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Hemorrhagic Infarct of Torsed Ovary: A Case Report

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Abstract: Ovarian torsion, the twisting of the ovary on its supporting tissues, occurs primarily in premenopausal women, causing acute abdominal or pelvic pain. Without prompt diagnosis and surgical intervention, adnexal torsion may lead to ovarian infarction and a resulting reduction in fertility. Radiologic methodologies including ultrasound, color Doppler ultrasound, and magnetic resonance imaging (MRI) can play key roles in the diagnosis of this entity by allowing for the visualization of blood flow to the ovary.

Keywords: *hemorrhagic infarct, ovarian torsion, adnexal torsion*

Case Presentation

A perimenopausal 52-year-old gravida 4, para 2 woman presented with chills, dysuria, pain with bowel movements, and intermittent right-sided abdominal pain. She had no urinary urgency or frequency, hematuria, or abnormal bowel movements. Initial imaging at an outside hospital reportedly revealed no relevant findings other than bilateral ovarian cysts.

The patient received a referral for persistent lower abdominal and pelvic pain and, on physical exam, had right-lower quadrant pain and experienced tenderness upon palpation of that area. No mass was palpated.

Grayscale and color Doppler ultrasound performed 11 days after initial imaging revealed a lack of flow to an enlarged, edematous right ovary (Figures 1A and 1B). T2-weighted MR images of the pelvis demonstrated hyperintense cystic areas within the same ovary and the corresponding para-ovarian fluid (Figures 2A and 2B). T1-weighted MR images revealed a peripheral rim of hyperintensity in the same ovary pre-contrast and asymmetric enhancement of the corresponding para-ovarian soft tissues post-contrast (Figures 2C and 2D).

Key Points

- Ovarian torsion occurs when the long axis of the ovary acutely rotates, impeding blood flow. A delay of treatment can lead to hemorrhagic infarction.
- Clinical findings related to ovarian torsion can include severe intermittent lower abdominal or pelvic pain, nausea with vomiting, fever, leukocytosis, and a palpable mass.
- Color Doppler ultrasound and pelvic MRI are beneficial diagnostic tools when ovarian torsion is being considered.

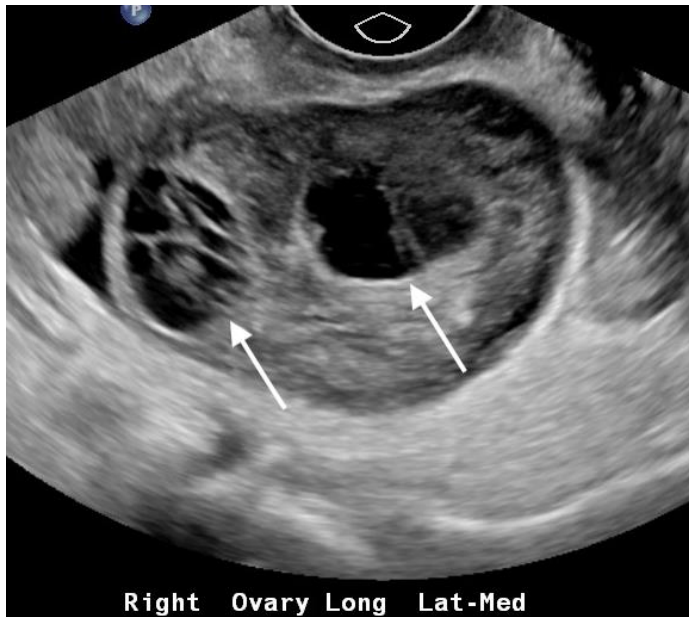
Abbreviations

ADC: apparent diffusion coefficient
DWI: diffusion-weighted imaging
MRI: magnetic resonance imaging
OHSS: ovarian hyperstimulation syndrome
SSFSE: single-shot fast spin-echo

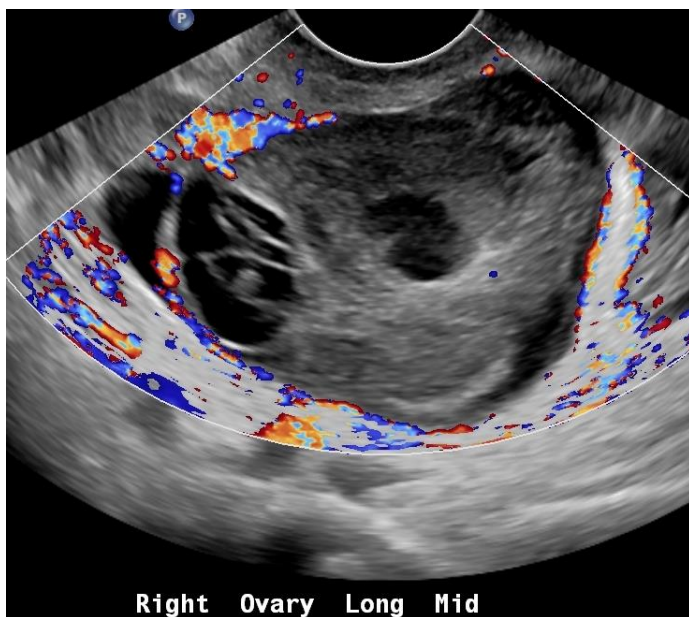
Diffusion-weighted imaging (DWI) and apparent diffusion coefficient (ADC) images showed diffusion restriction in the right ovary (Figures 2E and 2F). The patient was diagnosed with a hemorrhagic infarct of a torsed right ovary. She was treated conservatively, and her pain subsequently resolved.

Figure 1. Ultrasound Images of the Right Ovary of a 52-Year-Old Woman

A Grayscale image, longitudinal view



B Color Doppler image, longitudinal view



(A) Longitudinal transvaginal grayscale ultrasound of the right ovary demonstrates an enlarged, edematous ovary with two hemorrhagic cysts (arrows). (B) Longitudinal transvaginal color Doppler ultrasound of the right ovary demonstrates absent ovarian blood flow, as indicated by scant mixed-directional color flow.

Discussion

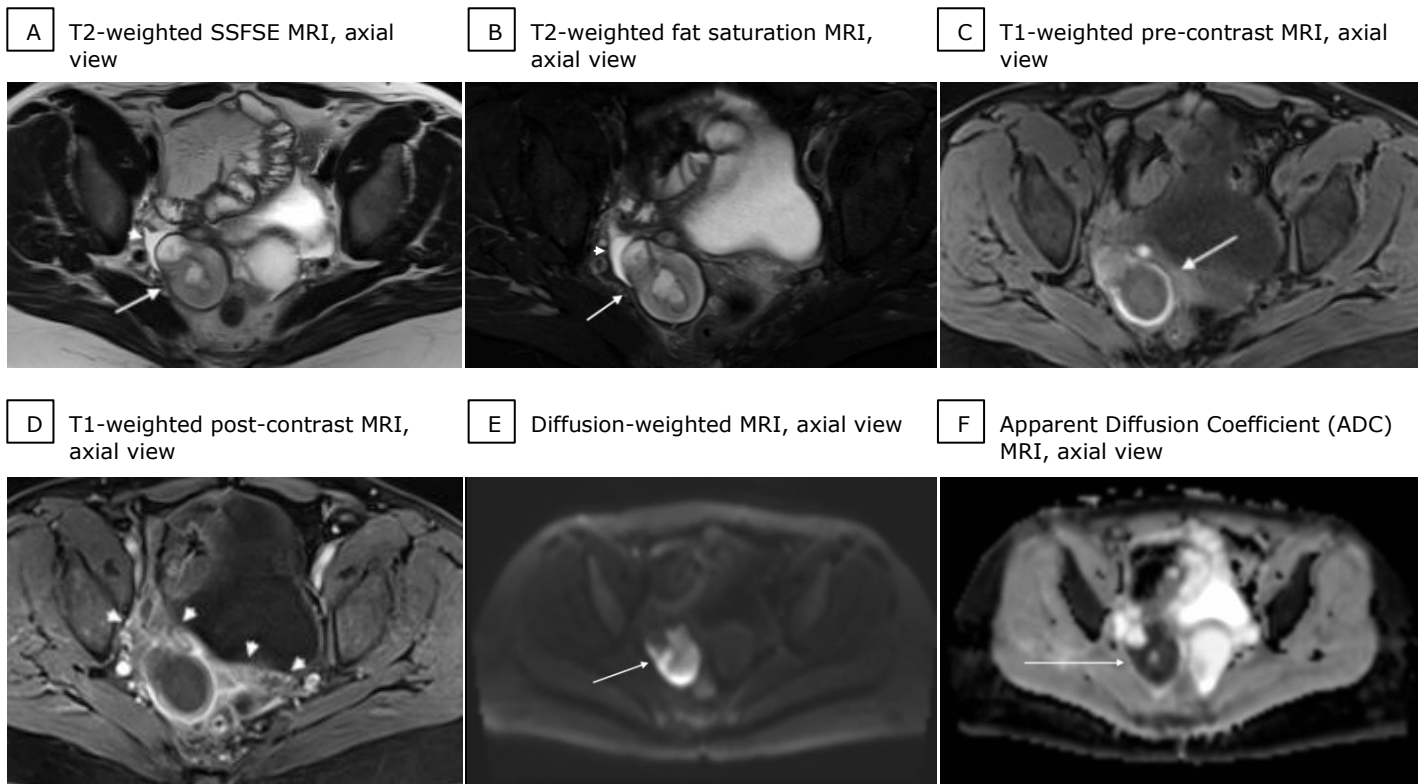
General Epidemiology and Clinical Presentation

Prompt diagnosis of ovarian torsion, also known as adnexal torsion, is crucial, as salvage rates of ovaries in cases of acute torsion are low but improve with prompt treatment.¹ Clinically, patients typically present with severe pelvic pain, with other common associated symptoms including nausea, vomiting, and fever.^{1,2} Delayed diagnosis of ovarian torsion can lead to ovarian infarction/necrosis.¹⁻³ Infarction may be a source of significant morbidity and mortality, as patients may go on to develop superinfection of the necrotic ovary, thrombophlebitis, peritonitis, or sepsis.³ The severity of vascular impairment and rate of ovarian necrosis are usually based on the degree to which the ovary and its vascular pedicle are rotated along the long axis, as well as on the duration of the rotation and frequency of torsion-detorsion events.¹ The presence of hemorrhage in cases of ovarian torsion is a strong indicator of poor ovarian viability.¹

Imaging Characteristics

On transvaginal or transabdominal pelvic ultrasound, an enlarged and edematous (hypoechoic) ovary may be seen in cases of torsion.¹⁻⁴ Classically, reduced flow is visible with color Doppler, the standard imaging technology deployed when ovarian torsion is being considered.¹ Flow can be significantly reduced or even nonexistent in cases where torsion progresses to infarction. Ovarian cysts may act as lead points and can be found within the infarcted, torsed ovary and can themselves become hemorrhagic.^{1,2} Paraovarian inflammatory change and pelvic free fluid may also be visible.^{1,3} Unlike acute ovarian torsion, in which an enlarged, medially displaced ovary may be visible with a twisted pedicle, an infarcted torsed ovary may appear normal or small in size with or without a twisted pedicle.^{3,5}

While ultrasound imaging, especially with color Doppler, should be used for acute examination, MRI can be useful for clarifying findings in complex cases.¹ On MRI, restricted diffusion, which may be mistaken for malignant tissue, can indicate tissue infarction.¹ A hyperintense ovarian stroma may be

Figure 2. Magnetic Resonance Imaging (MRI) of the Right Ovary of a 52-Year-Old Woman.

(A) Axial T2-weighted single-shot fast spin-echo (SSFSE) MR image demonstrates hyperintense cystic areas within an enlarged, edematous right ovary (arrow) and para-ovarian fluid (arrowhead). (B) Axial T2-weighted fat saturation MR image demonstrates an enlarged, edematous ovary (arrow) with hyperintense cystic areas and para-ovarian fluid (arrowhead). (C) Axial T1-weighted pre-contrast MR image demonstrates a peripheral rim of hyperintensity in the right ovary (arrow) as well as internal hyperintensity in the cystic areas. (D) Axial T1-weighted post-contrast MR image shows an ovarian stroma without contrast enhancement. There is also asymmetric enhancement of the right para-ovarian soft tissues (arrow heads) representing para-ovarian inflammatory change. (E) Axial diffusion-weighted MR image demonstrates diffuse hyperintensity in the right ovary (arrow) (B-value = 1000). (F) Axial apparent diffusion coefficient (ADC) MR image shows diffuse hypointensity in the right ovary (arrow) corresponding to the hyperintense area seen on diffusion-weighted imaging (DWI). This finding is compatible with infarction.

seen on T2-weighted imaging due to edema in the setting of torsion.⁴ On T2-weighted images, a hypointense ring surrounding the torsed ovary can indicate old blood products (hemosiderin) when torsion has progressed to hemorrhagic infarction.² T1-weighted sequences can show hyperintensity in the same ring distribution.² No contrast enhancement is expected in a completely hemorrhagic infarcted ovary.^{2,3} While radiological findings play an important role in the prompt diagnosis of ovarian torsion, laparoscopy is required for definitive diagnosis.^{1-3,5}

Differential Diagnoses

Important differential considerations include a ruptured hemorrhagic ovarian cyst, massive

ovarian edema, and ovarian hyperstimulation.¹ Ruptured hemorrhagic cysts are common causes of pelvic pain in premenopausal women.¹ Ultrasound may demonstrate an avascular cystic ovarian lesion, possibly angulated or crenulated in appearance with lace-like reticulations and hyperechoic debris.¹ CT may show a cystic ovarian/adnexal lesion with heterogeneous attenuation and surrounding hemoperitoneum.¹ Ovarian edema may occur due to many pathologies, ranging from torsion and detorsion events to underlying malignancy to acute hormonal changes.¹ With massive ovarian edema, the ovary is enlarged and edematous in appearance, heterogeneous hypoechoic on ultrasound, and hypodense on CT, and displays

high signal intensity on T2-weighted MR images.¹ Ovarian hyperstimulation syndrome (OHSS) is a potential side effect of fertility treatments involving follicle stimulation.¹ Unique imaging features of OHSS include enlarged ovarian follicles arranged in a spoke-wheel distribution with normal central ovarian tissue, marked enlargement of the ovaries, and pleural effusions and ascites, all of which occur bilaterally.¹ This contrasts with ovarian torsion, in which the center of the ovary is usually expanded and edematous, and peripheral follicles appear normal.¹

Prognosis, Treatment, and Therapeutic Options

In acutely symptomatic patients, urgent surgery is considered standard treatment.¹⁻⁵ Typically, a laparoscopic approach is adequate to approach the pathologic region and detorse or resect tissue, although open abdominal surgery may be required in certain instances.¹ In cases of acute torsion, a full recovery of the ovary with preserved function is possible.¹⁻³ However, in cases where the ovary is severely infarcted, oophorectomy may be required.^{1-3,5}

When multiple cysts or an ovarian mass is tied to the torsion event, treatment of the cysts or mass is crucial to preventing future torsion.¹ Treatment options for such cysts or masses may consist of hormonal therapy or unilateral or bilateral oophoropexy, a laparoscopic procedure in which the utero-ovarian ligament is shortened or the ovary, if enlarged, is sutured to the uterosacral ligament to stabilize the ovary.

Conclusion

Ovarian torsion occurs when an ovary rotates along its long axis, impeding blood flow to the ovary and fallopian tube. Torsion may occur spontaneously, although underlying conditions including polycystic ovaries or large adnexal masses can be precipitating factors. If ovarian torsion is not treated acutely, progression to gangrenous hemorrhagic infarction can occur. Ovarian salvage rates in cases of acute torsion improve with prompt diagnosis and treatment, which is enabled by imaging, especially through

MRI as well as standard and Doppler ultrasound imaging.

Author Contributions

Conceptualization, J.N.D. and M.K.P.; Acquisition, analysis, and interpretation of data, J.E.C. and P.S.; Writing – original draft preparation, J.E.C. and P.S.; Review and editing, J.E.C., P.S., J.N.D., and M.K.P.; Supervision, P.S., J.N.D., and M.K.P. All authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All authors had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

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