

Visual Case Discussion

"Whirlpool" and "Navel" signs on CT and MRI in a case of adnexal torsion

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Ovarian or adnexal torsion in a female presenting with acute lower abdominal pain is an important differential diagnosis in clinical practice. It is the fifth most common gynaecological emergency (2.7% of all gynaecological emergencies).¹ Here, we present a case of young female with acute abdomen due to ovarian torsion diagnosed using CT and MRI, prior to surgery. This condition may arise as a consequence of a twisted pedicle arising from stromal edema, haemorrhage, a mass/ cyst or hyper stimulation mainly involving the ovaries and Fallopian tubes, ultimately leading to the infarction. Ovarian cysts are found to be ~300% more in prevalence in cohorts of ovarian torsion as compared to the normal population.¹ Classically, ovarian torsion is unilateral and occurs in an abnormally enlarged ovary, most common in young children although it can occur in pre and post-menopausal women. Ovarian tumours give rise to 50–60% of these cases.¹ Majority (70%) are associated with vomiting and nausea. The classical description includes “sharp, stabbing or crampy lower quadrant pain, worsening intermittently with passage of time over many hours”. Though presentations are varied, a quick diagnosis and immediate surgical intervention is vital for salvage of the ovaries. Ultrasonography with colour Doppler is usually the investigation of choice for these cases; however, this particular case presented a scenario wherein the diagnosis required a CT abdomen along with MRI to demonstrate the entire anatomy of this pathology. A 28-year-old female presented to the Emergency room with complaints of lower abdominal pain since 10 days, severe intensity for the past 1 h with an episode of vomiting. The pain was described as sharp, radiating from flanks to the groin with no relieving factors. History of intake of tablet Paracetamol 650 mg twice daily for the past 4 days was provided. Patient was obese (BMI ~40). She was a known hypothyroid patient, on Tab ELTROXIN 50 mg. No other co-morbidities were noted at the time of presentation. BP was 150/90 mmHg and Pulse was 76/min, SpO₂ was 96%. Her last menstrual period was 3 months ago. She was Para 1 (she has a 5-year-old child, alive and healthy). Her

initial blood labs revealed neutrophilic leucocytosis (11,750 cells/mm³) and anaemia (Hb 11.0 mg/dl, RBC-4.28 mil/mm³). Her blood urea (12 mg/dl) and serum creatinine (0.4 mg/dl) were normal. Urine analysis was unremarkable. As her initial clinical presentation was of renal/ureteric colic and she was subjected to ultrasound abdomen. A cyst was noted in the midline, more towards the right side and was reported as a Para ovarian simple cyst measuring ~10.6 × 11.7 cm, lateral to the right ovary. Initial doppler study of the ovaries could not be performed satisfactorily due to the presence of excessive tenderness, partially filled urinary bladder, excessive bowel gas shadowing and inability of ultrasound to cover the entire lesion in a single field of view. In view of the urgent need to diagnose the condition, patient was then subjected to CT abdomen. Later, an MRI screening was performed to better delineate the anatomy. CECT abdomen showed a hyperdense grossly enlarged left ovary measuring ~9.9 × 5.1 cm; A large well defined minimally enhancing cystic lesion measuring ~17.1 × 11.3 × 12.1 cm arising from the left ovary was noted in midline and left adnexal region nearly occupying the entire pelvis. Twisting of the left ovarian vascular pedicle was noted leading to the diagnosis of left adnexal and ovarian torsion. The classical "Whirlpool sign"² can be clearly visualized in the twisted leash of left ovarian vessels on the CT and MRI (Video 1). On coronal sections, the "navel sign" was noted wherein the twisted pedicle exerts a mass effect on the smooth contour of the cyst wall producing a characteristic inward indentation (Fig. 1).³ MRI pelvis also revealed grossly enlarged left ovary. A large T1 hypo/ T2 hyperintense cystic lesion was noted in the midline and seen arising from the left ovary. Twisting of the pedicle was seen in the lower lateral portion of left ovary (Fig. 2). Minimal free fluid was noted around left ovary and pouch of Douglas. Patient was stabilized and was taken up for laparoscopic cystectomy and salpingo-oophorectomy. As the cyst was large, surgery was converted to a laparotomy with cystectomy with left salpingo-oophorectomy. A 360° twist around

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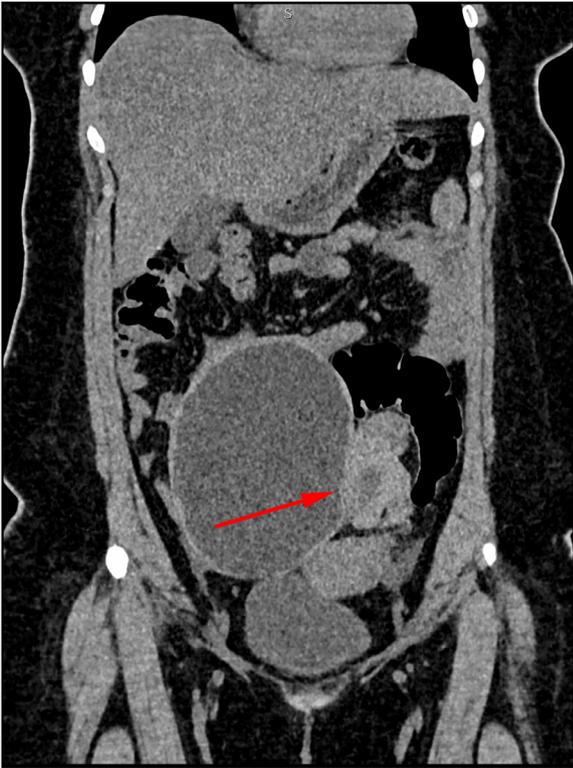


Fig. 1. CT Pelvis- Coronal section shows indentation on the contour of the left adnexal cyst by the twisted vascular pedicle - "Navel" sign (arrow head).

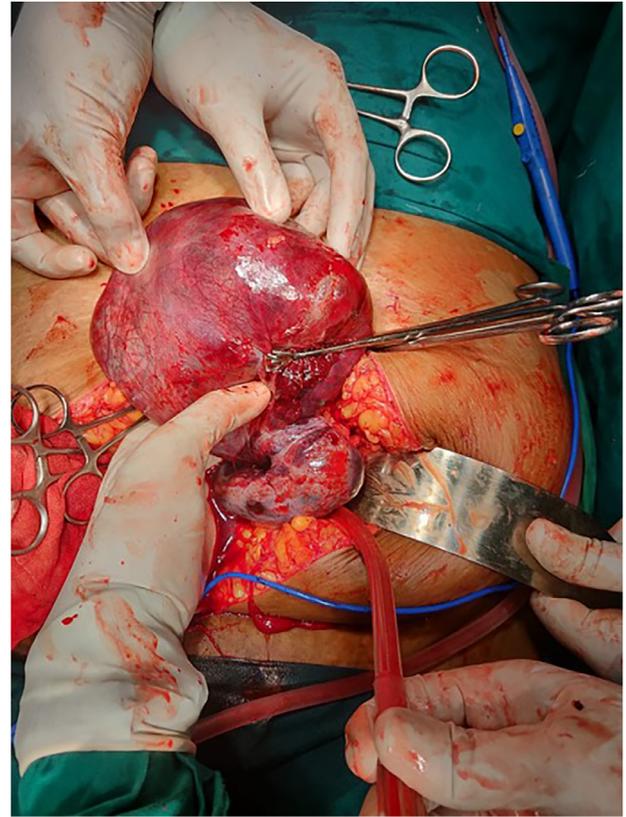


Fig. 3. Intra operative photograph of the adnexal cyst with left ovary showing the twisted pedicle (arrow head).

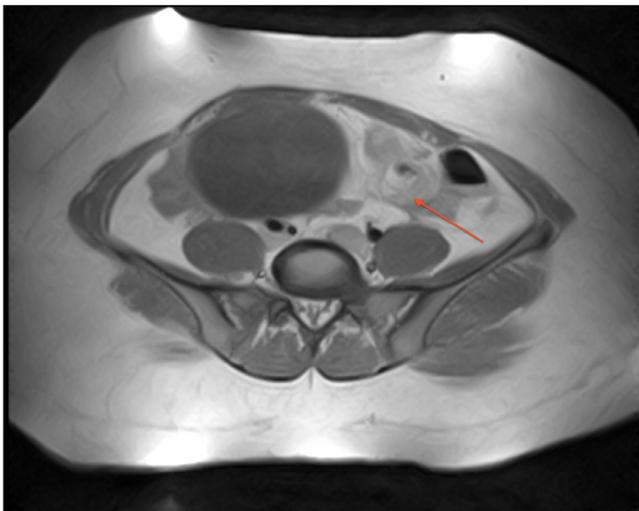


Fig. 2. MRI Pelvis- Axial T1 Weighted image shows grossly enlarged left ovary. A large T1 hypointense cystic lesion noted in the midline and seen arising from the left ovary. Twisting of the pedicle seen in the lower lateral portion of left ovary- "Whirlpool" sign on MRI (arrow head).

the pedicle was noted at the time of surgery consistent with the CT/MRI findings (Fig. 3). The lesion was sent for histopathological analysis and revealed a picture consistent with twisted ovarian cyst with areas of ischemic necrosis. Patient had an uneventful post-operative period. This study stresses upon the quick evaluation of an abdominal emergency using CT and MRI when ultrasound result is inconclusive and describes the "Whirlpool sign" and "navel sign" of adnexal torsion in both CT and MRI.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.visj.2019.100579](https://doi.org/10.1016/j.visj.2019.100579).

References

1. McWilliams GD, Hill MJ, Dietrich CS 3rd. *Surg Clin North Am.* 2008;88(Apr (2)):265–283 vi.
2. Ghonge NP, Lall C, Aggarwal B, Bhargava P. The MRI whirlpool sign in the diagnosis of ovarian torsion. *Radiol Case Rep.* 2015;7(3):731. <https://doi.org/10.2484/rcr.v7i3.731> Published 2015 Dec 7.
3. CT findings of adnexal torsion: A matched case-control study. Lee MS, Moon MH, Woo H, Sung CK, Oh S, et al. CT findings of adnexal torsion: a matched case-control study. *PLoS One.* 2018;13(7):e0200190.

Questions

1. What HU is indicative of haemorrhagic necrosis of the ovary in a case of ovarian torsion on CT?
 - a. > 50HU
 - b. 25–50HU
 - c. 0–25HU
 - d. < 0 HU

2. Which of these is a risk factor for ovarian torsion?
 - a. Bicornuate uterus
 - b. Inguinal hernia
 - c. Late menarche
 - d. Salpingitis
 - e. Ovarian dermoid

3. Differential diagnoses for ovarian torsion include all except:
 - a. Pelvic inflammatory disease (PID)

- b. Massive ovarian oedema (MOO)
- c. Oophoritis
- d. Congenital absence of Fallopian tube

Answers

1. >50HU. Explanation: The Hounsfield scale corresponding to the haemorrhagic necrosis is noted to be >50HU. Reference: Robert Fosbinder, Denise Orth (2011). Essentials of Radiologic Science. Lippincott Williams & Wilkins. ISBN 9780781775540.
2. Ovarian dermoid. Explanation: Ovarian mass lesions predispose to ovarian torsion since they can act as a lead point. If there is a concern for ovarian torsion, make sure to look carefully at the ovary around an ovarian mass or cyst.
3. Congenital absence of Fallopian tube. Explanation: The true etiology of ipsilateral ovarian and/or tubal absence has yet to be elucidated. The two most likely causes of ipsilateral ovarian and/or tubal absence may include an asymptomatic torsion of the adnexa with consequent organ ischemia and reabsorption, or a defect in the development of the Mullerian and gonadal structures underlying vascular anomalies.