***Atlas imaging of ovarian mass mimics: Experience from Hassan II UHC in Fez***

***Abstract :***

This article presents a comprehensive imaging review of ovarian mass mimics, emphasizing the differential diagnosis of extra-ovarian lesions in the female pelvis. It highlights the importance of anatomical landmarks and specific imaging signs such as the beak sign and the ovarian vascular pedicle to distinguish true ovarian tumors from conditions like hydrosalpinx, pyosalpinx, adnexal ectopic pregnancy, torsion, and other pelvic pathologies.

***Keywords :*** Ovarian mass mimics, Pelvic pathologies, Extra-ovarian lesions, Radiologic imaging

***Introduction***  
The female pelvis is a complex anatomical region, and many pathologies have nonspecific imaging features that can complicate accurate diagnosis. While early detection of ovarian masses is crucial, it is equally important to identify conditions that mimic ovarian tumors, preventing misdiagnosis and unnecessary surgery.

This article reviews key imaging features that resemble ovarian tumors, equipping radiologists with the tools to accurately differentiate adnexal lesions and formulate appropriate diagnoses.

***Materials and Methods:***

We conducted a retrospective descriptive study over a period of three years, from January 2021 to December 2023, at the Radiology Department of the Mother and Child Hospital, Hassan II University Hospital Center (UHC), Fez, Morocco.

The study included 241 female patients who presented with a pelvic mass suspected to be of adnexal or ovarian origin. All patients underwent at least one cross-sectional imaging modality, including ultrasound (US), computed tomography (CT), or magnetic resonance imaging (MRI), as part of their diagnostic workup.

Inclusion criteria:

* Female patients aged 16 years and older
* Presence of a pelvic mass initially suspected to be ovarian in origin
* Availability of complete imaging data (US, CT, or MRI)
* Histological confirmation or clinical/imaging follow-up allowing diagnostic categorization

Exclusion criteria:

* Known primary ovarian malignancy
* Incomplete imaging records or missing clinical data

All imaging examinations were reviewed by board-certified radiologists with expertise in pelvic imaging. Cases were classified based on radiological findings, supported when available by histopathological confirmation or clinical evolution.

Each lesion was analyzed with regard to:

* Anatomical location (intra- or extra-ovarian)
* Morphological appearance on imaging (shape, margins, internal content)
* Specific imaging signs (e.g., beak sign, vascular pedicle, claw sign)
* Associated features (e.g., ascites, lymphadenopathy, bowel displacement)

The final diagnoses were categorized into benign extra-ovarian conditions mimicking ovarian masses, as outlined in the results section. The goal was to construct a visual atlas to aid radiologists in identifying these mimics.

***Results:***

Based on histopathological and radiological findings, we will present an imaging atlas for educational purposes that illustrates the various extra-ovarian etiologies classified as ORADS 1 that can mimic ovarian masses: Hydrosalpinx and hematosalpinx (N=13), Pyosalpinx and Tubo-ovarian abscess (N=23), Adnexal Ectopic Pregnancy (N=13), Adnexal torsion (N=27), Peritoneal Inclusion Cyst (N=14), Uterine Vasculature (N=9) Uterine leiomyoma Figo 7 ( N=17), peritoneal carcinomatosis (N=12), Peritoneal tuberculosis (N=8), appendicitis or diverticulitis (N=21), Appendiceal Mucocele (N=10), GIST (N=5), Sigmoid tumor process (N=7), Necrotic lymphadenopathy (N=11), Lymphoma (N=7), Sarcoma (N=3), Neurogenic tumors (N=4), Pelvic pheochromocytoma (N=1), Hematoma (N=23), Lymphocele (N=13).

***Fig 1 : The percentage distribution of the various etiologies identified in our study***

***Discussion***

Adnexal masses have an incidence of 0.17% to 5.9% in asymptomatic women and 7.1% to 12% in symptomatic women, and less than 25% of these masses are diagnosed as malignancy [1].

5.1% of pelvic masses mimicking ovarian masses are found to be an extra-ovarian disease [2]

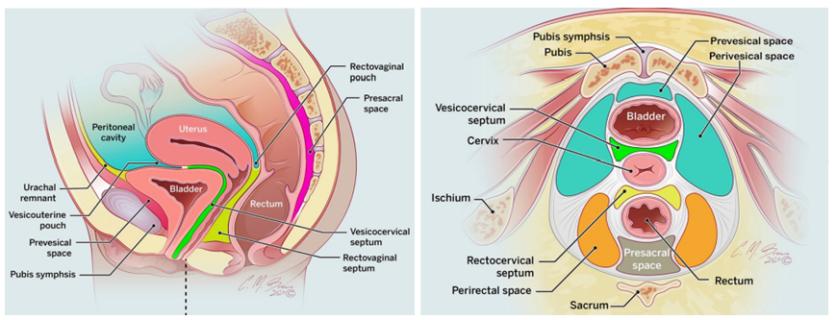
1. **Anatomy**

Localization of pelvic masses is challenging when anatomical landmarks are obscured. Identifying the ovaries is crucial for distinguishing intraovarian from extra-ovarian lesions. Each ovary is suspended by the mesovarium, ovarian ligament, and suspensory ligament, with variable laxity contributing to their mobility especially postpartum [5]. The ovarian veins, draining into the left renal vein and inferior vena cava, can be traced caudally along the suspensory ligaments to locate the ovaries, with the pelvic ureters serving as additional guides [5].

The pelvis is divided into intraperitoneal and extraperitoneal spaces by the peritoneum, which covers the bladder dome, uterus, and anterior upper rectum (Figure 2) [6]. In females, discontinuities at the oviductal ostia may allow communication between these compartments. The intraperitoneal space, centrally located, includes the vesicouterine space, rectouterine pouch of Douglas (the most dependent peritoneal space), and lateral paravesical recesses, and contains the ovaries, small intestine, colon, and upper rectum [6]. Surrounding this, the extraperitoneal space comprises the bladder, uterus, pelvic ureters, lower rectum, iliac vessels, lymph nodes, and pelvic sidewall, and is subdivided into anterior (prevesical and perivesical spaces), middle (vagina, cervix, uterus), and posterior (perirectal and presacral spaces) compartments [7].

Fig 2 : Axial and sagittal drowing shows the pelvic extraperitoneal compartments that are divided into anterior prevesical and perivesical spaces and posterior perirectal and presacral spaces, while peritoneal reflections create the vesicouterine and rectovaginal pouches, with fatty septa forming the vesicocervical and rectovaginal septa below them

Reference : Forstner, R., Thomassin-Naggara, I., Cunha, T.M. et al. ESUR recommendations for MR imaging of the sonographically indeterminate adnexal mass: an update. Eur Radiol 27, 2248–2257 (2017). <https://doi.org/10.1007/s00330-016-4600-3>



1. **Is the Mass Ovarian or Extra-ovarian in Origin?**

Identification of a normal ipsilateral ovary, as described above, excludes ovarian origin of a mass. In cases of masses abutting the ovary, multiple imaging signs help to assess the origin of the mass.

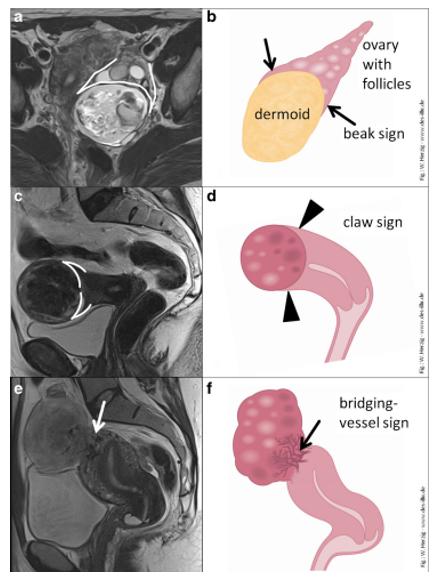
Several imaging signs suggest an ovarian origin of a pelvic mass (Figure 3). The "beak sign" refers to the formation of a sharp angle between the ovary and the mass, creating a beak-like shape at the ovarian edge. The "ovarian vascular pedicle" sign is characterized by the direct connection of a normal or asymmetrically enlarged gonadal vein to the mass. The "phantom organ" sign is observed when the ovary is not visualized, provided there is no prior history of surgical resection or transposition. Additionally, the "embedded organ" sign occurs when the ovary appears to be incorporated within the mass [3,8,9].

Conversely, certain signs are indicative of an extra-ovarian origin. The "claw sign" and the "bridging vessel" sign are suggestive of a uterine source for the mass. The displacement pattern of surrounding organs can further aid in determining the origin of a pelvic mass. Intraperitoneal masses typically cause lateral or posterior displacement of the uterus, rectosigmoid colon, and iliac vessels. Masses located within the rectouterine pouch of Douglas tend to shift the uterus anteriorly while displacing the rectum posteriorly. In contrast, extraperitoneal masses may result in anterior or central displacement of the uterus, rectosigmoid colon, and iliac vessels, in addition to potentially effacing the pelvic sidewall muscles. Prevesical masses are known to posteriorly displace the bladder [3].

Accurate localization of a pelvic mass as an extraperitoneal lesion effectively excludes an ovarian origin, facilitating a more precise differential diagnosis and guiding appropriate clinical management.

Fig 3 : Differentiation of ovarian versus uterine origin. Beak sign indicating ovarian origin in a benign teratoma (arrows and outlined in a and b). The most important differential diagnosis of a solid adnexal mass includes uterine leiomyoma, which can be differentiated by the claw sign (arrow and outlined in c and d) or in broad-based leiomyomas by bridging vessels (arrow in e and f)

Reference : Forstner, R., Thomassin-Naggara, I., Cunha, T.M. et al. ESUR recommendations for MR imaging of the sonographically indeterminate adnexal mass: an update. Eur Radiol 27, 2248–2257 (2017). https://doi.org/10.1007/s00330-016-4600-3

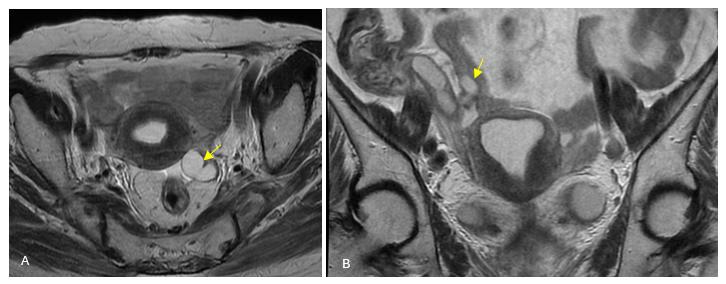


1. **Differential diagnosis to ovarian masses:**
2. *Intraperitoneal lesions*
   1. *Extra-ovarian adnexal lesions.*
      1. *Hydrosalpinx and hematosalpinx*

Hydrosalpinx, most commonly resulting from adhesions due to pelvic inflammatory disease, it can be asymptomatic but may result in infertility or pelvic pain [10]. On ultrasonography, it typically manifests as a C- or S-shaped anechoic fluid-filled structure with a “cogwheel” configuration evident on cross-sectional views due to thickened endosalpingeal folds, while CT and MRI reveal a dilated fallopian tube adjacent to the uterus containing simple fluid with thin, mildly enhancing walls (Figure 4) [11].

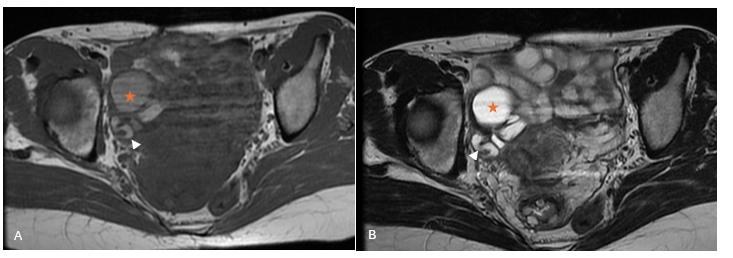
Hematosalpinx, which may arise from conditions such as endometriosis, ectopic pregnancy, adnexal torsion, malignancy, or trauma, appears on ultrasound similar to hydrosalpinx but with internal low-level echoes due to blood products. On MRI (Figure 5), it shows variable T1- and T2-weighted signal abnormalities depending on the age of the blood, with the absence of T2 shading helping to differentiate it from an endometrioma [11].

Fig 4: 74 years old, postmenopausal. Admitted for cervical cancer, having undergone external radiotherapy and brachytherapy. (reference: Radiology department of the mother and child hospital, CHU Hassan II, Fez)



Axial (A) and coronal (B) T2 WI shows a dilated and tortuous appearance of both fallopian tubes, more pronounced on the left, with fluid content, consistent with hydrosalpinx.

Fig 5: 45 years old. Left lateral uterine mass. (reference : Radiology department of the mother and child hospital, CHU Hassan II, Fez).



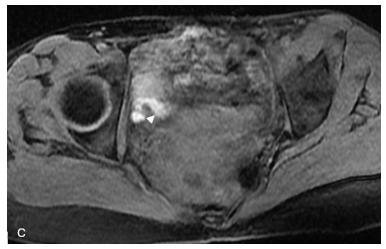
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B

A



Axial images in different sequences demonstrates a dilated and tortuous appearance of the right fallopian tube with fluid content, showing slight hyperintensity on T1-weighted non-fat-saturated image (A), more hyperintense on T1-FATSAT sequence (C), consistent with an hematosalpinx.

Also note the presence of an endometrioma on the homolateral ovary ()

* + 1. *Pyosalpinx, and Tubo-ovarian abscess*

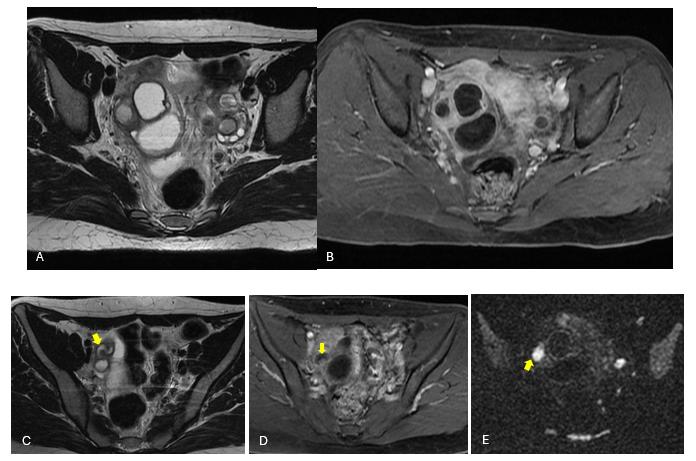
Salpingitis occurs when the ascending infectious process results in a nondilated fallopian tube with wall thickening, hyperenhancement, and adjacent reactive inflammation, and may progress to pyosalpinx when obstruction at the fimbriated end leads to pus accumulation [11].  
On ultrasound, CT, and MRI (Figure 6), pyosalpinx is identified as a thick-walled tubular structure with complex, echogenic or heterogeneous fluid and fluid-debris levels, with surrounding inflammation aiding in its differentiation from hydrosalpinx [11].

Tubo-ovarian abscess, occurring in approximately 20% of pelvic inflammatory disease cases, manifests as a complex adnexal mass with wall thickening, irregular septations, diffusion restriction, and sometimes internal gas, with additional MRI findings of high T1 signal from hemorrhagic or proteinaceous components and postcontrast enhancement of the abscess walls and surrounding inflammatory stranding [12].

Fig 6: 27 years old. No prior medical history. Admitted for pelvic pain persisting for 5 months.(reference : Radiology department of the mother and child hospital, CHU Hassan II, Fez).

B

A



E

D

C

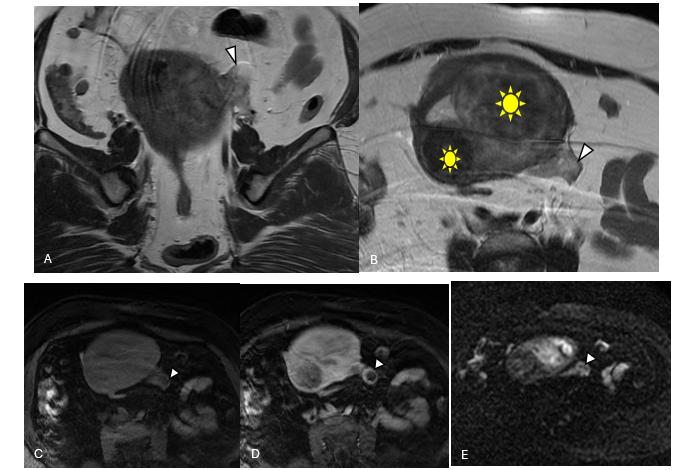
Axial images in different sequences shows a right lateral uterine rounded formation, well-defined with regular contours, described as hypo-intense on T1, hyper-intense on T2 (A), with a hypo-intense T2 wall and enhancement after contrast injection (B), consistent with an ovarian abscess.

Associated with the presence of a tubal structure adjacent to the uterus (yellow arrow), with hypo-intense T1 content (D), hyper-intense T2 content (C), partially restrictive on diffusion (E), and a thickened wall that enhances after contrast injection (D), consistent with pyosalpinx.

* + 1. *Adnexal ectopic pregnancy*

Ectopic pregnancy is a significant contributor to first-trimester maternal mortality, most commonly occurring in the fallopian tubes and presenting acutely [13]. Ultrasound, the primary imaging modality, typically demonstrates a complex adnexal mass or gestational sac separate from the ovary—with an echogenic peripheral ring or "ring of fire" on color Doppler in unruptured cases, while MRI (Figure 7) is employed when findings are indeterminate; ruptured cases (Figure 8) may lead to pelvic hematoma, and chronic ectopic pregnancies (accounting for 1.7% of pelvic masses mimicking ovarian tumors [1].

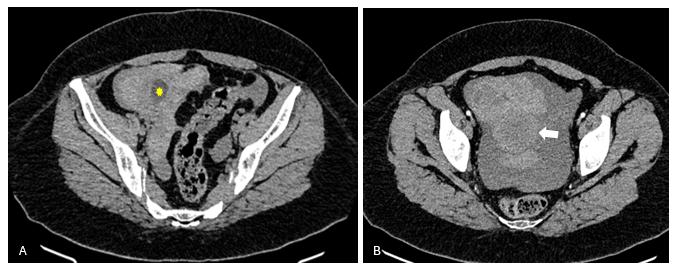
Fig 7: 40 years old, G6P5. Presents with 10 weeks of amenorrhea and elevated beta-hCG levels. (reference: Radiology department of the mother and child hospital, CHU Hassan II, Fez).



The left fallopian tube is swollen with a cystic intraluminal formation affecting its ampullary portion (headarrow), described as hyperintense on axial (B) and coronal (A) T2-weighted images, and hypointense on T1-weighted image (C), surrounded by a thick wall with hyperintensity on diffusion (E) and early ring-like enhancement after GADO injection (D), measuring 25 x 20 mm, consistent with an adnexal ectopic pregnancy.

Note the presence of a polymyomatous uterus () .

Fig 8 : 43 years old. diabetic, under treatment. Last menstrual period: not specified, elevated beta-hCG levels. She presented with an acute abdominal syndrome, with haemodynamic problems.  
Post-operative follow-up revealed a ruptured ectopic pregnancy.   
(reference: Radiology department of the mother and child hospital, CHU Hassan II, Fez).



B

A

CT scan, with and without contrast, in axial reconstructions:

Presence of intra-peritoneal fluid effusion, spontaneously hyperdense in some areas (B), with a fluid level in the pelvic region and a right lateral uterine cystic formation ().

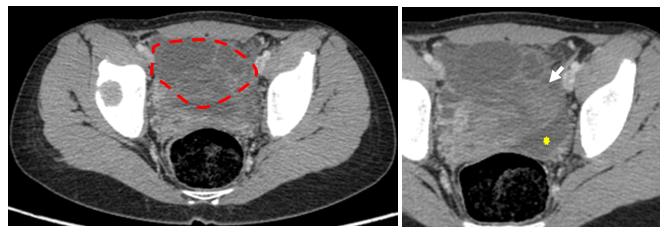
This effusion extends towards the right iliac fossa, along the right parietocolic gutter(A).

Also note the presence of a pregnant uterus (white arrow)

* + 1. *Adnexal torsion*

Although this EPOS primarily addresses extra-ovarian pathologies, adnexal torsion is discussed due to its mechanism of twisting along the fallopian tube and vascular pedicle, leading to vascular compromise [14]. Typically affecting premenopausal women with ovarian cysts or benign neoplasms, torsion initially impairs venous outflow, resulting in edema and, if untreated, subsequently compromises arterial flow, culminating in infarction [15]. Ultrasound findings range from a normal-appearing ovary to one with stromal engorgement and peripheralized follicles, while CT (Figure 9) and MRI commonly reveal an enlarged, medially displaced ovary with a twisted pedicle; infarction is indicated by non-enhancing, hemorrhagic areas on imaging [16].

Fig 9: 21 years old, presenting with acute severe pelvic pain localized to the left side. Surgical exploration revealed a twisted adnexal mass with a healthy ovary, associated with a small amount of hemoperitoneum.  
(reference: Radiology department of the mother and child hospital, CHU Hassan II, Fez).



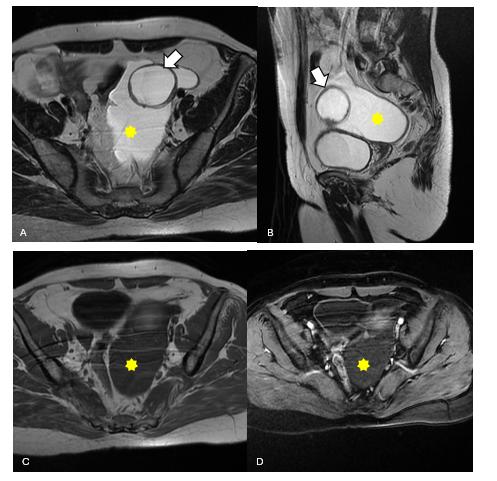
Axial CT scans after contrast injection, through the pelvic region, show a dilated and tortuous left fallopian tube with a virtual wall, non-enhanced after contrast, proximal to a spiral twist (white arrow). The findings are associated with a small fluid effusion ().

No underlying cause was identified.

* + 1. *Peritoneal inclusion cyst*

A peritoneal inclusion cyst results from benign serous ovarian fluid accumulating in entrapped reactive mesothelium following an inflammatory process (e.g., surgery, endometriosis, or PID) [17]. These cysts, which can be simple or multilocular, conform to adjacent structures and may envelop the ovary in a “spider web” pattern [18]. On ultrasound, they appear as anechoic cystic structures with mildly thickened, low-resistance septations, while CT and MRI typically reveal an entrapped ovary with follicles(Figure 10) a feature that distinguishes them from ovarian neoplasms, and they lack malignant potential [19].

Fig 10: 42 years old, perimenopausal. Underwent surgery in January 2022 for inter-adnexal hysterectomy (histopathology: leiomyoma).Presenting with right pelvic pain..  
(reference: Radiology department of the mother and child hospital, CHU Hassan II, Fez).



D

C

MRI findings shows a left ovarian lesion (white arrow), rounded and well-defined, hyperintense on both T1 (C) and T2 sequences (A,B) not suppressed on FAT-SAT, unchanged after contrast, with a thin wall enhanced after Gadolinium injection (D).

Left-sided pelvic cystic formation (), hypointense on T1, hyperintense on T2, containing fine septa enhanced after contrast, without tissue bud within, consistent with peritoneal inclusion cyst.

* 1. *Uterine lesions*
     1. *Uterine vasculature*

Dilated uterine vasculature, resulting from venous obstruction or incompetent valves, may mimic a cystic ovarian mass but demonstrates distinct vascularity on color Doppler and enhancement similar to the iliac vessels on CT/MRI (Figure 11), thereby preventing unnecessary biopsy and hemorrhage [20].

Fig 11: 47 years old, underwent a suction curettage for hydatidiform mole in October 2022, with histopathology revealing a complete mole. The clinical course was marked by persistent bleeding and a rise in beta-hCG levels. Ultrasound: enlarged uterus with a heterogeneous image occupying the entire uterine cavity.  
(reference: Radiology department of the mother and child hospital, CHU Hassan II, Fez).

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C

B

A

Multiple serpiginous peri-uterine structures are visible (yellow cercle), in T2 WI (A), T1 FS (B), consistent with uterine varices, most of which are thrombosed (head arrow) (C)

* + 1. *Leiomyoma*

Leiomyomas (fibroids) are benign hormone-responsive tumors with a well-circumscribed, whorled internal architecture; pedunculated or parasitized variants—identified by a connecting stalk (bridging vessel sign) on ultrasound and further characterized by CT/MRI (Figure 12), can pose diagnostic challenges [21].

Fig 12: 47 years old, no medical history. Admitted for the management of pelvic pain.

Pelvic ultrasound : solid right lateral uterine mass.  
(reference: Radiology department of the mother and child hospital, CHU Hassan II, Fez).

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B

A

Axial contrast-enhanced computed tomography image (A) shows an enhancing median pelvic mass (yellow star), showing heterogeneous enhancement in contact with the ovaries, uterus, some small bowel loops, and bladder.

Sagittal T2-weighted magnetic resonance image (B) shows a T2 hypointense mass (red star), subserosal and pedunculated to the uterus, located at the right anterolateral surface, near the uterine horn junction, with a pedicle measuring 12.5 mm in diameter, consisting with a pedunculated leiomyoma

* 1. *Peritoneal disease* 
     1. *Peritoneal Carcinomatosis*

Peritoneal carcinomatosis results from metastatic seeding, often from ovarian cancer and appears as small, irregular soft tissue nodules on CT (with mucinous deposits showing low attenuation) and on MRI using DWI and postcontrast sequences, frequently accompanied by proteinaceous ascites that may eventually infiltrate abdominal viscera [22].

* + 1. *Peritoneal Tuberculosis*

peritoneal tuberculosis, which accounts for 37.2% of pelvic masses mimicking ovarian tumors [2], typically arises from reactivation of latent Mycobacterium tuberculosis [23]and presents with similar ascitic findings on ultrasound and CT, including peritoneal nodularity and soft tissue masses with central low attenuation representing tubers (Figure 13) [24].

Fig 13: 22 years old. Presenting with pelvic pain in the context of a deteriorated general.

Peritoneal biopsy consistent with peritoneal tuberculosis.  
(reference: Radiology department of the mother and child hospital, CHU Hassan II, Fez).

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B

A

Axial T2-weighted magnetic resonance images shows a right ovarian cystic lesion (white arrow), with hemorrhagic sediment content. The left ovary is multifollicular (orange arrow).

We note also a moderate ascites associated with regular thickening of the peritoneal (headarrows).

* 1. *Gastrointestinal lesions*
     1. *Appendiceal mucocele*

Appendiceal mucocele, a chronic cystic dilation of the mucin-filled appendix, is histologically classified as simple mucocele, mucosal hyperplasia, mucin cystadenoma, or cystadenocarcinoma, typically affecting middle-aged patients and potentially leading to complications such as infection, obstruction, torsion, or rupture [25]. Ultrasound demonstrates a cystic tubular structure, often with the specific “onion skin sign” [26] while CT and MRI further characterize the lesion with features like simple fluid attenuation, calcifications, and wall enhancement suggestive of superinfection or malignancy [4]. Rupture of larger appendiceal cystadenomas or cystadenocarcinomas may seed mucin into the peritoneal cavity (Figure 14), resulting in pseudomyxoma peritonei, a condition that mimics ovarian malignancy, can cause bowel obstruction, and is managed with surgical debulking and intraperitoneal chemotherapy [25].

Fig 14: 62 years old. Admitted for the management of chronic pain in the right iliac fossa.  
(reference: Radiology department of the mother and child hospital, CHU Hassan II, Fez).

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C

B

A

MRI findings shows a cystic dilation of the appendix (white arrow) with fluid content, hypointense with wall enhancement in the sagittal T1 GADO+ (B), and hyperintense on axial FIESTA (A). Associated with intraperitoneal fluid effusion (C) in contact with the appendix (head arrow), indicating rupture.

* + 1. *Gastro-intestinal stromal tumor*

Gastrointestinal stromal tumor (GIST) is the most common mesenchymal neoplasm of the gastrointestinal tract, accounting for approximately 20% of soft tissue sarcomas, with a peak incidence in individuals aged 50–60 years and a slight male predominance [27]. It most frequently originates in the stomach (70%) or small intestine (25%) and is characterized by KIT receptor expression, which confers resistance to apoptosis [28]. On MRI (Figure 15), larger GISTs often display internal cystic necrosis with high T2 signal and heterogeneous postcontrast enhancement, while smaller lesions enhance homogeneously; features such as large size, cystic changes, and low ADC signals suggest higher malignant potential [29]. Treatment involves surgical resection and/or tyrosine kinase inhibitors, given that 20–30% of GISTs are malignant at diagnosis [29, 30].

Fig 15: 45 years old. No significant medical history. Admitted for the management of a hard, non-mobile hypogastric mass.  
Biopsy results suggest a gastrointestinal stromal tumor (GIST).  
(reference: Radiology department of the mother and child hospital, CHU Hassan II, Fez).

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C

B

A

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E

D

MRI findings shows a large intra-peritoneal mass, well-defined but with irregular contours, described as having an intermediate signal on T2 (A,B), containing T2 hyperintense corresponding to areas of necrosis (headarrows), with diffusion restriction (C). It features also multiple fine septa.

Ovaries are small in size and appear normal in axial T2 (D,E) (orange arrows).

Large intra-peritoneal effusion, described as hyperintense fluid on T2 (yellow star).

1. *Extraperitoneal lesions*
   1. *Lymphoma.*

Lymphoma typically presents with systemic symptoms such as fever, night sweats, and weight loss, and imaging frequently reveals multi-station adenopathy and splenomegaly, with bulky pelvic masses occasionally mimicking ovarian tumors. On CT, lymphomatous lesions usually manifest as homogeneous masses with mild to moderate enhancement (Figure 16) that encase vessels without compressing them. MRI findings include isointensity on T1-weighted images, iso- to hyperintensity on T2-weighted images, and moderate postcontrast enhancement [31].

Fig 16: 27 years old, G3P3.Recently diagnosed with B-cell lymphoma.  
(reference: Radiology department of the mother and child hospital, CHU Hassan II, Fez).

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B

A

Axial (A) and coronal (B) reconstructions through the abdominopelvic region show a pseudo-aneurysmal thickening of a small bowel loop (arrow) located sub-umbilically, with moderate enhancement, without clear evidence of invasion into adjacent structures.

* 1. *Pelvic lymphadenopathy.*

Pelvic lymphadenopathy refers to the enlargement of lymph nodes in the pelvic region, and can mimics an ovarian mass. Several conditions can lead to pelvic lymph node enlargement. Common causes include:

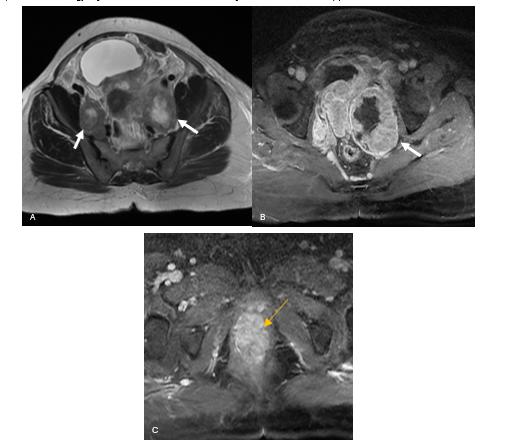
Infection: Bacterial (tuberculosis ++..), viral, or parasitic infections in the pelvic region can cause lymph nodes to enlarge as they work to fight off the infection.

Cancer: Certain types of cancers, such as ovarian, cervical, or prostate cancer, can spread to the pelvic lymph nodes, causing them to swell (Figure 17).

Inflammatory conditions: Conditions like pelvic inflammatory disease (PID) or inflammatory bowel disease (IBD) can lead to lymphadenopathy.

Fig 17: 68 years old, no medical history. Admitted for the management of rectal bleeding for 22 days.

Digital rectal examination: palpable mass with budding appearance, 1 cm from the anal margin, with blood on the glove.  
(reference: Radiology department of the mother and child hospital, CHU Hassan II, Fez).



B

A

C

MRI findings shows a tumoral thickening of the rectum (orange arrow), showing heterogeneous enhancement after contrast (C) associated with bilateral lumbosacral adenopathy (white arrows) presents with an heterogenous enhancement in the axial post gado contrast (B) with massive necrosis

* 1. *Sarcomas*

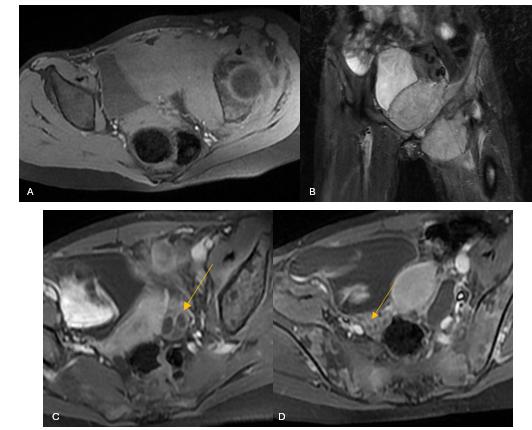
Soft tissue sarcomas are a heterogeneous group of malignant tumors of mesenchymal origin that originate from the soft tissues rather than bone, and can mimics ovarian masses (Figure 18). They are classified on the basis of tissue seen on histology.

Fig 18: 17 years old, presenting with inguinal pain and difficulty walking.  
(reference: Radiology department of the mother and child hospital, CHU Hassan II, Fez).

D

C

A



MRI findings demonstrating a tissue process centered on the left obturator frame, described as isointense on axial FS T1 (A), and showing heterogeneous enhancement after contrast on coronal T1 FS C+ (B).

Both ovaries appear normal (orange arrows).

* 1. *Neurogenic tumors*

Pelvic extraperitoneal neurogenic tumors including schwannomas (Figure 19), neurofibromas, ganglioneuromas, and paragangliomas may exhibit cystic degeneration [32]. Extraperitoneal schwannomas are encapsulated lesions that can show calcifications on CT and demonstrate low T1 and high T2 signals with heterogeneous enhancement on MRI, typically managed with surgical resection for symptomatic patients [33]. Neurofibromas, often seen in neurofibromatosis type 1, appear unencapsulated with a characteristic target sign on T2WI and may rarely transform into malignant peripheral nerve sheath tumors [34]. Ganglioneuromas arise from sympathetic ganglia, presenting as well-defined masses with occasional punctate calcifications on CT and a “whorled” appearance on postcontrast MRI [34]. Paragangliomas, or extra-adrenal pheochromocytomas (Figure 20), are well-defined, avidly enhancing masses that may produce catecholamines in nearly 40% of cases, necessitating surgical resection with preoperative alpha-blockade [35].

Fig 19: 52 years old, admitted for cervical tumor. Extension assessment  
(reference: Radiology department of the mother and child hospital, CHU Hassan II, Fez).

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B

A

Axial contrast-enhanced computed tomography shows heterogeneous tissue mass of the cervix (A), with irregular but well-defined borders. We noted also the presence of a left paravertebral tissue mass at the L5 level (arrow), oval-shaped with a vertical long axis, well-defined, and showing mild enhancement consistent with a schwannoma in biopsy.

Fig 20: 86 years old. Lateral uterine mass.  
(reference: Radiology department of the mother and child hospital, CHU Hassan II, Fez).

Une image contenant croquis, dessin, peinture, art

Description générée automatiquementUne image contenant crâne, os, croquis, noir et blanc

Description générée automatiquementUne image contenant monochrome, Photographie monochrome, noir et blanc, intérieur

Description générée automatiquementUne image contenant capture d’écran, monochrome, noir, noir et blanc

Description générée automatiquementUne image contenant noir et blanc, art, croquis, monochrome

Description générée automatiquementUne image contenant noir et blanc, croquis, dessin, Dessin d’enfant

Description générée automatiquement

B

F

E

D

C

A

MRI findings demonstrating a large left parametrial pelvic mass (white arrows), described as heterogeneous T2 hyperintense (A), containing necrotic areas in T1 hypointense with hemorrhagic changes (B), a hyperintense in diffusion sequence (D), and showing an early and intense enhancement after contrast (C).  
the both ovaries are seen (orange arrows), without any anomaly (E,F)

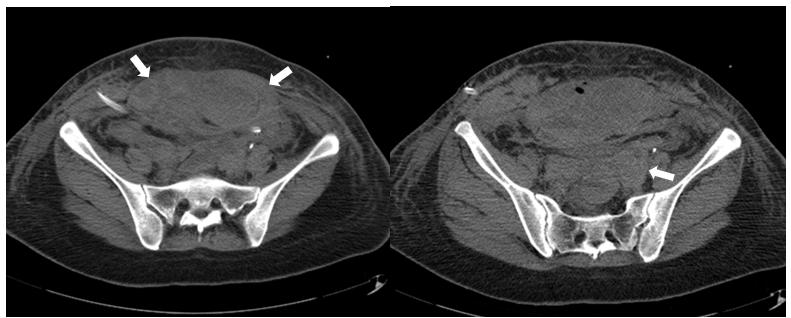
A biological workup was requested for further investigation, revealing elevated catecholamine levels, suggesting an extra-adrenal pheochromocytoma.

1. *Either intraperitoneal or extraperitoneal lesions*
   1. Hematoma

Hematomas, which may result from trauma, surgery, interventional procedures, or aneurysm rupture, can be challenging to differentiate from the ovary based on their location. Their imaging appearance evolves over time: on ultrasound, an acute hematoma appears echogenic before becoming hypoechoic with septations and thickened walls, while on CT it presents as a hyperattenuating collection (Figure 21) that transitions to a cystic appearance over approximately two weeks. On MRI, acute and subacute hematomas demonstrate high signal on fat-suppressed T1-weighted images without postcontrast enhancement, and chronic hematomas may develop a thin peripheral low-signal rim due to hemosiderin with a subjacent bright inner rim; the “concentric ring” sign. Multiphase contrast-enhanced CT or MRI may be necessary to evaluate for active bleeding, and de novo hematomas may require subtraction imaging or follow-up to exclude an underlying lesion [36].

Fig 21: 32 years old. Vaginal delivery two days ago, complicated by postpartum hemorrhage.

Underwent hemostatic hysterectomy with a Hemoglobin level at 5 g/dl.  
(reference: Radiology department of the mother and child hospital, CHU Hassan II, Fez).



Axial CT scan images with spontaneous contrast at the abdominopelvic level:

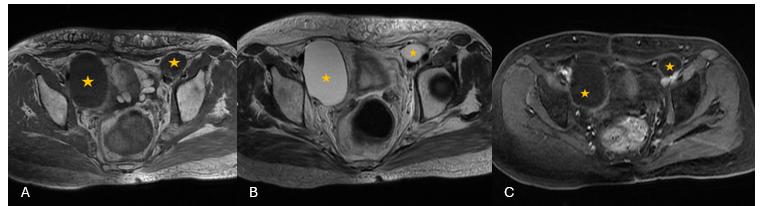
Presence of large collections (white arrows) in the anterior abdominopelvic wall, and adjacent to the iliac vessels confluent, extending intra-abdominally, spontaneously hyperdense and heterogeneous, forming a fluid-blood level, containing some air bubbles.

* 1. ***Lymphocele, Seroma, and Urinoma***

Lymphoceles are lymph-containing collections within thin fibrotic walls that typically occur three to eight weeks post-lymphadenectomy or renal transplant, potentially causing lower extremity edema, deep venous thrombosis, or hydroureteronephrosis, and are seen as non-enhancing simple fluid collections along the lymphatic chain [4]. Seromas (Figure 22), resulting from surgery or trauma, similarly present as non-enhancing simple fluid collections with possible mass effect on adjacent pelvic structures. In contrast, urinomas are collections of extravasated urine often due to urinary tract obstruction or iatrogenic causes that appear as anechoic on ultrasound and demonstrate fluid attenuation on CT, with increased attenuation on delayed phases and CT/MR urography pinpointing the site of extravasation [37].

Fig 22: 56 years old. Followed in the radiotherapy department for endometrial adenocarcinoma, post-surgery, having undergone external radiotherapy and brachytherapy.

Underwent total hysterectomy, bilateral adnexectomy, and pelvic and lombo-aortic lymphadenectomy  
(reference: Radiology department of the mother and child hospital, CHU Hassan II, Fez).



MRI findings demonstrate two bilateral external iliac pelvic cystic formations (yellow star), described as T1 hypointense (A), T2 hyperintense (B), with thin walls enhanced after contrast (C), exhibit a slightly mass effect on the adjacent pelvic structures, consisting with seromas

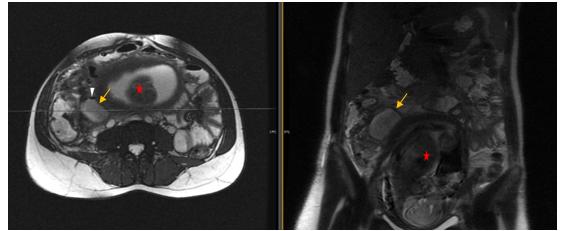
Absence of visualization of the uterus and ovaries, consistent with the surgical procedure.

* 1. ***Pelvic abscess***

Pelvic abscesses account for 17.7% of pelvic masses mimicking ovarian tumors and may develop from a variety of etiologies, including tubo-ovarian abscesses, complicated appendicitis, diverticulitis, inflammatory bowel disease, anastomotic leaks, or superinfected fluid collections [2]. Accurate diagnosis necessitates integration of clinical history, prior surgical records, and laboratory findings. Imaging typically reveals thick peripheral wall enhancement, complex internal contents with air (Figure 23) (suggestive of fistulous communication or gas-forming organisms), and adjacent inflammatory changes [4].

Fig 23: 21 years old, no medical history. Fever and right iliac fossa pain at 24 weeks of pregnancy.

Abdominal ultrasound: Collection in the right iliac fossa (RIF) circumscribed by small bowel loops, forming an appearance of an appendiceal mass.  
(reference: Radiology department of the mother and child hospital, CHU Hassan II, Fez).



Axial (A) and coronal (B) MRI images demonstrate the presence of a pre-cecal fluid collection in the RIF (orange arrow), containing an air bubble (headarrow). Associated with agglutinated bowel loops, with surrounding fat infiltration. The appendix was not visualized.

Monofetal pregnancy ().

***Conclusion***

Distinguishing between ovarian and extra-ovarian masses is essential to avoid misdiagnosis and unnecessary interventions. Ultrasound is the primary modality for diagnosis of adnexal lesions and MRI is a problem-solving modality, given it superior soft tissue contrast, guiding optimal patient management.

***Data access statement***: All data supporting the findings of this study are included in the article. No additional datasets were generated or analyzed.

***Ethics Approval and consent:*** : This case report was conducted in accordance with ethical standards. Informed consent was obtained from the patient for the publication of this case and accompanying images. Ethical approval was obtained from the institutional review board of Hassan II UHC. Patient data were anonymized, and informed consent was obtained for all published images.

Disclaimer (Artificial intelligence)

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Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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Author(s) hereby declare that generative AI technologies such as Large Language Models, etc. have been used during the writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1.

2.

3.

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