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'Butterfly Sign' In Bone Scan Leading To Diagnosis of Post Radiotherapy Sacral Insufficiency Fracture in a Case of Carcinoma Cervix

Dr. Veenu Agrawal (MD)[1], Dr. Prathamesh Joshi (DNB)[2], Dr. Shubhangi Shetkar (DNB)[3], Dr. Mukta Kulkarni (DNB)[4]

[1] *(Department of Radiotherapy, Government cancer hospital, Aurangabad)*
[2, 4] *(Department of Nuclear Medicine, Tapadia diagnostic centre, Aurangabad)*
[3] *(Department of Radiology, Tapadia diagnostic centre, Aurangabad)*

Abstract: *Sacral insufficiency fracture is a known complication after pelvic radiotherapy. The condition can be missed if clinical suspicion is not high er can be misdiagnosed as metastases. Imaging modalities play a vital role in correct diagnosis of this pathology. We describe intriguing 'Butterfly sign'/'Honda sign' in sacro-iliac region on bone scan in a patient of carcinoma cervix. Further clinical and radiological evaluation revealed presence of sacral insufficiency fracture. Temporal relation of pathology to radiotherapy suggested possible role of Radiotherapy resulting in SIF. SIF should be considered in differential diagnosis of post radiotherapy patients complaining of sacral pain.*

Keywords: *Bone scan, Butterfly sign, Carcinoma cervix, Honda Sign, Sacral insufficiency fracture*.

I. Introduction

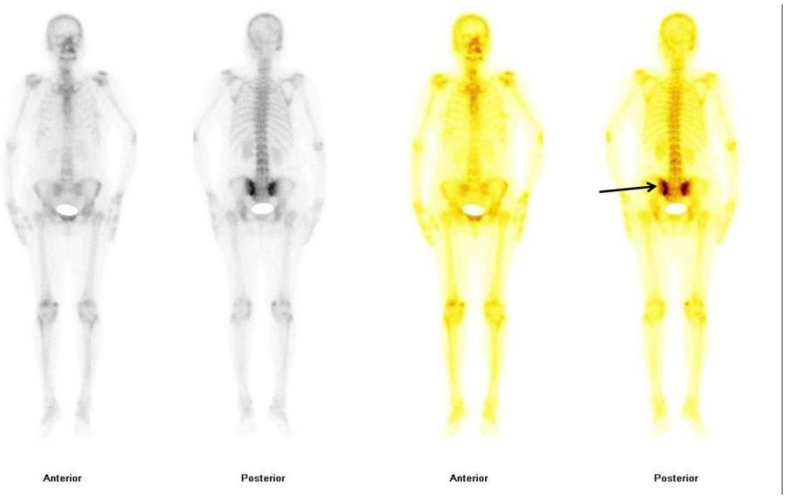
Sacral insufficiency fracture (SIF) is a type of fracture which occurs within normal stress on bone, weakened by demineralization or decreased elastic resistance of bone matrix . The predisposing conditions can be osteoporosis, previous radiotherapy, rheumatoid arthritis, prolonged use of corticosteroids, diabetes or renal failure [1]. We describe a case of post radiotherapy SIF in which bone scan findings followed by radiological investigations led to the diagnosis.

II. Case Report

A 65-year-old woman, post treatment case of carcinoma cervix; presented with a new onset of low back pain. Six months year ago patient was diagnosed with non-keratinizing squamous cell carcinoma cervix (T3bN0M0). Four months ago, she had received 50 Gy external beam radiotherapy (EBRT) to pelvis after 3DCRT planning in 28 fractions on Linear accelerator. Concurrent chemotherapy was administered with five cycles of Injection Cisplatin 50 mg weekly. This was followed by intra-cavitary radiotherapy 8 Gy in two fractions in two weeks. The patient was referred for bone scan in view of the new onset of low back pain and clinical suspicion of bone metastasis. Bone scan(BS) was performed on Siemens dual head gamma camera, three hours after intravenous injection of 24 milliCurie of 99m Technetium methylene diphosphonate. Bone scan revealed symmetrical increased tracer uptake in bilateral sacro-iliac region (arrow in figure 1). Such uptake pattern is described as 'Butterfly sign'(symmetrical sacro-iliac region uptake mimicking wings of butterfly) or Honda Sign (automobile company Honda's H sign- bilateral sacro-iliac uptake of tracer forming vertical lines of H & body of sacrum the horizontal line).Rest of the bone scan was unremarkable. Considering the typical pattern seen on bone scan, a possibility of SIF was raised in bone scan report. For further characterization of sacral pathology and ruling out metastatic disease; computed tomography (CT) was performed (Figure 2). For assessing local disease response, magnetic resonance imaging (MRI) was performed (Figure 3). Both the radiological investigations did not reveal any residual cervix lesion suggesting good response to treatment and they also confirmed bone scan suggested pathology of SIF . Rest of the pelvic bones were normal on CT and MRI. Considering the temporal relation with external Radiotherapy and absence of other known predisposing factors , we concluded post Radiotherapy SIF as cause of her low back pain. She is being managed conservatively by orthopedic surgeon with partial relief of pain.

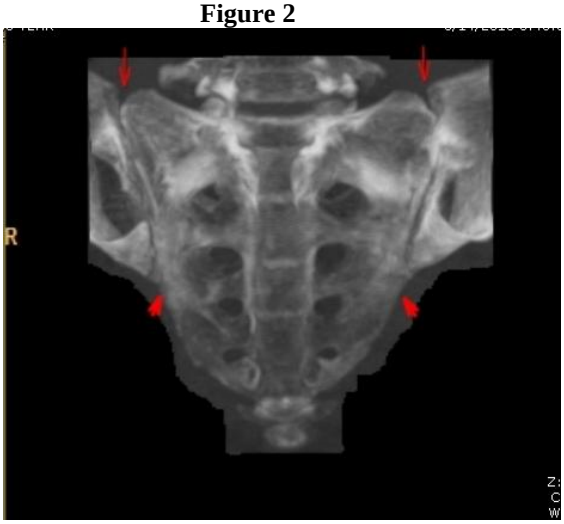
III. Figures

Figure 1



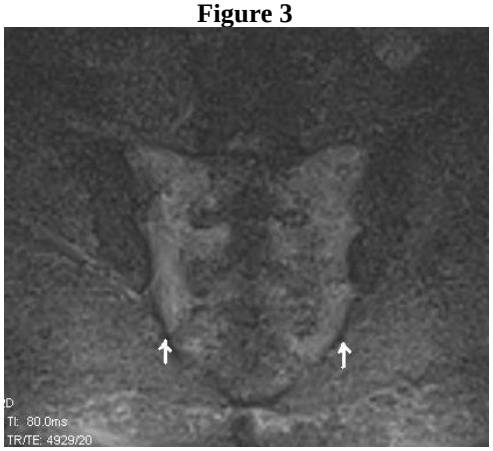
Bone scan reveals symmetrical increased tracer uptake in bilateral sacro-iliac regions. Such uptake is typically known as 'Butterfly sign' or 'Honda sign' and is considered characteristic pattern of SIF.

Figure 2



CT coronal images, Maximum intensity projections in bone window revealed linear sclerosis in bilateral sacrum alae (thick arrows), parallel and adjacent to sacro-iliac joints (thin arrow)

Figure 3



MRI STIR coronal images revealed hyper intensities in zone 1 of sacrum (arrow) suggestive of marrow edema medial to bilateral sacro-iliac joints.

IV. Discussion

Clinically SIF presents as low backache which can be radiating to buttocks or legs [1]. The prevalence in high risk group is 9.5-11.4 % in published literature [2,3]. If misdiagnosed as bone metastasis further diagnostic tests/treatment can result in financial burden to patient and a late diagnosis of SIF can cause delay in treatment; leading to complications [4].

Bone scan remains the most sensitive modality to diagnose SIF with reported sensitivity of 96%. The typical Honda sign or butterfly sign (as seen in our case) is seen in around 40 % of cases [5]. Single photon emission computed tomography (SPECT) along with Xray CT (SPECT-CT) should be utilized when available, as it improves specificity [6].

CT scan and MRI can confirm bone scan findings and rule out metastasis. Other sites, that can result in insufficiency fractures post radiotherapy are- pubic ramus, acetabulum, femoral neck and ilium. Several studies have found out pubic fractures associated with SIFs occur in up to 33% of cases [7]. MRI can provide detailed evaluation of these bones as well.

Positron emission tomography and computed tomography (PET/CT) which is being increasingly used in oncology patients can also show similar 'Honda sign' in SIF [8].

In conclusion, we present this case to increase awareness regarding SIF in post RT patients. SIF should be kept in mind as one of the possible diagnosis by oncologists as well as imaging physicians (Nuclear medicine and radiology) during evaluation of cancer patients with low backache.

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