



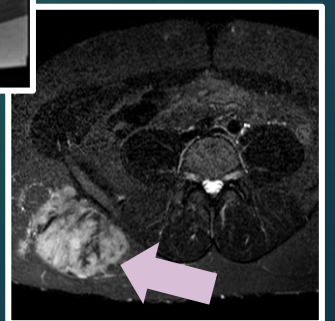
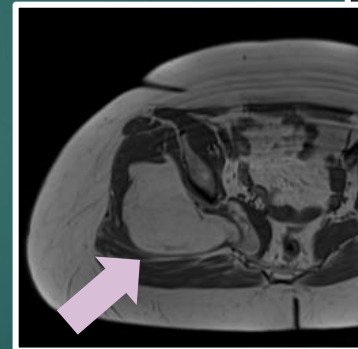
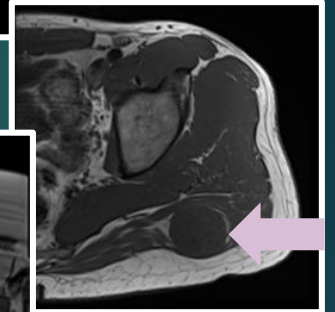
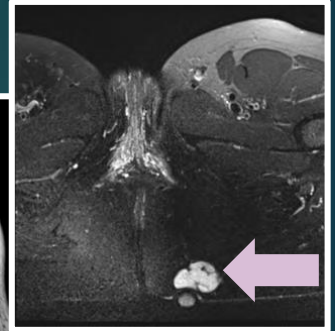
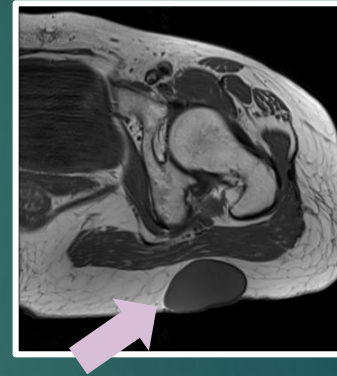
PAIN IN THE BUTTOCK (MASSES)

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EDUCATIONAL GOALS

1. To review the spectrum of buttock masses on imaging
2. To present an approach to non-neoplastic, benign, and malignant buttock masses on ultrasound, CT and MR imaging
3. To discuss the management pathway of benign and malignant buttock masses



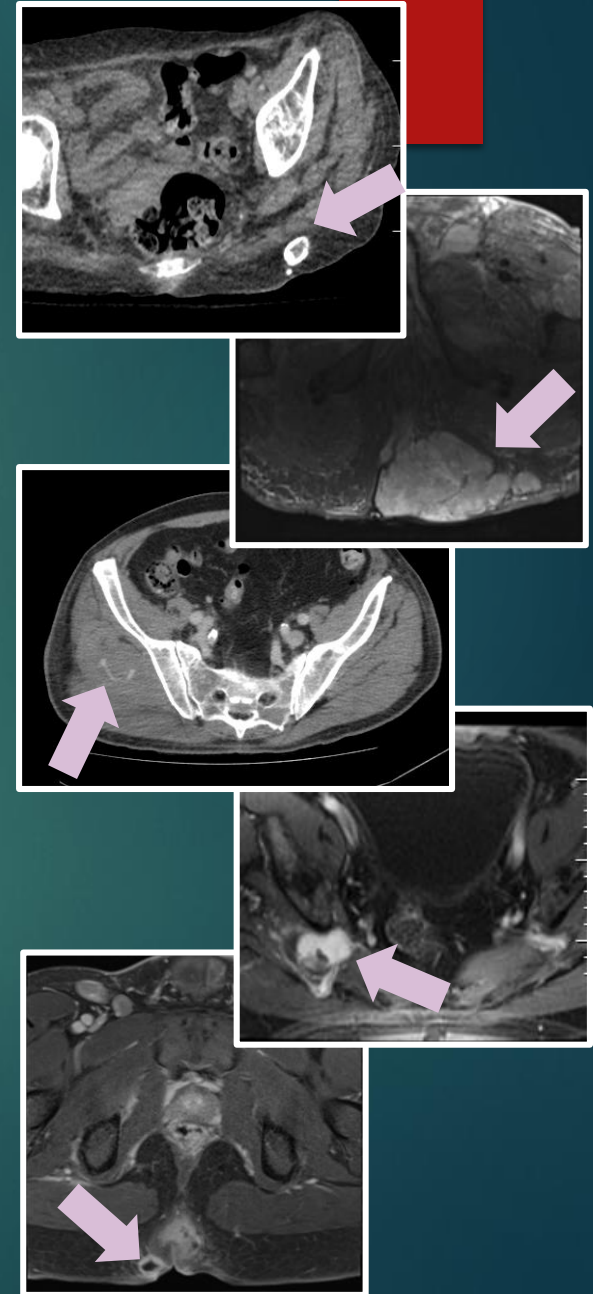
BACKGROUND

There is a wide spectrum of disease that can involve the buttocks, ranging from non-neoplastic to malignant processes.

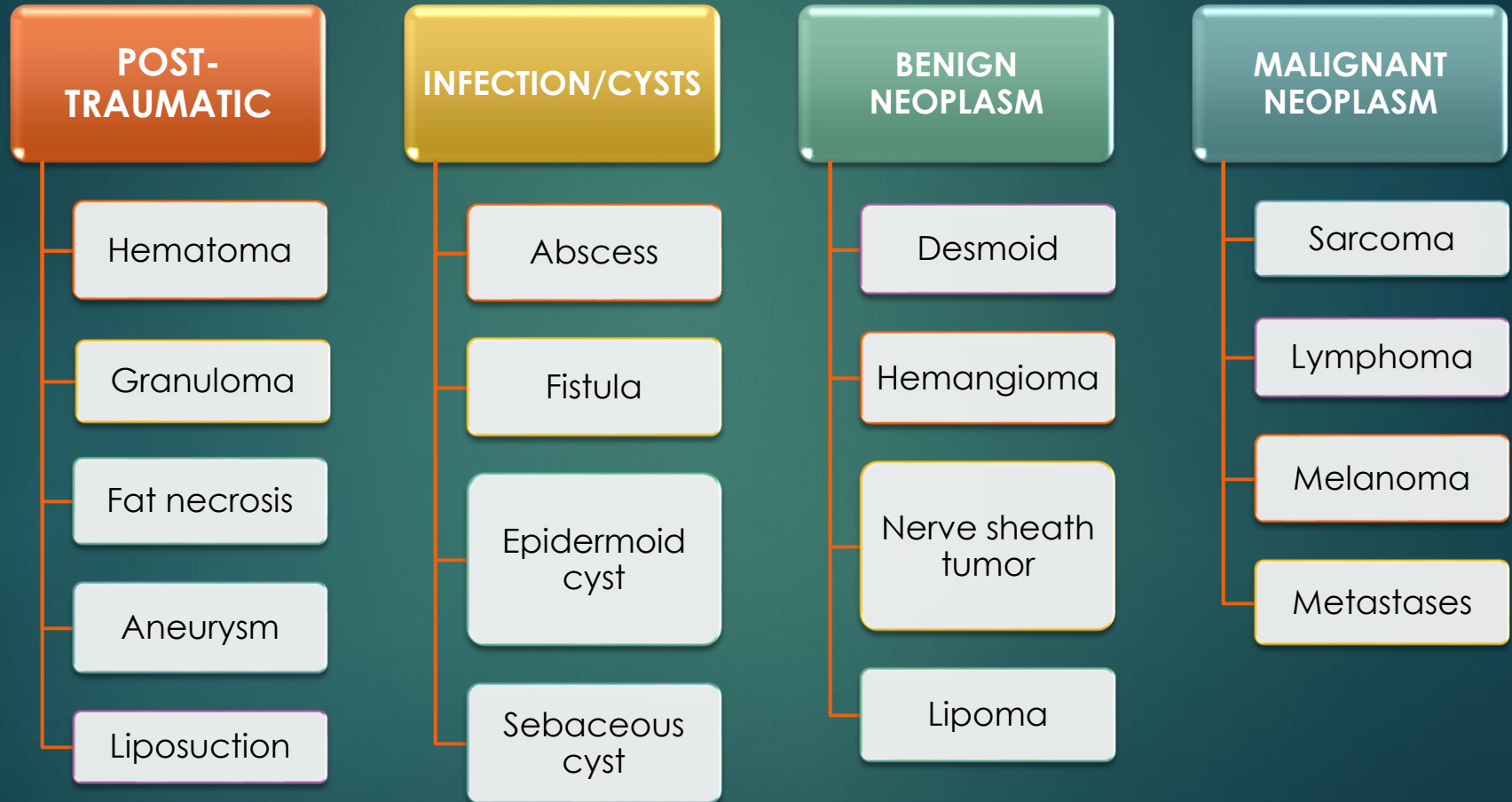
Often, patients will present with a palpable mass and clinical history can help narrow the differential diagnosis.

If there is a history of trauma or surgery, a non-neoplastic cause is likely. However, many neoplastic causes of a palpable buttock mass exist, and careful consideration of potential malignant diagnoses should not be missed.

We will present a comprehensive review of the non-neoplastic, benign and malignant processes that involve the buttock.



DDX BUTTOCK MASSES



HEMATOMA

Soft tissue hematomas often occur in the context of trauma or intervention.

Unenhanced CT will demonstrate a high density collection. Depending on the clinical history, contrast enhanced phases such as angiography and delayed phases can be used to assess for active bleeding. “Blushes” of contrast or pooling of contrast on delayed phase indicate active bleeding.

If the patient is hemodynamically stable, then conservative management can be considered for hematomas. If active bleeding is seen, interventional radiology should be consulted for embolization assessment.

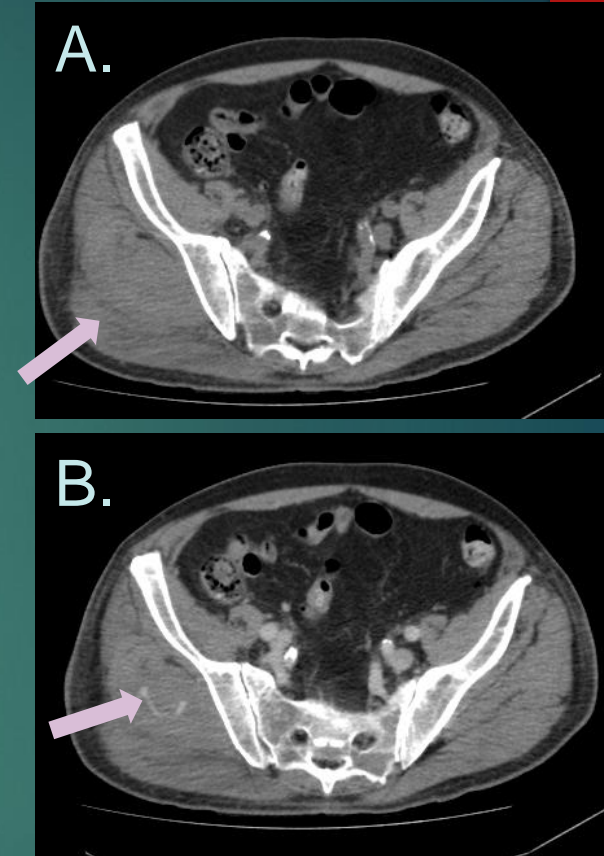


Figure A: Unenhanced CT demonstrates a slightly high attenuation mass in the right buttock centered within the gluteus medius muscle.

Figure B,C: Contrast-enhanced CT shows active bleeding within the gluteus medius muscle hematoma. This patient was post bone marrow biopsy.

GRANULOMA

Gluteal injection granulomas have a typical appearance on imaging.

Small, well defined and typically calcified nodules are seen in the subcutaneous tissues of the buttocks.

Granulomas occur in the context of subcutaneous injection with inflammation and subsequent fat necrosis with often dystrophic calcification formation.

A clinical history of prior gluteal injections is supportive.

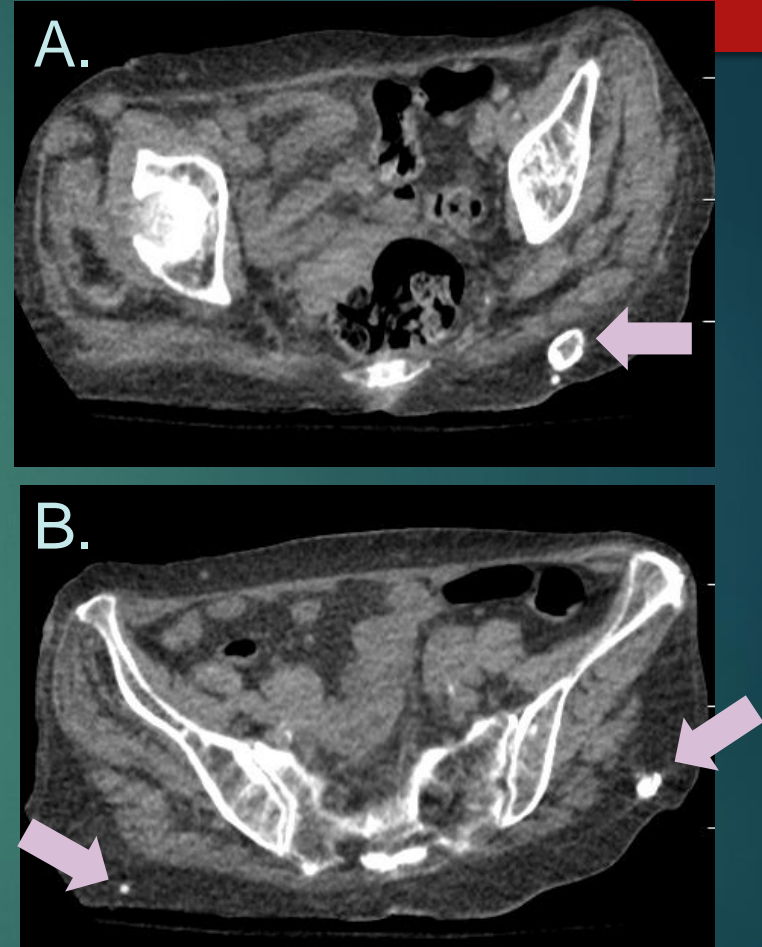


Figure A: Unenhanced CT images demonstrate several calcified nodules in the buttock subcutaneous tissues. These were in keeping with calcified injection granulomas.

FAT NECROSIS

Fat necrosis can present clinically as a palpable lump often in the context of trauma.

On imaging, a globular or lobulated fatty mass is present with soft tissue stranding. If contrast is given, then rim enhancement can be seen.

Differential between fat necrosis and liposarcoma on imaging can be challenging. Large size >10cm, thick septations, presence of nodular soft tissue masses, and decreased percentage of fat content should raise suspicion for liposarcoma.

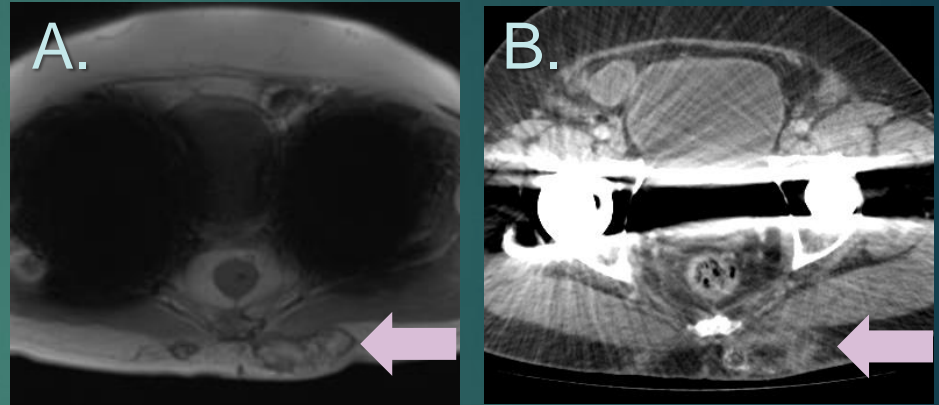


Figure A: Axial T1W MR image shows a fatty area of inflammatory change in the left posterior buttock.

Figure B: CT of the same patient demonstrates a rounded area of fatty inflammatory change with tiny flecks of calcification medially, in keeping with post traumatic fat necrosis.

ANEURYSM

Gluteal pseudoaneurysms often occur in the clinical context of trauma or intervention.

Angiography utilizing CT or MRI can be used to assess for suspected pseudoaneurysm. One will see a saccular filling of contrast on the angiographic phase. Delayed phases can be utilized to assess for bleeding from the pseudoaneurysm.

Interventional radiology should be consulted for potential embolization.

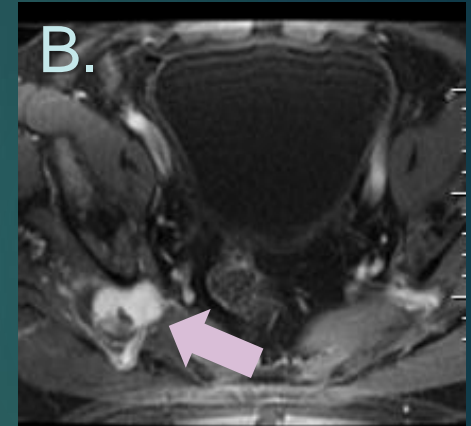
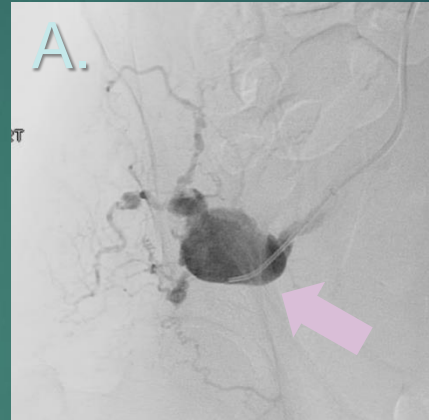


Figure A: Angiography image demonstrates selective catheterization of the gluteal artery with a large aneurysm filling with contrast.

Figure B: T1W post contrast image demonstrates a large gluteal artery aneurysm. This post was post bone marrow biopsy.

LIPOSUCTION

Liposuction involves blunt cannula insertion into the subcutaneous layer of the region being treated followed by aspiration of the fat from the deep subcutaneous layer. Solutions containing lidocaine, epinephrine and saline are often utilized during the process to provide anesthesia and prevent blood loss.

Normal post treatment changes can include heterogeneous stranding and edema/fluid in the site. Traumatic procedures can result in excessive bleeding and hematoma formation. Abscess can also occur if infection results.

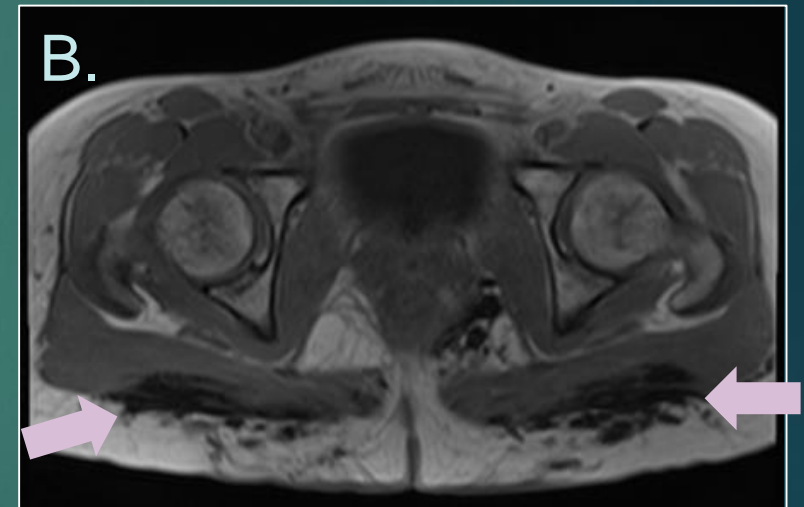


Figure A: CT image demonstrates patchy soft tissue change in the deep subcutaneous tissues overlying the gluteus maximus muscle who had recent liposuction procedure. **Figure B:** T1W MR image demonstrates dark heterogeneous changes in the buttock muscles and in the overlying subcutaneous tissues in keeping with hemosiderin deposits from post-traumatic liposuction. No organized hematoma was seen.

FISTULA

Perianal fistulas can be idiopathic in etiology. Crohn disease, infection (tuberculosis), trauma, or anorectal carcinoma are other possible causes.

Fistula tracts can course along and exit the gluteal cleft. Abscess can also occur in the gluteal region.

On imaging, the presence of an enhancing tract within the gluteal soft tissues with connection to the anal sphincter complex will be seen.

MRI is the modality of choice for assessment of perianal fistula disease.

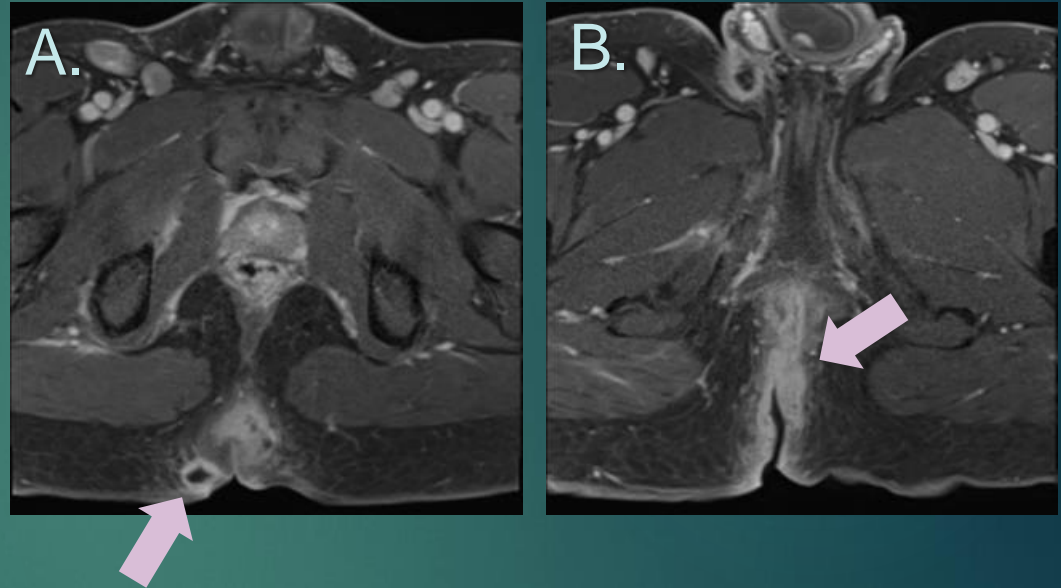


Figure A,B: Axial post contrast T1-fat saturated images of the pelvis demonstrate a rim-enhancing collection in the right medial buttock. Further inferior image demonstrates bilateral tracts in the natal cleft representing perianal fistula disease.

EPIDERMOID CYST

Epidermoid cysts are well-circumscribed lesions which often abut or communicate with the skin surface.

Varying degrees of T1 and T2 signal intensity can be seen within the cyst. There should be no internal enhancement within the cyst, but wall enhancement can be seen.

On ultrasound, a laminated internal architecture can be seen.

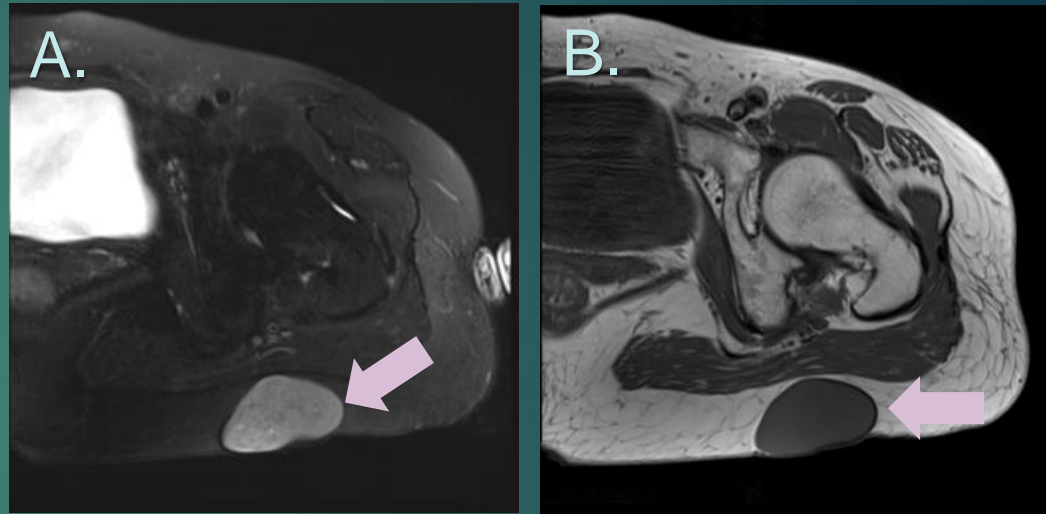


Figure A,B: T2-fat saturated and T1W image demonstrates a cystic lesion in the subcutaneous tissues of the left buttock. The cyst is well-circumscribed, abuts the skin and demonstrates areas of intermediate T2 material within.

FIBROMATOSIS

Desmoid fibromatosis is a mesenchymal tumor that is locally aggressive, composed of spindle-shaped fibrous cells surrounded by collagen material.

MR is the imaging modality of choice for assessment. Masses are varying iso- to hyperintense to muscle on T2W images and isointense to muscle on T1W images.

The presence of very dark T2 bands in the mass likely represent dense regions of collagen and hypocellularity.

Masses typically demonstrate avid contrast enhancement.

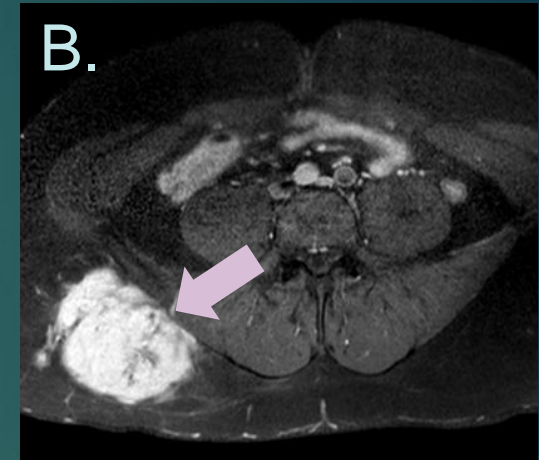


Figure A: Axial T2-fat saturated image demonstrates a large lobulated mass in the upper right buttock subcutaneous tissues. The mass is heterogeneous with predominantly high T2 signal intensity. Note the regions of very dark T2 bands within the mass.

Figure B: Post-contrast T1-fat saturated image demonstrates avid enhancement of the mass, with less enhancement of the very dark T2 strands. This mass is in keeping with fibromatosis.

HEMANGIOMA

Soft tissue hemangiomas are benign vascular tumors.

Patients with buttock soft tissue hemangiomas can present with pain or swelling, that can be intermittent.

On MR imaging, a lobulated mass containing septations and central low T2 signal intensity is seen. The lesion is overall high signal on T2W images.

Dynamic contrast-enhanced imaging may show progressive enhancement of the lesion.

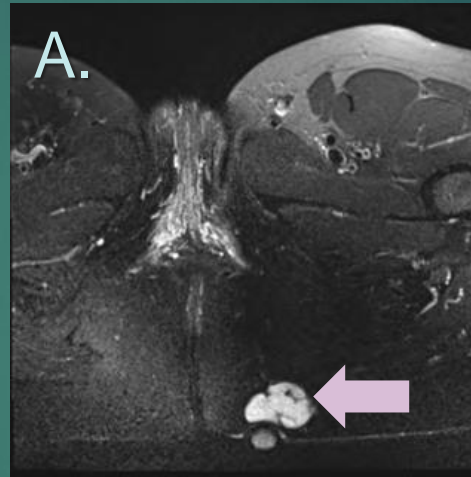
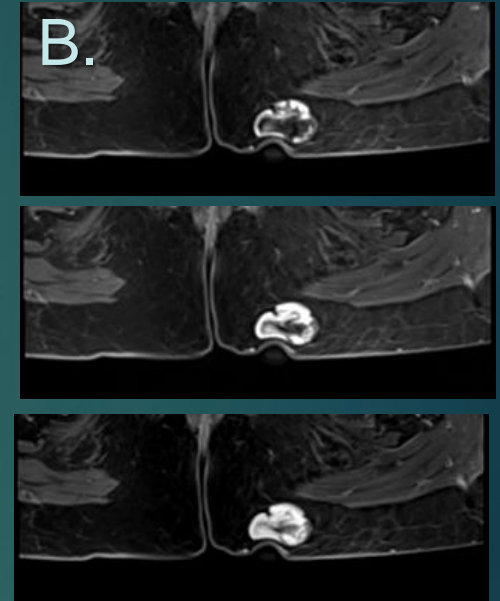


Figure A: Axial T2 fat-saturated MR image demonstrates a very high T2 signal intensity lobulated mass with septations within the subcutaneous tissues of the medial left buttock.

Figure B,C: Dynamic post-contrast T1-fat saturated images demonstrates progressive enhancement of the mass. This was in keeping with a soft tissue hemangioma.



SCHWANNOMA

Benign peripheral nerve sheath tumors include schwannoma and neurofibroma.

On imaging, both lesions can demonstrate the **split-fat sign** (thin peripheral rim of fat around the lesion), fusiform shape, and target sign (hyperintensity on T2W images with central low signal).

Schwannomas tend to be more eccentrically positioned, while neurofibromas are centrally located to the nerve.

Schwannomas tend to have more cystic change than neurofibromas.

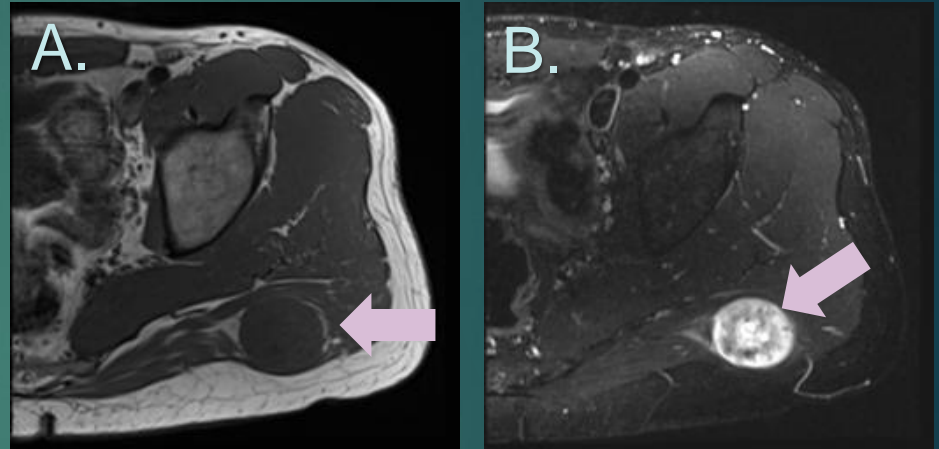


Figure A: Axial T1W MR image demonstrates a rounded mass in the left gluteus maximus muscle. Notice the presence of a split-fat sign.

Figure B,C: T2-fat saturated image demonstrates the mass to be of heterogeneous high T2 signal intensity. This was in keeping with a schwannoma of the gluteus maximus.

LIPOMA

Benign gluteal lipomas can occur as a palpable mass or an incidental finding on imaging.

These masses are composed of **well-differentiated fat and appear bland on imaging (no internal soft tissue component should be seen)**. Thin fibrous strands can be seen within the lipoma.

If large, the lipoma can have mass effect on surrounding structures, but no aggressive invasion should be seen.

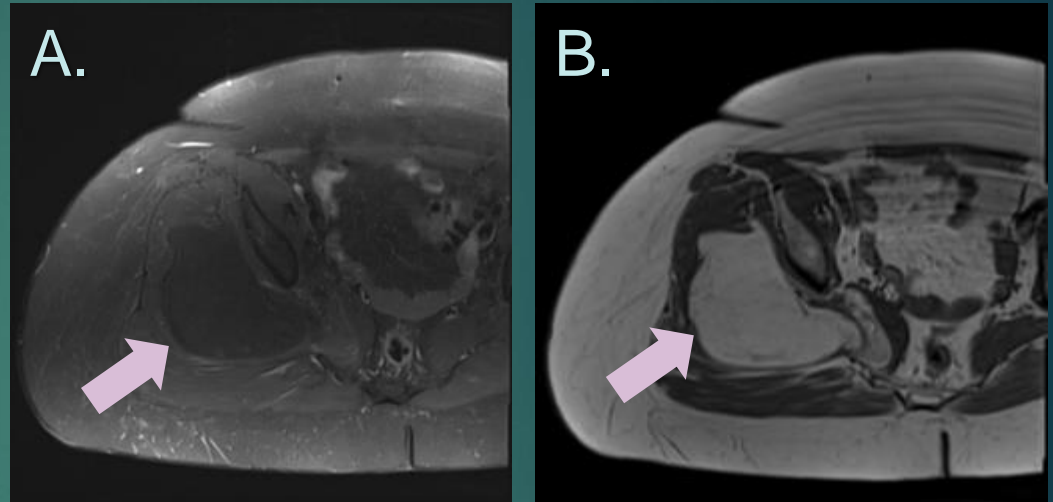


Figure A,B: Axial T2-fat saturated and T1W MR images demonstrates a fatty mass in the right buttock. The mass is centered within and around the gluteus medius muscle. The internal architecture of the fatty mass is bland, with minimal septations and no solid component. This was in keeping with a lipoma.

SARCOMA

Primary buttock soft tissue sarcomas are common malignant entities that occur primarily in adults. The most common histological types are liposarcoma, leiomyosarcoma and synovial sarcoma.

Often these tumors can grow to a large size before becoming symptomatic due to the large muscle bulk in the gluteal region or the presence of a large amount of subcutaneous tissue dependent on body habitus.

Treatment consists of wide local excision and often adjuvant radiation therapy.

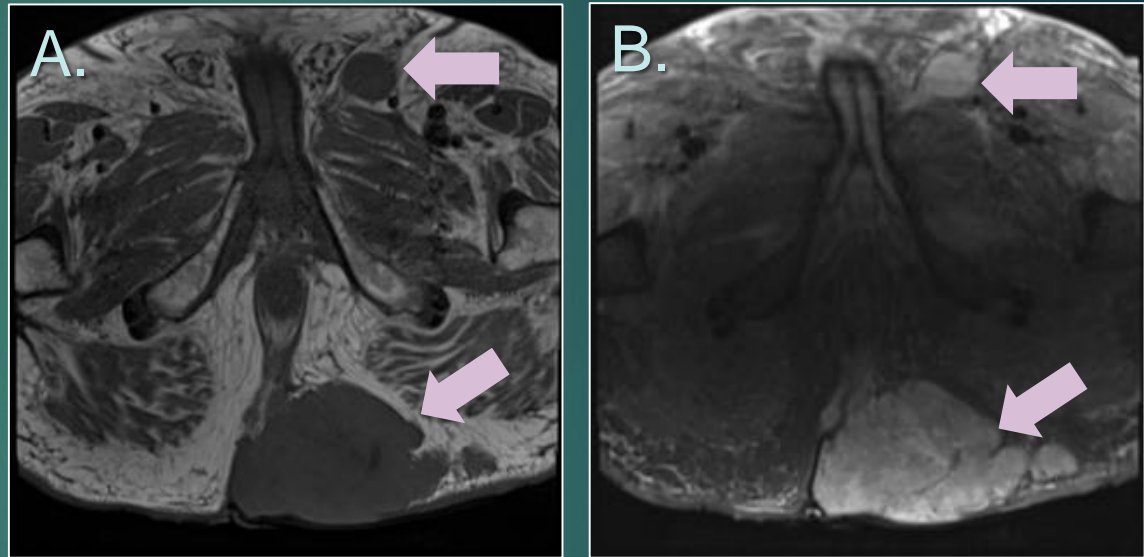


Figure A,B: T1W and T2FS MR images of a gluteal mass demonstrates very high T2 signal intensity. Left inguinal adenopathy is also present. Pathology showed epithelioid sarcoma.

SARCOMA (MYXOID)

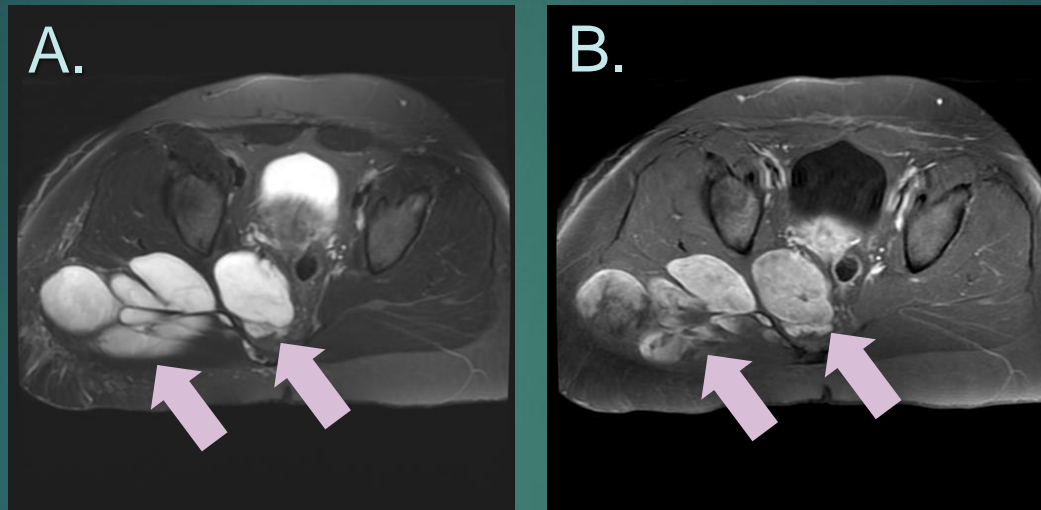


Figure A,B: T2-fat saturated and T1 post contrast fat-saturated MR images demonstrates a very high T2 signal intensity multi-lobulated mass with both intrapelvic and extrapelvic components. The mass is situated within the right gluteal muscles and there is an intrapelvic component in the right posterior pelvis. There is avid mildly heterogeneous enhancement of the mass. This was in keeping with a myxoid liposarcoma.

OSTEOSARCOMA

Osteosarcoma of the bone produces an osteoid matrix. Conventional osteosarcoma is an aggressive lesion, arising from the outer periosteum of bone and producing a cloud-like osseous matrix.

Patients usually present with bone pain or a palpable soft tissue mass. **Primary tumors usually occur in the metaphyseal regions of long bones and secondary lesions (usually malignant degeneration of Paget's disease) in flat bones, especially the pelvis.**

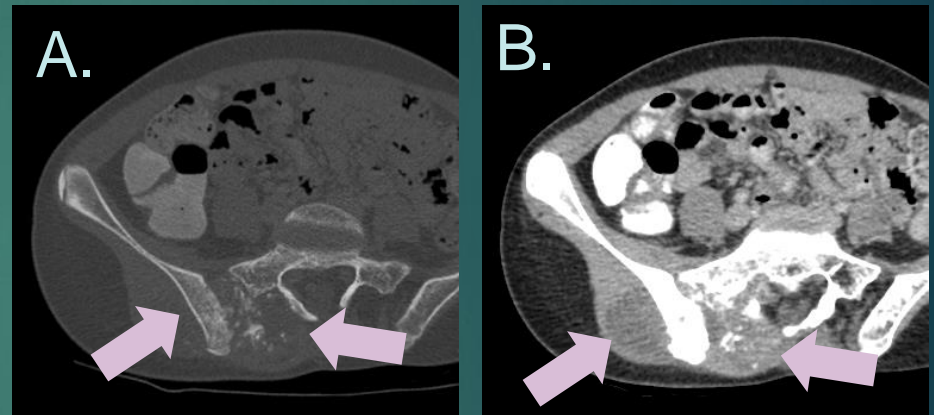


Figure A: CT in bone windows demonstrates an aggressive osseous lesion involving the right hemipelvis and the adjacent right posterior ilium.

Figure B: CT in soft tissue windows demonstrates that the bony mass has soft tissue component. Note the presence of mass involving the right gluteal muscles.

EWING SARCOMA

Ewing sarcoma is the second most common primary bone tumor. Primary osseous Ewing sarcoma typically involves the diaphysis of long bones and the pelvis is the most involved site.

On plain films, a lytic or mixed lytic-sclerotic lesion can be seen with laminated periosteal reaction or lifting of the periosteum.

MRI is used to assess the degree of extraosseous soft tissue involvement, tumor extent within the marrow and evaluation for skip lesions.

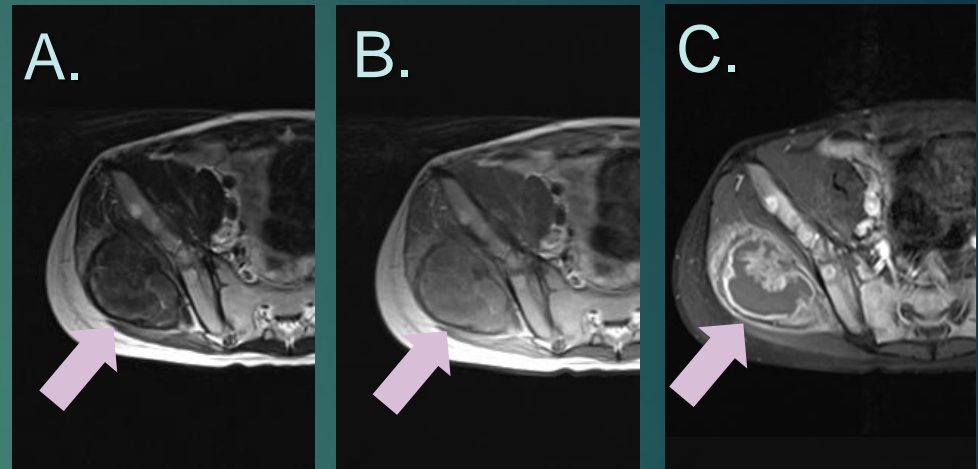


Figure A,B,C: Axial T2W, T1W, and T1 post-contrast images demonstrates a large mass in the right gluteal muscles. The mass is intermediate to low signal on T2, intermediate to high on T1. There is peripheral and central soft tissue enhancement within the mass. The adjacent iliac bone is abnormal, with heterogeneous tumor infiltration in the marrow.

LYMPHOMA

Extranodal lymphoma involving and isolated to muscle is rare, accounting for 1.5-8.3% of non-Hodgkin lymphoma.

The appearances of muscular lymphoma on imaging can be similar to that of soft tissue sarcomas or metastases.

Tissue biopsy is needed to determine the diagnosis.

On imaging, lymphoma of muscle is of similar density and isointensity to skeletal muscle. Varying regions of enhancement can be seen within the mass.

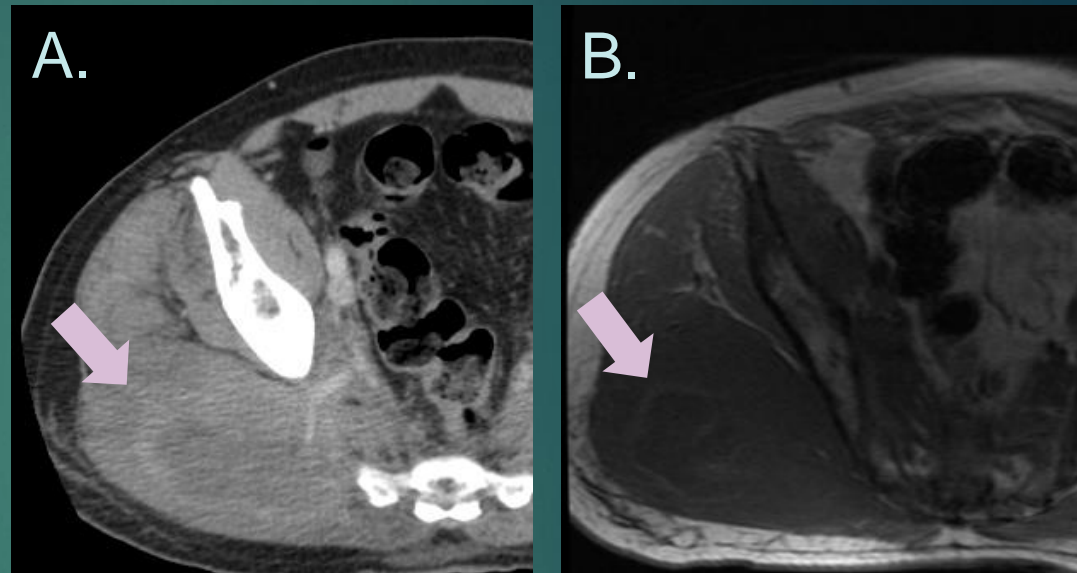


Figure A: CT image demonstrates mass-like enlargement of the right gluteal muscles. The mass is the same attenuation as the muscles with some minor areas that are slightly hyperdense to muscle.

Figure B,C: T1W MR image demonstrates similar findings with a mass in the right gluteal muscles with signal intensity isointense to the adjacent gluteal muscle. This was biopsy proven large B cell lymphoma.

METASTASES

Soft tissue metastases can involve the gluteal region.

Multifocal lesions and a history of primary malignancy should lead to this diagnosis.

A common primary malignancy with soft tissue metastases is metastatic melanoma.

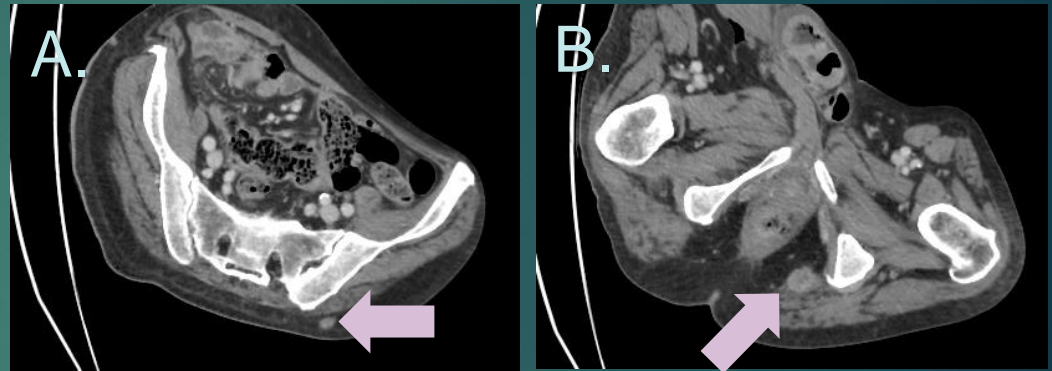


Figure A,B: CT images demonstrates multiple soft tissue lesions in this patient. A deposit is noted in the left buttock subcutaneous tissues and a further deposit is noted in the ischioanal fat. This patient had a history of metastatic melanoma.

TAKE HOME POINTS

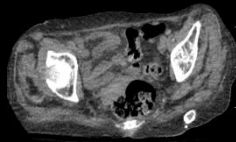
POST-TRAUMATIC

- Hematoma



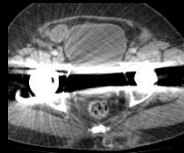
- History provided of trauma or intervention
- High density collection on CT

- Granuloma



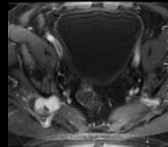
- History of buttock injections
- Calcified nodule in the subcutaneous tissue

- Fat necrosis



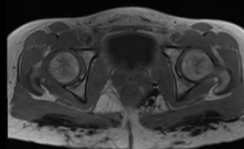
- History of trauma or intervention
- Globular or lobulated fatty mass with soft tissue stranding

- Aneurysm



- History of trauma or intervention
- CTA for imaging +/- interventional radiology

- Liposuction



- History of liposuction
- Stranding, fluid, edema, or hematoma in the subcutaneous tissues

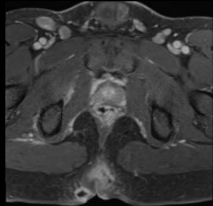
TAKE HOME POINTS

INFECTION/CYSTS

- Abscess

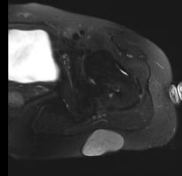
- History of fever, elevated WBC, painful mass
- Rim-enhancing collection

- Fistula



- Often history of Crohn disease
- Perianal fistula disease with extension/tracts into the gluteal region

- Epidermoid cyst



- History of palpable mass
- Cystic lesion in the subcutaneous tissues abutting the skin surface

- Sebaceous cyst

- History of palpable mass
- Cystic lesion in the subcutaneous tissues abutting the skin surface

TAKE HOME POINTS

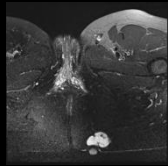
BENIGN NEOPLASM

- Desmoid fibromatosis



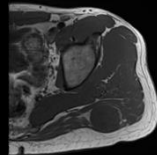
- Locally aggressive tumor
- Very dark T2 bands within the mass

- Hemangioma



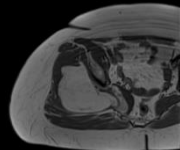
- Lobulated mass, septations, central low T2 signal intensity
- May show progressive enhancement

- Nerve sheath tumor



- Split fat sign (thin peripheral rim of fat around the lesion) and target sign (hyperintensity on T2W with central low signal)

- Lipoma

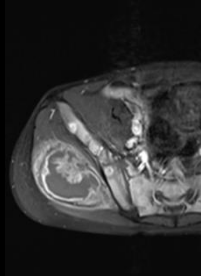


- Well-differentiated fatty mass and bland appearance on imaging
- No soft tissue within

TAKE HOME POINTS

MALIGNANT NEOPLASM

- Sarcoma



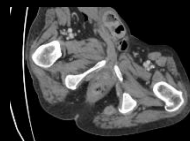
- Primary soft tissue buttock sarcomas include liposarcoma, leiomyosarcoma, synovial sarcoma, epithelioid sarcoma
- Primary osseous buttock sarcomas include osteosarcoma and Ewing sarcoma

- Lymphoma



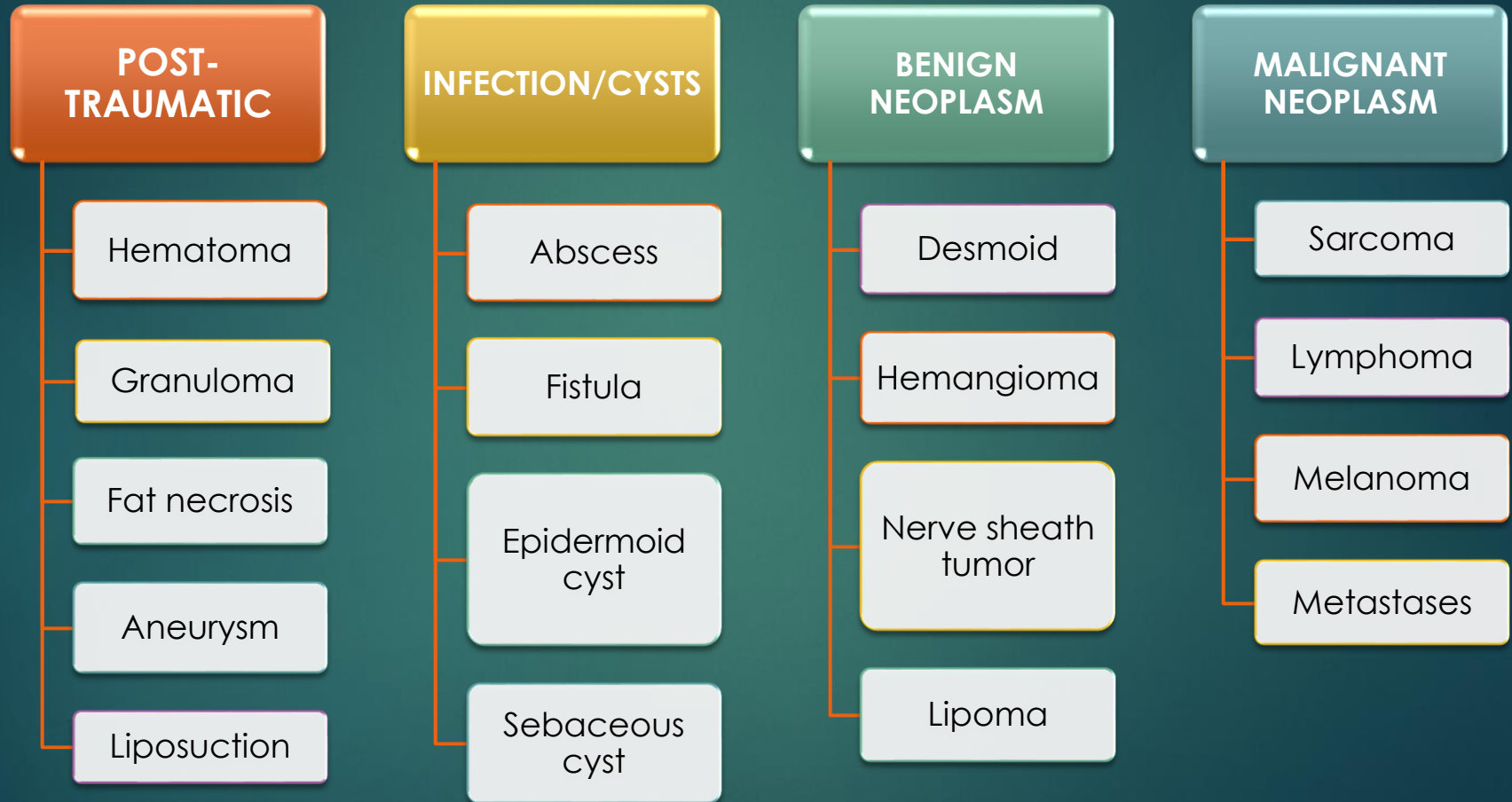
- Extranodal lymphoma involving muscle can be of similar density and signal intensity to adjacent skeletal muscle
- Tissue biopsy needed to determine diagnosis

- Metastases



- Multifocal lesions and history of primary malignancy
- Metastatic melanoma common

CONCLUSION



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3. Katsura M et al. Extranodal lymphoma originating in the gluteal muscle with adjacent bone involvement and mimicking a soft tissue sarcoma. International J of Surgery Case Reports (2015): 161-164.