Imaging Features of Extra-adrenal Myelolipoma

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Learning objectives

- To illustrate the CT and MR imaging findings of extra-adrenal myelolipoma.
- To describe the role of nuclear medicine in the differential diagnosis of a fatty mass, particularly liposarcoma.

Background

Myelolipoma is a benign tumor composed of fatty and hematopoietic elements.

Tumors are most frequently localized in the adrenal gland, followed by the presacral region. Prognosis is generally excellent, and most masses do not need surgical intervention. An accurate diagnosis of fatty masses is mandatory, since malignant disease such as liposarcoma are included in the differential diagnosis.

Findings and procedure details

Myelolipoma is a mesenchymal tumor that is composed of a mixture of adipose and hematopoietic cells. This type of tumor is most commonly localized to the adrenal gland; however, there are rare but well-documented cases of extra-adrenal involvement. The presacral region is the most frequent extra-adrenal location. Other reported locations include the pelvic retroperitoneum, musculofascial tissue,mediastinum, kidney, stomach, and liver.

Extra-adrenal myelolipomas exhibit a slight female predominance and are typically discovered between the ages of 50 to 70 years old. Most tumors are unilateral and have been found to range from 2 to 26 cm in size at the time of diagnosis. The etiology of extra-adrenal mielolipomas is still to be established.

The majority of patients are asymptomatic at the time of diagnosis, and lesions are discovered incidentally on imaging for alternative medical problems.

Depending on the size and location of the lesion, some patients may present with vague flank or abdominal pain due to hemorrhage, mechanical compression, or tumor infarction.

The imaging characteristics of extra-adrenal myelolipomas are similar to their adrenal counterparts. **Myelolipoma appearance on CT** depends on the composition of the lesión. Presacral myelolipoma contains macroscopic fatty tissue and hematopoietic softtissue density elements on CT. It appears as a heterogeneous mass that is well encapsulated and is closely attached to the anterior aspect of the sacrum. The mass has a low attenuation value consistent with fat (less than #20 HU) but may have soft-tissue density components representing the hematopoietic tissue. Hemorrhage and calcifications can also be seen on CT. The hematopoietic soft tissue elements may enhance after injection of intravenous contrast.

On MR imaging, the fatty components of a myelolipoma yield high signal intensity on T1-weighted images, which demonstrate fat suppression when applied. Hematopoietic elements will have lower signal intensity on T1-weighted images and intermediate signal intensity on T2-weighted images. Intra-tumoral hemorrhage may also be seen, and its resultant appearance and intensity characteristics will vary depending on the age of the blood . In-phase and out-of-phase gradient recalled echo (GRE) sequences may also be useful, as areas of a lesion with intracellular fat will lose signal on out-of-phase images, while areas of macroscopic fat (more typical of myelolipoma) will maintain signal intensity. The hematopoietic soft tissue elements may enhance after administration of intravenous gadolinium contrast. Myelolipoma may show restricted diffusion.

Differentiating presacral myelolipoma from other fat containing retroperitoneal tumors (namely liposarcoma, teratoma, and extramedullary hematopoiesis) may be difficult depending on the amount of visible fat and clinical history, as there is overlap in their imaging and microscopic appearances. Well-differentiated liposarcoma is the most common fat-containing retroperitoneal tumor. The malignant nature of the tumor causes it to exhibit more infiltrative growth without the well-defined borders and circumscription that myelolipoma tends to exhibit. In addition, liposarcoma can present with metastasis, whereas presacral myelolipoma will never present with metastasis.

Sulfur colloid scan using 99mTc can be used for imaging the reticuloendothelial system. In a normal study, 80-90% of uptake is seen in the liver, 5-10% is seen in the spleen, and the remainder is seen in the bone marrow. By taking advantage of this bone marrow distribution uptake, one can look for the distribution of myeloid elements within a presacral myelolipoma that would not be seen in liposarcoma. Technetium-99m sulfur colloid scintigraphy will confirm the presence of erythroid cells in presacral mielolipoma. Sulfur colloid imaging might be considered when a well-encapsulated mixed fatty and soft-tissue mass is seen. These features would more favor a diagnosis of presacral myelolipoma over liposarcoma. When a more aggressive-appearing fatty presacral mass is encountered with ill-defined margins, then biopsy as a next step would be warranted to rule out liposarcoma.

Images for this section:

Fig. 1: Presacral myelolipoma. Axial, sagittal and coronal contrast-enhanced CT images of presacral myelolipoma show encapsulated fatty and soft-tissue mass (arrows) attached to anterior sacrum. There is no invasion.

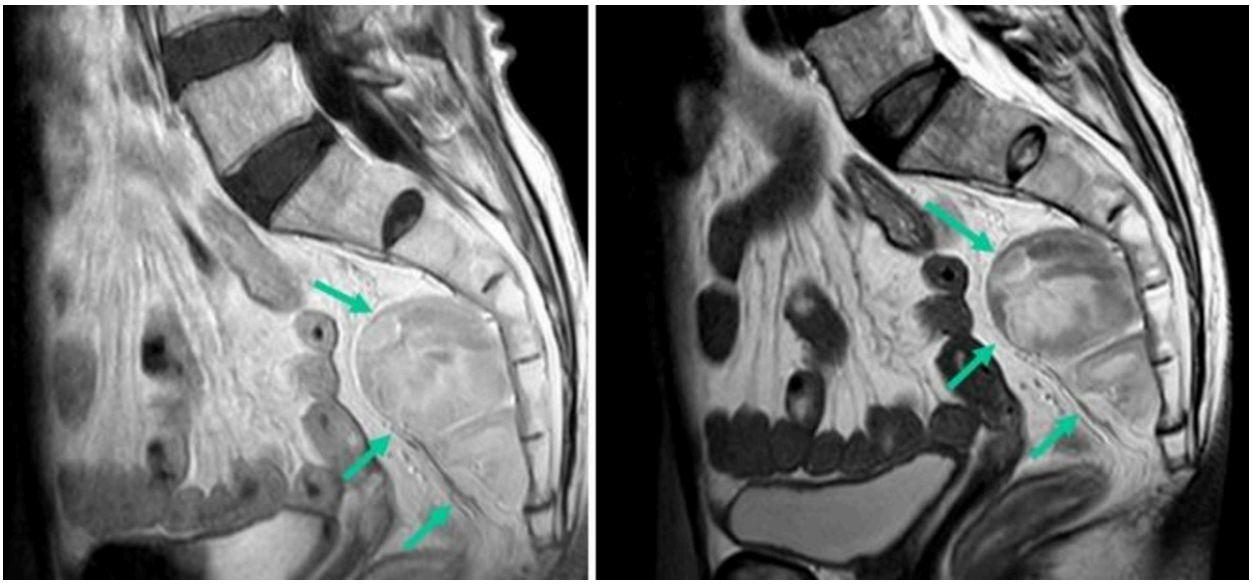

Fig. 2: Presacral extra-adrenal myelolipoma. Pre-contrast T1 and T2-weighted fast spin echo (FSE) sagittal image at the level of the midsacrum demonstrated a lobulated presacral mass with mixed fat/soft tissue signal (arrows). No bony invasion was seen.

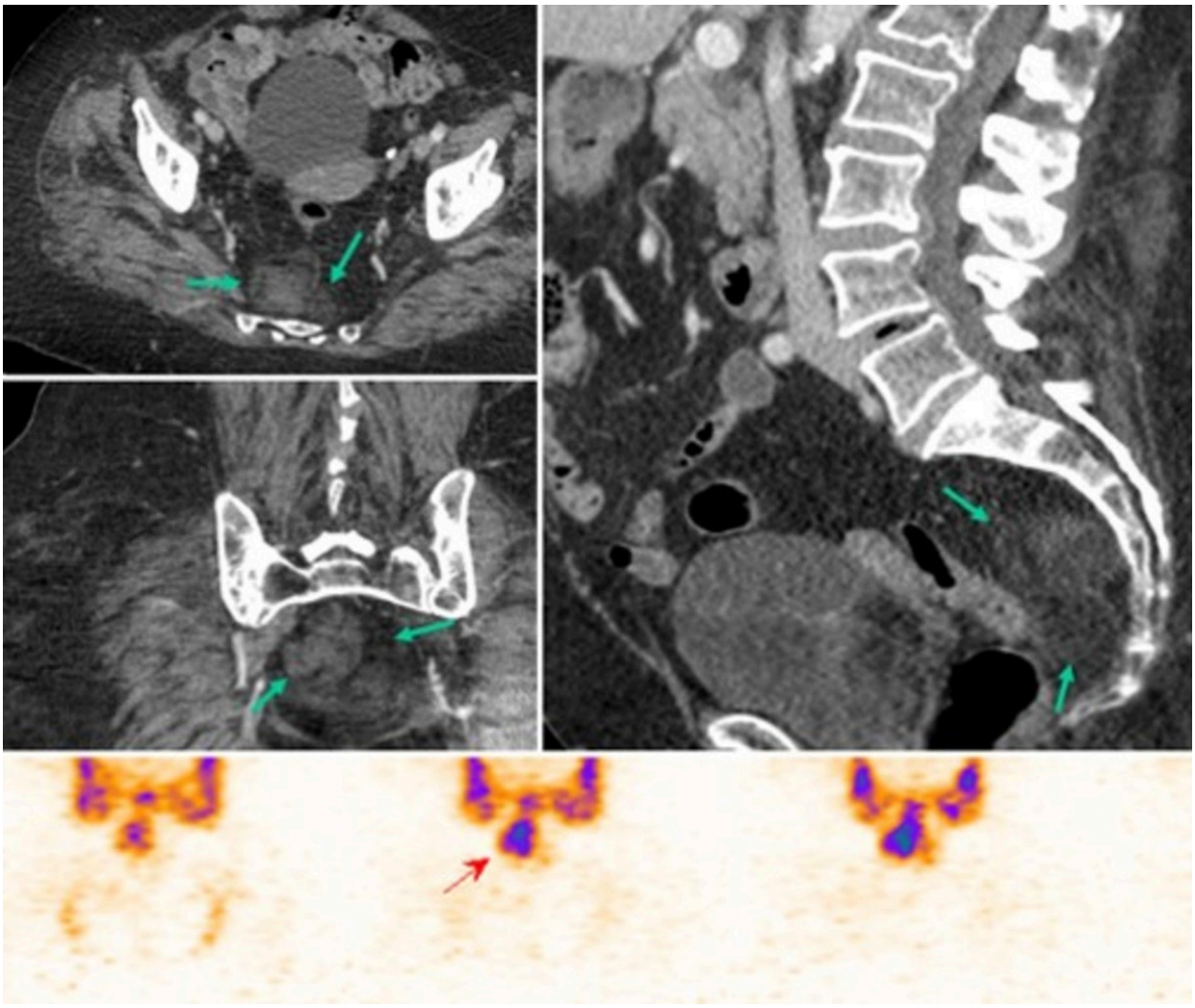

Fig. 3: Axial, coronal and sagittal images show incidental lobulated, heterogeneous presacral mass without evidence of erosion/invasion of the anterior sacrum (arrows). The mass is composed of fat and soft tissue elements. In bone marrow scintigraphy, a pathologic, focally increased site of uptake is exhibited in the presacral region. This finding was helpful to differentiate the lesion (arrows) from other lipid containing soft tissue tumors, thus supporting the initial diagnosis of myelolipoma.

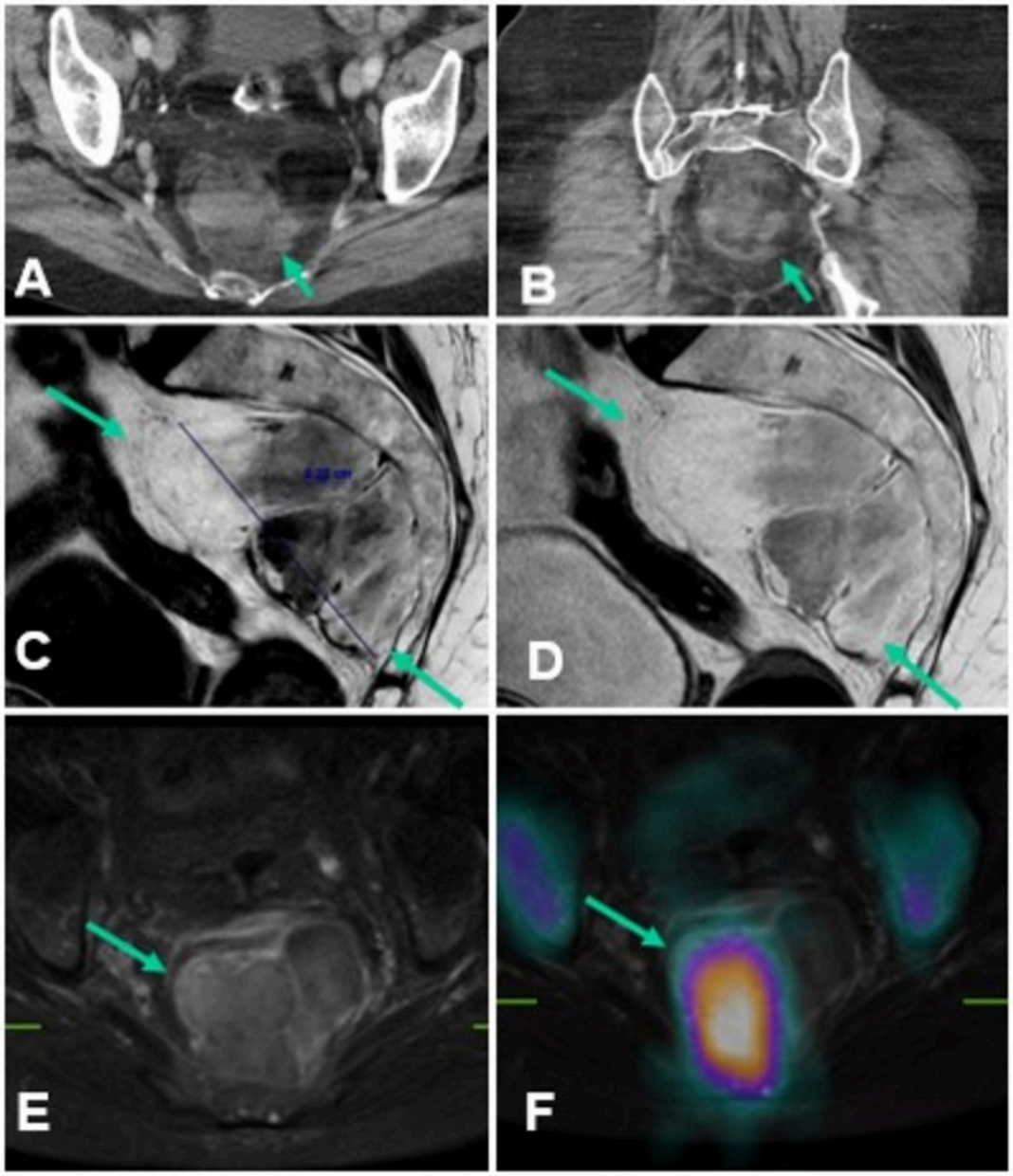

Fig. 4: Presacral myelolipoma. (A, B) Axial and coronal contrast-enhanced CT image shows lobulated presacral mass (arrow) with mixed fatty and soft-tissue densities. (C,D) Sagittal T1 and T2-weighted MR images show high-signal-intensity encapsulated mass (arrow) in presacral region. There are internal regions of intermediate signal intensity within it. (E) Axial T1-weighted fat-saturated gadolinium-enhanced MR image shows mild enhancement of tissue (arrow) within presacral myelolipom. (F) Technetium-99m sulfur colloid scintigraphy fused image shows uptake (arrow) in soft-tissue density of presacral myelolipoma.

Conclusion

Differentiation of presacral myelolipoma from other entities on imaging can be difficult because their imaging features overlap with one another.

The combination of a well-encapsulated fat-containing presacral mass on radiologic studies along with increased uptake on sulfur colloid scintigraphy, support the diagnosis of a presacral myelolipoma.

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