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CASE REPORT

An Imaging Mimicry: A Case Report of Mature Cystic Teratoma or Fat-Containing Lesion

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ABSTRACT

A 52-year-old female patient with a history of autoimmune thyroiditis was diagnosed with a pelvic mass that was initially thought to be an ovarian dermoid cyst, also known as a mature cystic teratoma, on abdominal/pelvic CT imaging in 2017. Later, from 2019 to 2023, various imaging modalities such as CT and MRI revealed that the growing mass developed a cystic component that became encapsulated. Thus, we conclude this mass was likely a lipomatous lesion that underwent fat necrosis due to local inflammation rather than a dermoid cyst. The emergence of a mixed solid and cystic mass with features suggestive of a lipomatous lesion following the disappearance of a left ovarian cyst presented diagnostic challenges. This case emphasizes the pathophysiological aspects of fat necrosis and dermoid cysts, the complexity of discerning between the two on imaging, and the need for a comprehensive, collaborative diagnostic approach between radiologists and other clinicians.

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Fat necrosis and mature cystic teratomas (MCT), also termed ovarian dermoid cysts, are two pathologies that may be difficult to differentiate on imaging and clinical presentation. This report discusses the challenge of distinguishing these two pathologies on imaging while noting their respective pathophysiologies. Additionally, a unique attempt is made to highlight the link between inflammation from epiploic appendagitis, as seen in our patient, and the subsequent risk of fat necrosis.

CASE PRESENTATION

This case involves a 52-year-old female patient with a history of autoimmune thyroiditis, hysterectomy, and a right salpingectomy presented with a left complex pelvic mass. In 2017, our patient was diagnosed with epiploic appendagitis, which is a rare inflammatory condition present due to an ischemic infraction of the small fat-filled pouches of visceral peritoneum that hang from taenia coli. These affected appendices are at risk of undergoing fat necrosis. At this time, CT imaging revealed prominent fat in the left adnexal region, which was thought to be a dermoid cyst/MCT as seen in **Figure 1**. Later in 2019, T2-weighted MRI imaging demonstrated that the left adnexa l fat-containing lesion may be consistent

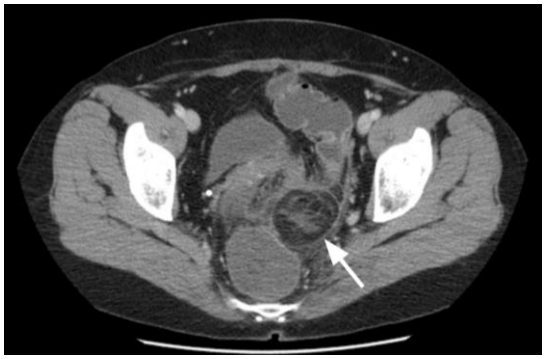

Figure 1. Abdominal/Pelvic CT with Contrast in 2017. The white arrow indicates an inflamed heterogenous encapsulated fat density in close approximation to the sigmoid colon.

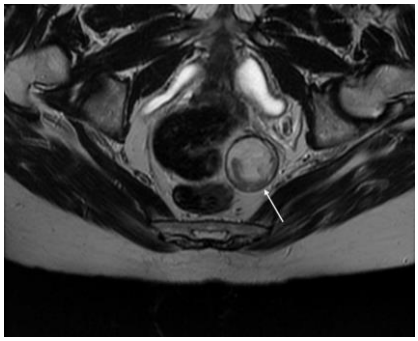

Figure 2. Axial T2 MRI in 2019. Arrow points to a heterogeneously intense 3x4 cm well-circumscribed mass with fat signal centrally and hypointense signal peripherally.

with an MCT diagnosis, while having both hyperechoic and hypoechoic components which can be visualized in **Figure 2**. In 2023, T2-weighted MRI imaging revealed that this mass had grown and had developed a new cystic component as depicted in **Figure 3**.

Furthermore, **Figure 3** showcases that the mass without abnormal enhancement in the left peri-rectosigmoid region had been involuted since 2017, overlapping with the epiploic appendagitis which argues against a dermoid cyst/MCT diagnosis and favors a lipomatous lesion that underwent fat necrosis. Additionally, the patient reported symptoms such as new-onset loose stools, fecal incontinence, dyspareunia, and unintentional weight loss, which adds complexity to the clinical presentation. Given these findings, we rationalize them as compatible with an area of encapsulated fat necrosis related to this inflammation rather than an MCT.

DISCUSSION

In our case, the complexity of the pelvic mass, exhibiting features suggestive of lipomatous lesions, beckons an in-depth exploration into potential etiologies, mainly contrasting the pathophysiologies of fat necrosis and MCTs. Mature cystic teratomas are the most common of all germ cell tumors and are the most common benign ovarian tumor. These tumors commonly contain somatic tissue from all three germ layers (endoderm, mesoderm, and ectoderm) and typically require surgical resection. These teratomas can have various imaging presentations, from a pure cystic mass to a complex cystic mass with a solid component.

Meanwhile, fat necrosis is closely related to prior inflammation. In this condition, adipocytes undergo premature apoptosis due to enzymatic reactions or physical injury, which often occurs in breast tissue. It is often forgotten that fat necrosis can occur anywhere in the body that contains adipose tissue and presents as a well-defined mass with varying densities and may mimic a liposarcoma or other adipocytic tumors, which adds to the complexity of identification.[1] Following subsequent inflammatory events, such as those associated with epiploic appendagitis, the peritoneal region becomes a canvas for fat necrosis.[2] Interestingly, fat necrosis has a natural progression to decrease or be involuted in size, which can be observed in this patient. This phenomenon

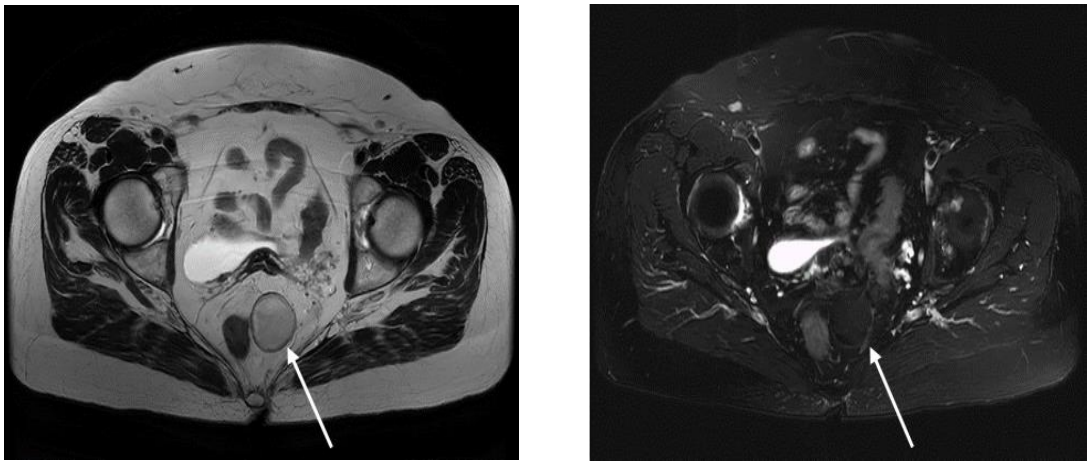

Figure 3. Axial T2 MRI (left) and Axial T2 Fat-Saturated MRI (right) in 2023.
The white arrows demonstrate a fat containing lesion in the left hemipelvis measuring 4.1 x 4.2 x 3.6 cm.

underscores the interplay between inflammation and adipose tissue, emphasizing the nuance needed to detect such pathology in the imaging landscape.[3,4] Lastly, it is essential to note that given the years between the different imaging modalities in this case, it raises the consideration of whether more frequent monitoring could have provided earlier insights into the nature of the pelvic mass. Current guidelines per the ACR Appropriateness Criteria for pre- or postmenopausal patients with adnexal masses that are indeterminate on pelvic ultrasound and have no acute symptoms should undergo MRI Pelvis with or without contrast. Current guidelines may need to be adjusted, particularly in cases of diagnostic uncertainty. Also, this case raises the question of whether a decisive diagnosis was possible earlier, especially in 2017, when the primary imaging was performed. Specific radiological-based diagnoses like fat necrosis might be challenging to make confidently without observing lesion alterations over time. In subsequent imaging, changes in mass development were vital in the differentiation between fat necrosis and MCT. This means it is crucial to consider long-term imaging, and it posits that sometimes, time and monitoring of lesion changes are needed for accurate diagnosis. Ultimately, understanding these two conditions' shared imaging features and divergent pathophysiological underpinnings becomes crucial for accurate diagnosis and discerning mimicry of overlapping presentations.

CONCLUSION

In summary, this case highlights a 52-year-old female patient with a history of autoimmune thyroiditis presents with a left complex pelvic mass. The patient's imaging initially showed a pelvic mass that was thought to be an MCT in 2017 with epiploic appendagitis or compounded with local inflammation. Later, various imaging modalities revealed contrary findings, such as subsequent involution typically seen in fat necrosis. These findings lower the likelihood of a dermoid cyst since the mass has been separated from both ovaries and increase the possibility of fat necrosis due to local inflammation via epiploic appendagitis. Thus, this

case report highlights the complex imaging and overlapping presentations between fat necrosis, inflammation, and neoplasms such as MCTs, as well as the necessity for continued research in advancing our understanding of these conditions to refine patient-centered clinical management.

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