and MRI). Currently, there is a lack of characteristic diagnostic imaging features on conventional imaging modalities which have been nonspecific in this domain, and the differential diagnosis includes sarcoma, hematoma, and abscess, thus the newer molecular imaging approaches need critical exploration and comparison.

Basu S, Mahajan A. Psoas muscle metastasis from cervical

carcinoma: Correlation and comparison of diagnostic features on FDG-PET/CT and diffusion-weighted MRI. *World J Radiol* 2014; 6(4): 125-129 Available from: URL: <http://www.wjgnet.com/1949-8470/full/v6/i4/125.htm> DOI: <http://dx.doi.org/10.4329/wjr.v6.i4.125>

INTRODUCTION

Skeletal muscle metastasis from cervical carcinoma is a rare event (less than 1% incidence), the most common being the involvement of the psoas muscle. There is a lack of characteristic diagnostic imaging features on conventional imaging modalities which have been nonspecific in this domain and the differential diagnosis includes sarcoma, hematoma, and abscess^[1-6]. Thus the features of this relatively unusual but important entity on newer non-invasive molecular imaging modalities [*e.g.*, positron emission tomography/computed tomography (PET/CT) and diffusion-weighted imaging of magnetic resonance imaging (DWI-MRI)] need critical exploration and comparison.

CASE REPORT

A 52-year-old female, who presented with bleeding per vaginum 2 years previously and was diagnosed with squamous cell cervical carcinoma grade IIIB, had undergone external radiation therapy (40 Gy over 20 times) to the pelvis and cisplatin-based chemotherapy (concluded in 2011). She recently complained of pain in both thighs which was not relieved by analgesics and was referred for fluorodeoxyglucose-PET (FDG-PET)/CT for evaluation of disease status. On the whole-body survey with a full-ring dedicated LYSO-based time of flight PET-CT scanner, intense FDG uptake (Figure 1) was noted in the right psoas muscle [maximal standardized uptake value (SUV_{max}): 13.79 g/mL], in addition to foci in the prevertebral (SUV_{max}: 4.26 g/mL), left paraaortic (SUV_{max}: 3.64 g/mL), peribronchial and hilar lymph nodes. Metabolically active lesions in the right psoas muscle were further correlated radiologically: transverse and longitudinal grey scale ultrasound images (Figure 2) revealed a bulky right psoas muscle showing heterogeneous echotexture. On MRI (Figure 3), axial T1W and coronal T2W sequences revealed a bulky right psoas muscle (arrowhead) and altered signal intensity. On axial DWI there was evidence of restricted diffusion in the involved muscle (Figure 3C and 3D). Ultrasound-guided fine needle aspiration cytology of the right psoas muscle confirmed the presence of squamous cell carcinoma in the described lesion. Follow-up FDG-PET/CT was undertaken for treatment response monitoring, where FDG-PET/CT (Figure 4) demonstrated near-complete resolution of FDG uptake in the psoas muscle as well as the other foci following administration of 3 cycles of systemic chemotherapy and palliative local external radiotherapy (20 Gy over 5 times in 1 wk).

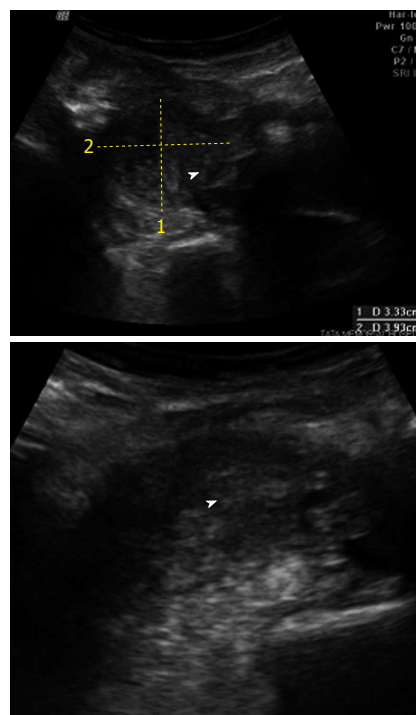


Figure 2 Ultrasound of the abdomen demonstrating a bulky right psoas muscle with heterogenous echotexture.

DISCUSSION

The various factors attributed to the relative rarity of skeletal muscle metastasis in a malignant process include: (1) contractility of muscles leading to turbulent blood flow; (2) unfavorable pH; and (3) the presence of protease inhibitors^[2]. The peer-reviewed literature on psoas muscle metastasis in the context of carcinoma cervix is limited, primarily emphasizing the diagnostic dilemma in differentiating this entity mainly from post-irradiation abscess and sarcoma^[1-6]. The challenges and refractoriness of the pain related to malignant psoas syndrome arising from a background of cervical carcinoma has been another aspect that has been described in the form of case reports^[7-9] with one report describing a good outcome with combined surgical excision and adjuvant radiation therapy.

The psoas muscle involvement mimicking abscess and an aggressive course has been primarily described in the context of HIV-positive women, though recent reports have also demonstrated this in HIV-negative women as well^[3-5]. Contrast-enhanced CT, MRI and ultrasound have all been utilized in this area with variable success and non-specific findings. In one report^[3], contrast-enhanced CT demonstrated a well-defined hypo-dense lesion with peripheral enhancement, suggesting psoas abscess. MRI findings were also suggestive of abscess, though FDG-PET imaging was not undertaken in this case. In our case, FDG-PET/CT demonstrated intense FDG uptake corresponding to the lesion that was clearly distinctive in demonstrating the lesion (when compared with the

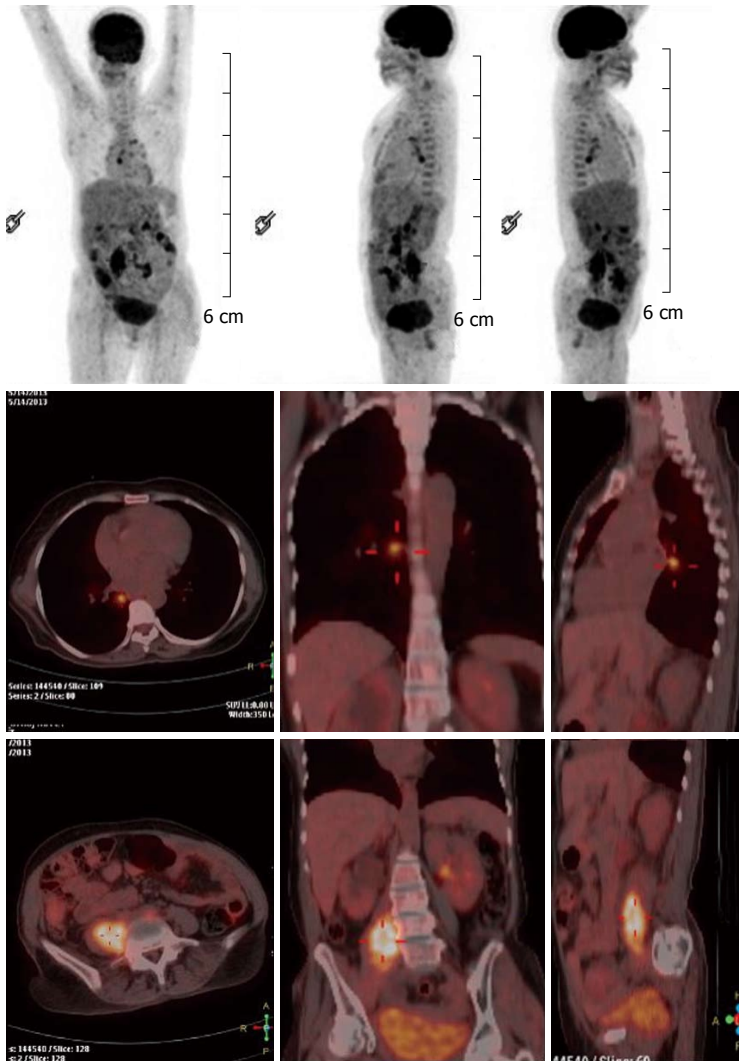


Figure 1 Whole body fluorodeoxyglucose-positron emission tomography/computed tomography. This first suggested disease involvement of the psoas muscle demonstrating intense FDG uptake (compared with the contralateral muscle). In addition, FDG foci are noted in the prevertebral, left paraaortic, peribronchial and hilar lymph nodes. FDG: Fluorodeoxyglucose.

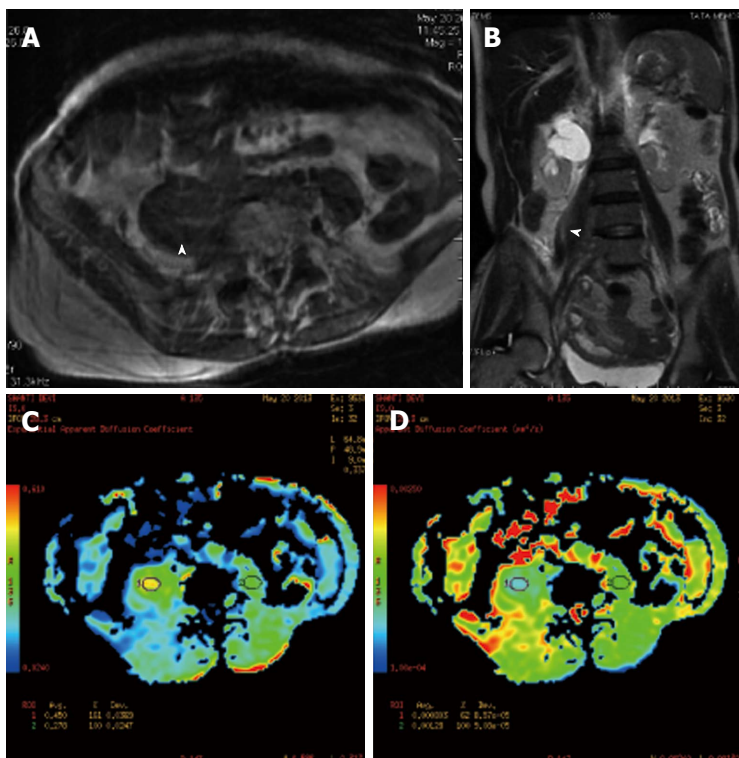


Figure 3 Magnetic resonance imaging. Axial T1W and coronal T2W sequence (A and B) reveals a bulky right psoas muscle (arrowhead) and shows altered signal intensity. On axial diffusion weighted images (C and D) there is e/o restricted diffusion in the involved segment.

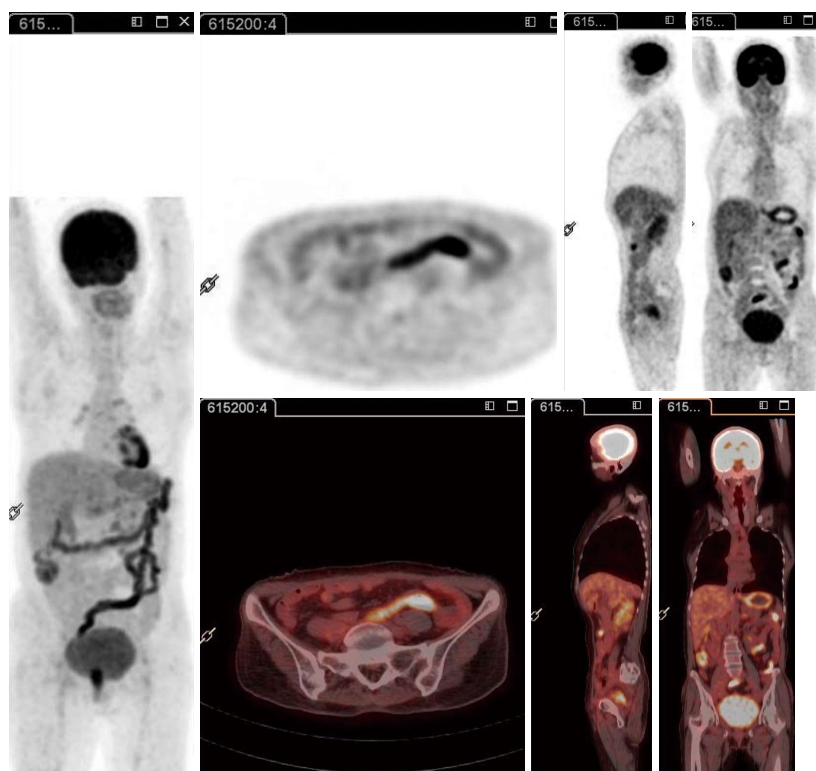


Figure 4 Follow-up fluorodeoxyglucose-positron emission tomography/computed tomography following administration of 3 cycles of systemic chemotherapy and local external radiotherapy demonstrating near-complete resolution of the fluorodeoxyglucose uptake in the psoas muscle as well as other foci.

contralateral muscle), while ultrasound showed heterogeneous echotexture and MRI showed subtle altered signal intensity in the right psoas muscle. Both the anatomical imaging modalities and the non contrast CT of the PET-CT examination demonstrated a bulky psoas muscle. Restricted diffusion of the involved segment on DWI-MRI was an important observation in addition to altered signal intensity on conventional MRI. Thus, in the absence of any focal abnormality on the anatomical modalities, enhanced glucose metabolism and restricted diffusion in the newer non-invasive molecular imaging modalities (*e.g.*, PET/CT and DWI-MRI) could serve as a valuable adjunct parameter in diagnosing this important entity.

COMMENTS

Clinical diagnosis

The patient presented with bleeding per vaginum 2 years previously and was diagnosed with squamous cell cervical carcinoma grade III B. She had undergone radiation therapy and cisplatin-based chemotherapy (concluded in 2011).

Differential diagnosis

Recurrence of cervical carcinoma.

Pathological diagnosis

Ultrasound-guided fine needle aspiration cytology of the right psoas muscle confirmed the presence of squamous cell carcinoma in the described psoas muscle lesion.

Treatment

The patient underwent 3 cycles of systemic chemotherapy following the diagnosis of disease recurrence in the psoas muscle.

Related reports

Follow-up fluorodeoxyglucose-positron emission tomography/computed tomography (FDG-PET/CT) demonstrated near-complete resolution of FDG uptake in the psoas muscle as well as the other foci following administration of 3 cycles of systemic chemotherapy and local external radiotherapy.

raphy (FDG-PET/CT) demonstrated near-complete resolution of FDG uptake in the psoas muscle as well as the other foci following administration of 3 cycles of systemic chemotherapy and local external radiotherapy.

Experiences and lessons

In addition to demonstrating a relatively unusual site of metastasis, the present report illustrates the comparative diagnostic features of this relatively unusual but important entity on newer non-invasive molecular imaging modalities such as FDG-PET/CT and diffusion-weighted imaging of magnetic resonance imaging as well as the conventional imaging modalities (*e.g.*, ultrasound, CT and magnetic resonance imaging).

Peer review

This is an interesting case. Well written, and good length as a case report.

REFERENCES

- 1 Hong JH, Song SH, Lee JK, Lee NW, Lee KW. Metastatic cervical adenocarcinoma mimicking retroperitoneal sarcoma of the psoas muscle on imaging. *Eur J Gynaecol Oncol* 2011; **32**: 221-223 [PMID: 21614923]
- 2 Kamal M, Touiti D, Jouhadi H, Benider A. Iliopsoas Metastasis from Cervix Carcinoma Masquerading as Psoas Abscess. *J Cancer Sci Ther* 2012; **4**: 75-76 [DOI: 10.4172/1948-5956.1000114]
- 3 Kalra N, Aiyappan S, Nijhawan R, Sharma SC, Khandelwal N. Metastatic carcinoma of cervix mimicking psoas abscess on imaging: a case report. *J Gynecol Oncol* 2009; **20**: 129-131 [PMID: 19590727 DOI: 10.3802/jgo.2009.20.2.129]
- 4 Devendra K, Tay SK. Metastatic carcinoma of the cervix presenting as a psoas abscess in an HIV-negative woman. *Singapore Med J* 2003; **44**: 302-303 [PMID: 14560863]
- 5 Bar-Dayan Y, Fishman A, Levi Z, Rachmani R. Squamous cell carcinoma of the cervix with psoas abscess-like metastasis in an HIV-negative patient. *Isr J Med Sci* 1997; **33**: 674-676 [PMID: 9397142]
- 6 Smith RW, Gooneratne NS. Psoas bed gallium uptake in a patient with carcinoma of the cervix post irradiation--abscess

- or metastasis. *Clin Nucl Med* 1978; **3**: 230 [PMID: 679578 DOI: 10.1097/00003072-197806000-00009]
- 7 **Stevens MJ**, Atkinson C, Broadbent AM. The malignant psoas syndrome revisited: case report, mechanisms, and current therapeutic options. *J Palliat Med* 2010; **13**: 211-216 [PMID: 20053159]
- 8 **Komatsu S**, Iseki M, Morita Y, Inada E. [A case of malignant psoas syndrome diagnosed while treating sciatica]. *Masui* 2013; **62**: 863-866 [PMID: 23905413]
- 9 **Strauss JB**, Shah AP, Chen SS, Gielda BT, Kim AW. Psoas muscle metastases in non-small cell lung cancer. *J Thorac Dis* 2012; **4**: 83-87 [PMID: 22295171]

P- Reviewers: Kim YS, Peitsidis P, Socea B **S- Editor:** Wen LL
L- Editor: Cant MR **E- Editor:** Liu SQ





Published by **Baishideng Publishing Group Co., Limited**

Flat C, 23/F., Lucky Plaza,
315-321 Lockhart Road, Wan Chai,
Hong Kong, China

Fax: +852-65557188

Telephone: +852-31779906

E-mail: bpgoffice@wjgnet.com

<http://www.wjgnet.com>

