Breaking Ground in Sarcoma Imaging: The Rise of FDG PET-CT as a Paradigm Shift

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OBJECTIVE

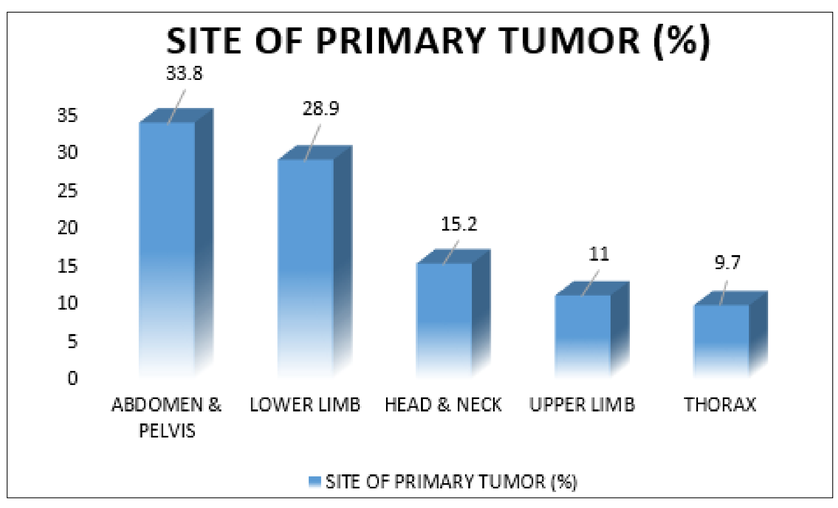
- Sarcoma is a relatively rare malignancy.
- Management is complex, and disease extent is the key factor in guiding appropriate therapy planning.
- NCCN guidelines recommend PET or CT for regional nodal metastases in angiosarcoma, clear cell sarcoma, rhabdomyosarcoma, epithelioid and synovial sarcoma.
- FDG PET-CT is a non-invasive imaging modality based on glucose metabolism.
- Increased glucose metabolism shows correlation with high grade nature and poor survival in soft tissue sarcomas.
- The study evaluates the role of PET-CT in staging/restaging of sarcomas and to find association of SUVmax with survival.

RESULTS

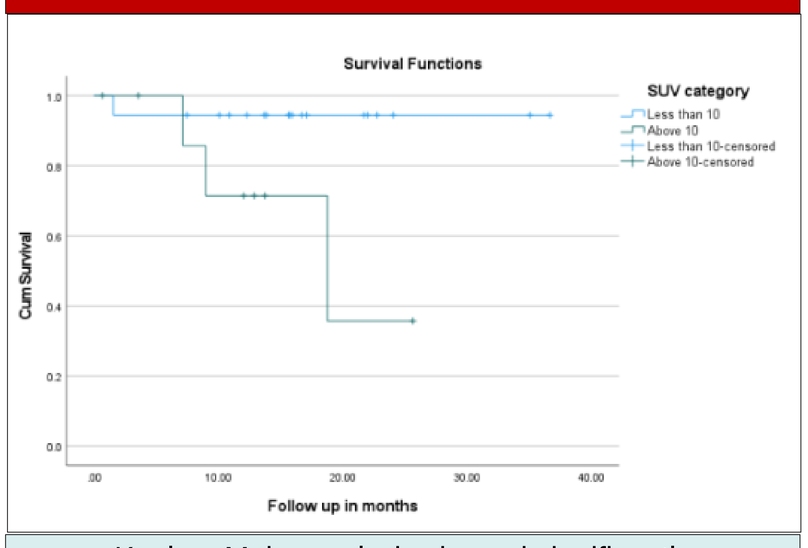
- Most common histopathological type
  - Ewing sarcoma
  - Osteosarcoma
  - Leiomyosarcoma
- Age Range 5-75 years
- Gender distribution 52% males; 48% females
- PET-CT detected
- Primary site:
  - Primary/residual or recurrent disease 40.6% ; SUVmax range 6.7-21
  - Mild primary site uptake 6.1%
  - No uptake in primary 53.3%
- Nodal disease 30.5%
- Distant metastases
  - Lung 22.9%
  - Osseous/Marrow 15.2%
  - Visceral 23.8%
- PET-CT changed management : 15.2%

Materials & Methods

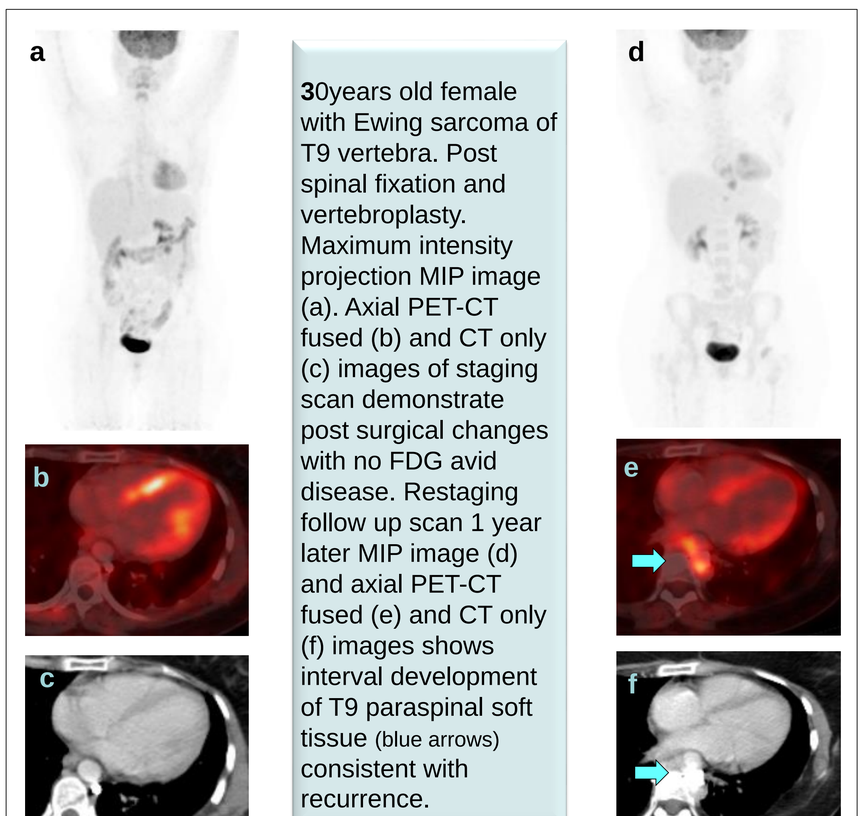
- Retrospective Analysis
- February 2022 to December 2024
- 197 PET/CT scans of 145 patients analyzed
- Parameters reviews
  - Age
  - Gender
  - Histopathology
  - Reason for PET-CT
  - Primary site
  - Metastatic sites
  - SUVmax of Primary site
  - Last follow up
- Analysis of SUVmax and survival using SPSS



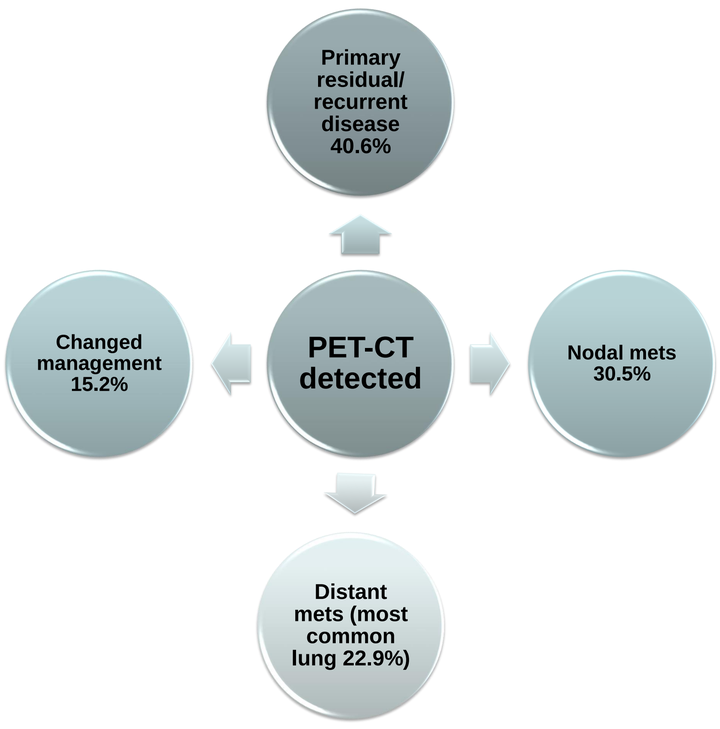
ANALYSIS OF SUVmax OF PRIMARY SITE WITH SURVIVAL



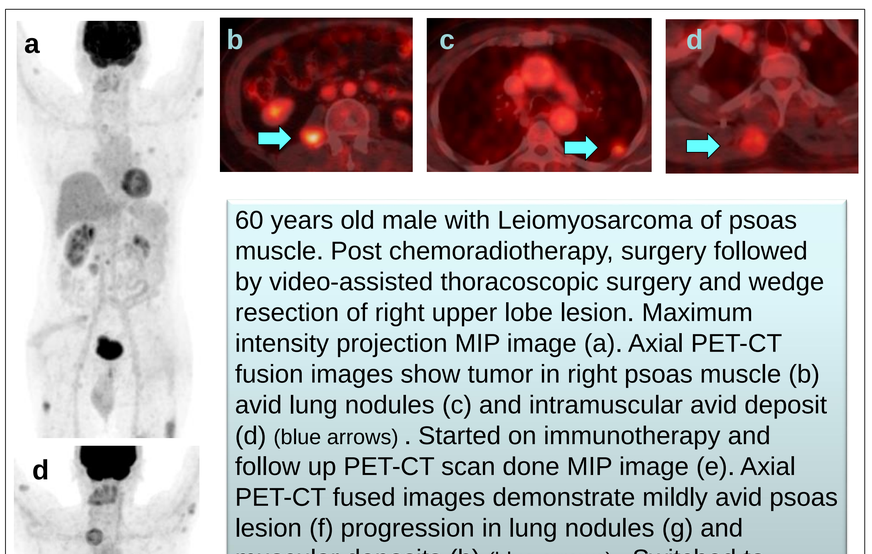
Kaplan–Meier analysis showed significantly poorer survival in patients with SUV >10 compared to SUV ≤10 (log-rank χ^2=4.38, p=0.036).



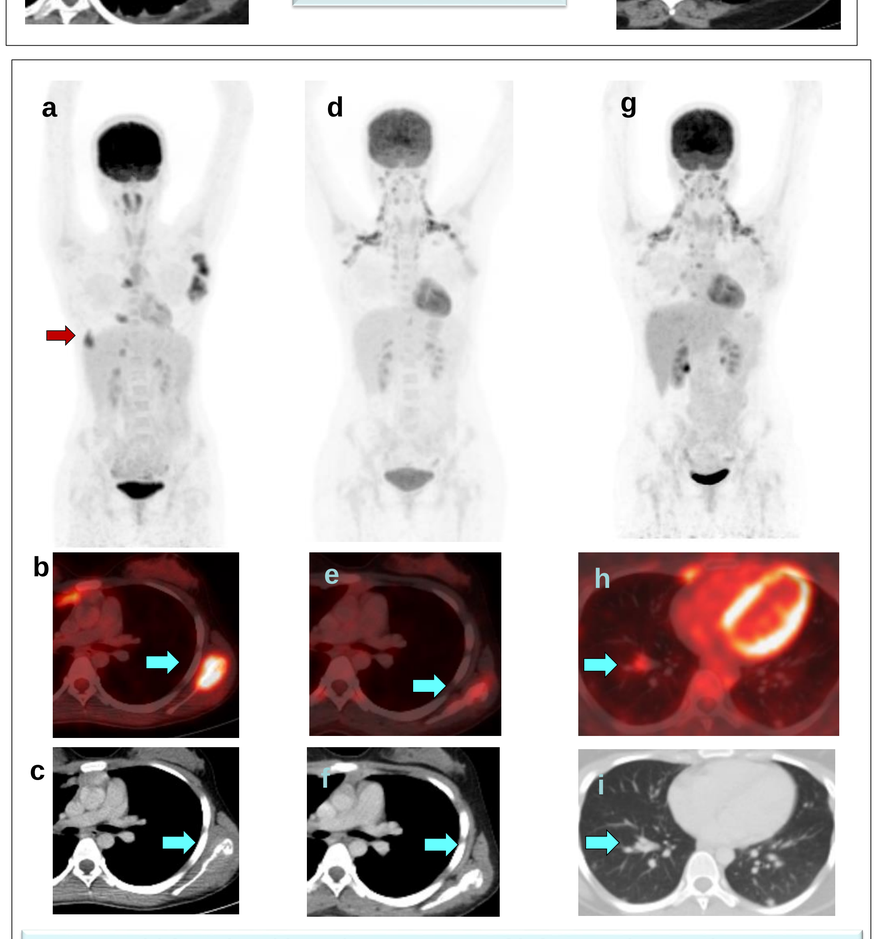
30years old female with Ewing sarcoma of T9 vertebra. Post spinal fixation and vertebroplasty. Maximum intensity projection MIP image (a). Axial PET-CT fused (b) and CT only (c) images of staging scan demonstrate post surgical changes with no FDG avid disease. Restaging follow up scan 1 year later MIP image (d) and axial PET-CT fused (e) and CT only (f) images shows interval development of T9 paraspinal soft tissue (blue arrows) consistent with recurrence.



CASES



60 years old male with Leiomyosarcoma of psoas muscle. Post chemoradiotherapy, surgery followed by video-assisted thoracoscopic surgery and wedge resection of right upper lobe lesion. Maximum intensity projection MIP image (a). Axial PET-CT fusion images show tumor in right psoas muscle (b) avid lung nodules (c) and intramuscular avid deposit (d) (blue arrows) . Started on immunotherapy and follow up PET-CT scan done MIP image (e). Axial PET-CT fused images demonstrate mildly avid psoas lesion (f) progression in lung nodules (g) and muscular deposits (h) (blue arrows) . Switched to palliative treatment.

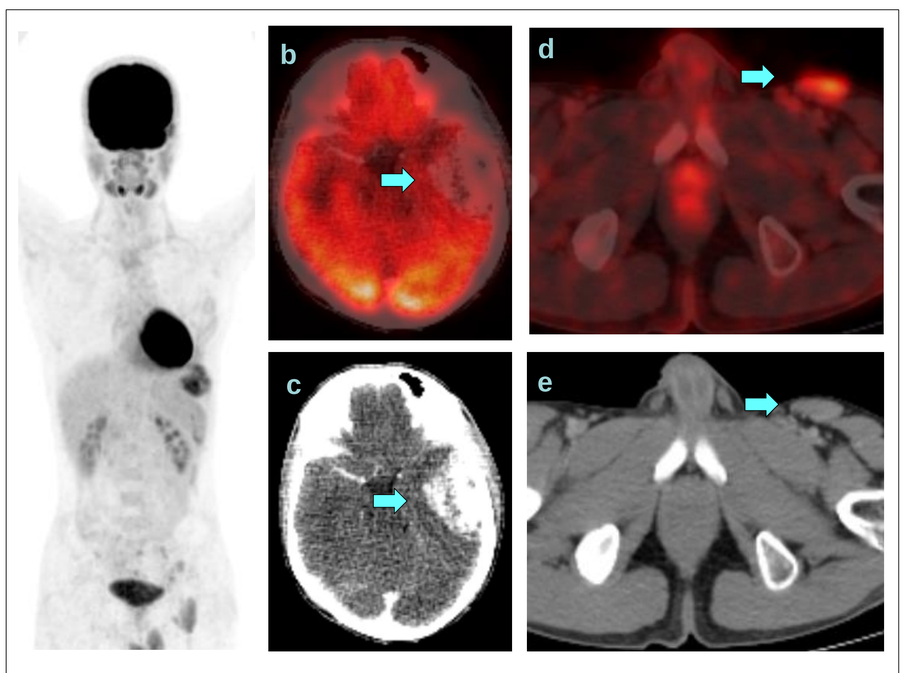


15years old female with Ewing sarcoma of left scapula. Maximum intensity projection (MIP) image (a). Axial PET-CT fused (b) and CT only (c) images of staging scan demonstrate hypermetabolic left scapular mass (blue arrow) & bilateral lung nodules (red arrow). Follow up scan after chemotherapy MIP image (d) and axial PET-CT fused (e) and CT only (f) images shows response in tumor (blue arrows) & lung nodules. Next follow up scan MIP image (g). Axial PET-CT fused (h) and CT only (i) images shows progressive disease with new lung nodules(blue arrows).

CONCLUSION

PET-CT plays a vital role in staging and restaging sarcomas, with significant impact on detecting primary and metastatic disease and altering management.

High primary tumor SUV (>10) is associated with poorer survival, highlighting its prognostic value.



19years old male with Osteosarcoma of left proximal tibia. Restaging PET scan Maximum intensity projection MIP image (a). Fused PET-CT and CT only axial images shows minimally avid extra axial mass in left temporal region (b,c) (blue arrows) . Fused PET-CT and CT only axial images shows avid left inguinal node (d,e) (blue arrows).

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