



Unveiling the Uncommon: Intrauterine Diagnosis of a Fetal Ovarian Cyst – A Rare Case Report and Review of the Literature

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Abstract

Fetal Ovarian Cysts (FOCs) are a rare condition that can be detected through prenatal ultrasonography. This report discusses a case of a preterm primigravida with suspected FOCs, identified via ultrasound at 34 weeks of gestation. Conservative management with serial monitoring was implemented. Spontaneous delivery occurred at 36 weeks, resulting in a live birth, followed by postnatal monitoring. Fetal ovarian cysts result from hormonal stimulation, leading to abnormal follicular growth and fluid-filled cyst formation. Detection is primarily through prenatal ultrasound, with MRI aiding further evaluation. Management depends on cyst size and characteristics, with conservative monitoring for smaller cysts and intervention for larger or complicated cases. Most fetal ovarian cysts regress spontaneously postnatally, though persistent hormone levels may prolong their presence. Conservative management is often effective, with postnatal monitoring essential to prevent complications and unnecessary surgery. This case highlights the importance of early detection, close monitoring, and a multidisciplinary approach in managing FOCs.

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Introduction

Fetal ovarian cysts (FOCs) are among the most frequently identified abdominal masses in female fetuses and are increasingly detected due to advances in prenatal ultrasonography (Isaacs,

2007; Rotar et al., 2021). The incidence of fetal ovarian cysts has increased with improvements in antenatal imaging and routine obstetric surveillance, enabling diagnosis during the third trimester of pregnancy (Trinh & Kennedy, 2015).

The pathogenesis of fetal ovarian cysts is primarily driven by hormonal stimulation of the fetal ovary by maternal estrogens, placental human chorionic gonadotropin (hCG), and fetal gonadotropins, leading to excessive follicular development and cyst formation (Di Lorenzo et al., 2020; Cheng, 2021). Maternal endocrine disorders, including gestational diabetes and thyroid dysfunction, have also been associated with increased risk of fetal ovarian cyst development (Souganidis et al., 2021).

Prenatal ultrasonography remains the primary diagnostic modality because of its high sensitivity and specificity in identifying fetal abdominal cystic lesions (Ozyuncu et al., 2010; Catania et al., 2016). Typical sonographic findings include a unilateral, thin-walled, anechoic cystic structure located in the lower abdomen of a female fetus (Rotar et al., 2021). In selected cases, magnetic resonance imaging may provide additional information regarding cyst morphology and potential complications (Nemec et al., 2022).

Management strategies vary according to cyst size and complexity. Small simple cysts are commonly managed conservatively because spontaneous regression occurs in more than half of cases (Bascietto et al., 2017). However, larger or complex cysts carry a greater risk of torsion, hemorrhage, rupture, and ovarian loss, which may necessitate prenatal or postnatal intervention (Diguisto et al., 2018; Hara et al., 2021).

This study aimed to describe the prenatal diagnosis, conservative management, and favorable postnatal outcome of a fetal ovarian cyst detected during late pregnancy and to discuss current evidence regarding its diagnosis and management.

Materials and Methods

Study Design

This study was conducted as a case-based clinical study describing the prenatal diagnosis, management, and postnatal outcome of a fetal ovarian cyst diagnosed during the third trimester of pregnancy. Clinical information was obtained from maternal medical records, prenatal ultrasonography findings, laboratory investigations, delivery records, and neonatal follow-up assessments.

Patient Information

A 32-year-old primigravida was referred to the Maternal-Fetal Medicine Unit at 34 weeks of gestation with a suspected fetal intra-abdominal cyst identified during routine antenatal ultrasonography. The pregnancy had progressed without significant maternal complications. There was no history of hypertension, diabetes mellitus, thyroid disease, or multiple gestation. Maternal laboratory examinations, including thyroid function tests, diabetes screening, and serum CA-125 levels, were performed to identify possible contributing factors.

Diagnostic Assessment

Serial prenatal ultrasonography was performed at 33, 34, and 36 weeks of gestation to evaluate cyst size, morphology, and progression. The diagnosis of fetal ovarian cyst was established based on the presence of a unilateral cystic mass located in the lower fetal abdomen without associated structural abnormalities. Fetal growth, amniotic fluid volume, fetal movement, and fetal heart rate were assessed during each examination.

Management and Follow-Up

Given the relatively small cyst size (<40 mm) and the absence of ultrasonographic signs of torsion, hemorrhage, septation, or rupture, conservative management with serial ultrasonographic monitoring was selected. Delivery mode was determined according to obstetric indications. Following birth, neonatal abdominal ultrasonography was performed to evaluate cyst persistence and monitor regression. Monthly follow-up examinations were scheduled until complete cyst resolution.

Ethical Considerations

The patient's identity was anonymized to ensure confidentiality. Written informed consent was obtained from the patient's family for publication of clinical information and imaging findings.

Results and Discussions

Case Report

Mrs. MBM, a 32-year-old primigravida at 34 weeks of gestation, was referred by an obstetrics specialist with a suspected diagnosis of Fetal Ovarian Cysts (FOCs). Anamnesis revealed no significant complaints, and obstetric examination confirmed a single viable fetus with a fetal heart rate (FHR) of 153 beats per minute, with no signs of obstetric complications. Laboratory tests, including thyroid profile, diabetes mellitus screening, and tumor marker CA-125 assessment, showed no significant abnormalities. An ultrasound examination at 33 weeks of gestation revealed a hypoechoic mass in the right fetal ovary measuring 3.49 cm × 2.95 cm × 3.49 cm (volume: 18.81 cm³) (Figure 1A). A follow-up examination at 34 weeks of gestation confirmed the presence of a hypoechoic mass suspected to originate from the right ovary, with a size of 3.22 cm × 2.29 cm (Figure 1B). The patient was reassessed at 36 weeks of gestation, and the ovarian cystic mass was still present, measuring 3.91 cm × 2.63 cm (Figure 1C). The fetus continued to exhibit good movement, with an estimated weight of 2,635 grams.



Figures 1. Serial prenatal ultrasound examination confirmed the presence of fetal ovarian cyst (A) 33 weeks of gestation: 3.49 cm × 2.95 cm × 3.49 cm hypoechoic mass, (B) 34 weeks of gestation: 3.22 cm × 2.29 cm hypoechoic mass originating from the right ovary, (C) 36 weeks of gestation: 3.91 cm × 2.63 cm ovarian cystic mass. VU: vesica urinaria, NOK: ovarian cystic neoplasms.

The patient was planned for conservative monitoring with serial ultrasound examinations and was expected to undergo vaginal delivery at full term. However, spontaneous labor occurred at 36 weeks 6 days of gestation, resulting in the birth of a live female infant weighing 2,485 grams, with an Apgar Score of 8/9. A postnatal abdominal ultrasound was performed on the newborn, revealing a reduction in the ovarian mass size to 1.66 × 1.15 × 0.82 cm (volume: 1.56 cm³) with internal echoes and debris inside (Figure 2A, 2B). The patient was scheduled for monthly ultrasound evaluations to monitor further changes. By the second month, no ovarian mass was observed on ultrasound, indicating complete regression of the cystic neoplasm (Figure 2C, 2D).

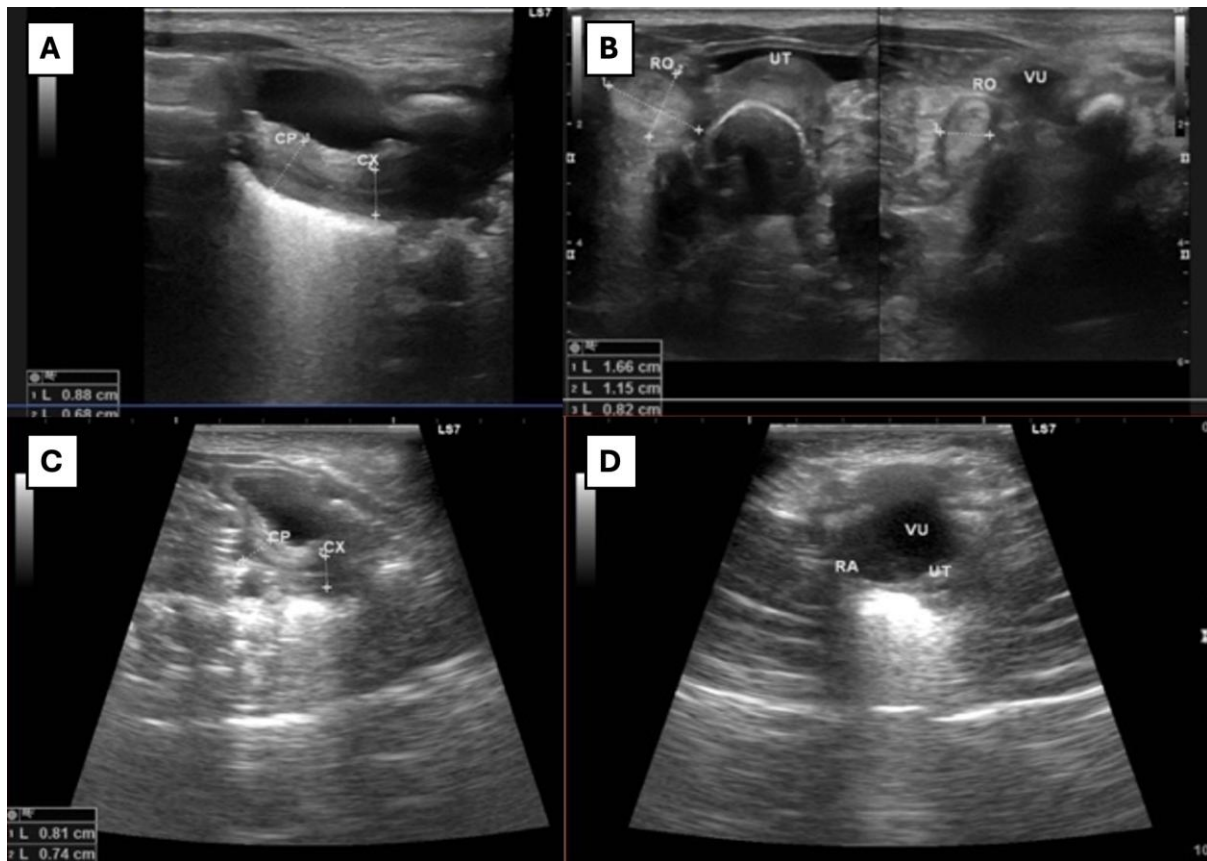


Figure 2. Postnatal serial ultrasound imaging showing regression of the ovarian mass. (A, B) At one month of age, a hypoechoic ovarian mass measuring $1.66 \times 1.15 \times 0.82$ cm was noted. (C, D) At two months of age, no identifiable ovarian mass was observed, indicating complete resolution.

Discussion

Fetal ovarian cysts develop due to hormonal stimulation, leading to abnormal growth of ovarian follicles and the formation of fluid-filled cystic structures. The progression of this condition can be classified into two forms: simple cysts and complex cysts (Cheng, 2021). Simple or unilocular cysts contain clear fluid, are non-septated, have thin walls without internal vascularization, and have a high likelihood of spontaneous regression without medical intervention (Tyraskis et al., 2017). Conversely, complex cysts may undergo internal hemorrhage, leading to the formation of blood clots, have the potential to develop ovarian torsion, which can disrupt blood supply and cause necrosis, and are at risk of rupture, which may trigger peritonitis due to fluid leakage into the peritoneal cavity (Tyraskis et al., 2017; Lawrence et al., 2020; Saeed et al., 2020). If FOCs develop into a complex form, the risk of complications increases significantly and may require medical intervention to prevent more serious consequences (Nakamura et al., 2019; Saeed et al., 2020).

Fetal ovarian cysts can develop due to various factors, primarily exposure to hormones such as pituitary gonadotropins, placental chorionic gonadotropins, and maternal estrogen, which stimulate the fetal ovaries (Cheng, 2021). This condition generally occurs due to increased hormone levels at the end of pregnancy. In addition to hormonal factors, vascular dysfunction that disrupts blood supply to the ovaries is also suspected to contribute to the formation of complex cysts. Maternal endocrine disorders, such as gestational diabetes, hypothyroidism, and hyperthyroidism, can also affect fetal hormonal regulation and increase the risk of ovarian cysts. Metabolic imbalances in these conditions

further influence maternal-fetal hormonal interactions, ultimately impacting fetal ovarian function. Multifetal pregnancy, which is often associated with elevated maternal hCG levels, is also linked to a higher risk of fetal ovarian cyst formation. Excessive hormonal stimulation in these conditions can lead to abnormal ovarian proliferation (Cheng, 2021; Souganidis et al., 2021).

Tests were conducted on the patient to assess endocrine and metabolic dysfunction. However, laboratory results were normal. The patient had no history of hypertension before or during pregnancy. The Ca-125 test result was 30.1 U/mL (normal limit ≤ 35 U/mL), indicating that the etiopathogenesis of the fetal ovarian cyst could not be determined with certainty. Moreover, Ca-125 testing has not yet been established as a reliable indicator for predicting the occurrence or outcome of fetal ovarian cysts. Therefore, further research, including maternal hormonal assessments and fetal Ca-125 measurements, is needed to understand better the mechanisms underlying fetal ovarian cyst formation (Di Lorenzo et al., 2020).

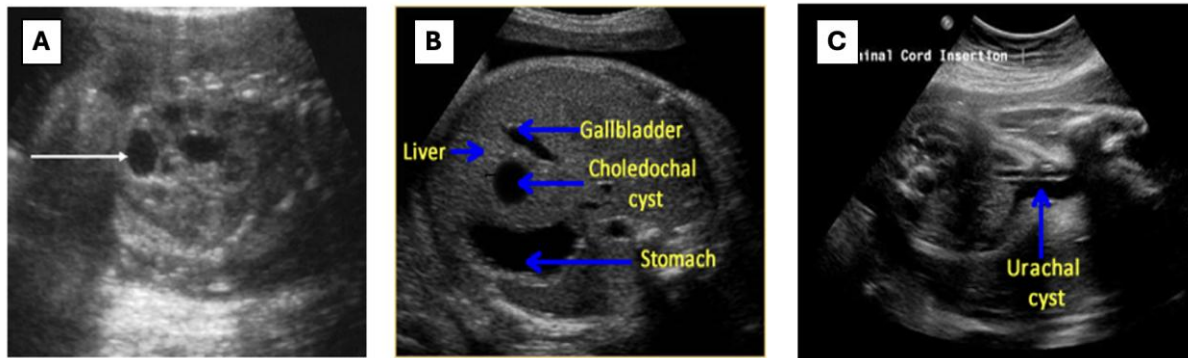
Most cases of Fetal Ovarian Cysts (FOCs) are detected through routine prenatal ultrasonography (Figure 6) (Isaacs, 2007; Di Lorenzo et al., 2020). The accuracy of prenatal ultrasonography in determining the etiology of fetal intra-abdominal cysts is relatively high, with sensitivity and specificity supporting its use as the primary diagnostic tool (Ozyuncu et al., 2010; Catania et al., 2016).

The key ultrasound findings of FOCs include a round anechoic mass with thin walls, no internal vascularization, free movement within the fetal abdominal cavity, and the absence of other organ abnormalities (Diguisto et al., 2018; Lawrence et al., 2020). If suspicious findings are observed, advanced imaging techniques such as Magnetic Resonance Imaging (MRI) can be used to assess cyst characteristics in greater detail, differentiate between benign and complex cysts, and evaluate the possibility of associated complications (Rotar et al., 2021; Lawrence et al., 2020).

In the diagnostic process, it is essential to consider several other conditions that may resemble Fetal Ovarian Cysts (FOCs) to prevent misdiagnosis (Trinh & Kennedy, 2015; Nemec et al., 2022). The differential diagnosis of fetal intra-abdominal cysts is quite broad. However, it can be narrowed down by determining the organ of origin (if possible), identifying the surrounding anatomy, and recognizing the cyst's location within the abdominopelvic cavity (Table 1) (Trinh & Kennedy, 2015; Tu, 2017). The ability to associate intra-abdominal cysts with the genitourinary or gastrointestinal tract aids in further classification and diagnosis (Nemec et al., 2022; Tu, 2017).

Several conditions that should be considered include intestinal duplication cysts, which are located along the digestive tract with thicker walls lined by intestinal epithelium; hydronephrosis, which is the enlargement of the kidney due to urinary tract obstruction, appearing as a cystic mass in the fetal abdomen; and mesenteric cysts, which are located in the intestinal mesentery and have different characteristics from ovarian cysts (Figure 3) (Nemec et al., 2022; Tu, 2017).

Distinguishing whether a cystic mass originates from the urinary bladder or surrounding organs is often challenging (Figure 4) (Tu, 2017; Fägerquist et al., 2001).



Figures 4. Ultrasound images of the differential diagnosis of fetal ovarian cysts: a.) Renal cyst, b.) Cholechochal cyst, c.) Urachal cyst.

To differentiate them, urinary bladder cysts typically exhibit a characteristic pattern of emptying and refilling with fetal urine every 25–30 minutes during the second and third trimesters. Therefore, a comprehensive evaluation using accurate imaging techniques is crucial to ensure a precise diagnosis and to avoid unnecessary interventions. In this case, the urinary bladder appeared normal, with surrounding organs showing appropriate shape and size (Tu, 2017; Fägerquist et al., 2001).

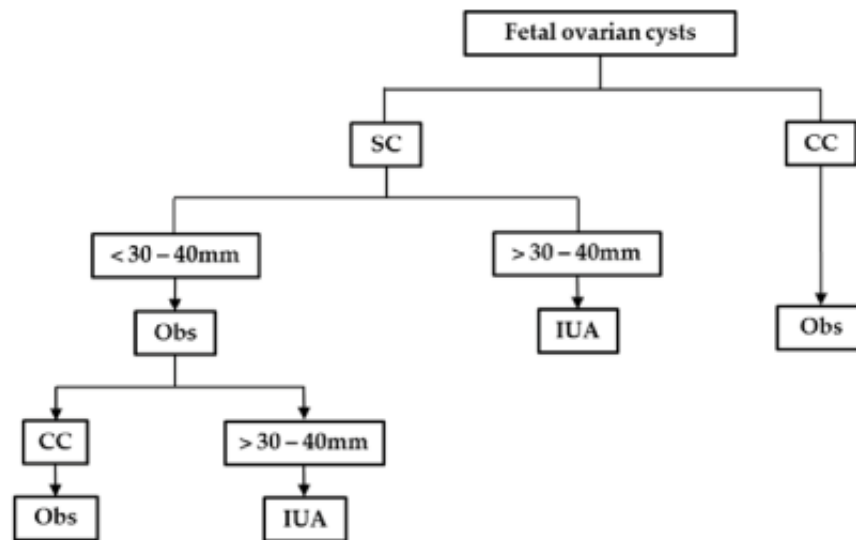
Antenatal ovarian torsion is the most common complication found in fetuses with ovarian cysts (Figure 5) (Tyraskis et al., 2017; Saeed et al., 2020).

Figures 5. Ultrasound image of fetal ovarian torsion: the most common complication of fetal ovarian cysts.

This is a rare condition that can disrupt the blood supply to the ovary, leading to necrosis, local inflammation, and peritonitis.^{10,17,18} This condition is more frequently associated with large ovarian cysts, with an incidence ranging from 25% to 75% in neonatal ovarian cyst cases.^{17,18} The diagnosis of antenatal ovarian torsion can be established through prenatal ultrasonography, which reveals a cystic mass with specific characteristics, such as fluid-debris levels, which are distinctive for torsion (Saeed et al., 2020; Nakamura et al., 2019; Devriendt et al., 2024).

Based on previous studies, 35 cases of neonatal ovarian torsion exhibited distinctive ultrasonographic signs.¹⁸ The majority of patients underwent laparoscopy, which revealed adhesions around the cyst and the absence of remaining ovarian tissue, indicating total ovarian damage due to torsion (Lawrence et al., 2020; Saeed et al., 2020). The risk of ovarian torsion is higher in cysts larger than 40 mm than in smaller ones (Devriendt et al., 2024). The antenatal detection of ovarian torsion has become easier through prenatal imaging, allowing for early diagnosis and better intervention planning. Close monitoring and careful clinical assessment are essential to prevent further complications (Devriendt et al., 2024; Toker Kurtmen et al., 2022).

The management of Fetal Ovarian Cysts (FOCs) depends on cyst size and characteristics (Figure 6).



Serial ultrasonography

- Simple cyst; repeat ultrasonography serially every two weeks, checking for both size and appearance.
- Complex cyst; repeat ultrasonography serially every two weeks, checking for size, appearance, and middle cerebral artery peak systolic velocity.

IUA

- Measure estradiol levels in the fluid content of the fetal ovarian cyst.
- If estradiol levels are > 1000 ng/L, the mass is very likely to be a fetal ovarian cyst.

Delivery

- Recommend spontaneous vaginal delivery after the onset of labor at term.
- Preterm delivery may be considered in cases of severe fetal anemia due to intracystic hemorrhage or bilateral ovarian cysts > 40 mm in diameter.
- Elective cesarean section should also be considered in cases in which vaginal delivery is expected to be difficult due to massive fetal ovarian cysts.
- Delivery should be performed at a perinatal center.

Figures 6. Diagnostic guidelines for identifying fetal ovarian cysts. CC: Complex cyst; IUA: In-utero aspiration; Obs: Observation; SC: Simple cyst.

If the cyst measures ≤ 40 mm, shows no signs of complications, and has a tendency for spontaneous regression, the preferred approach is conservative monitoring with serial ultrasonography every 2–4 weeks. (Tyraskis et al., 2017; Diguisto et al., 2018). However, if the cyst measures ≥ 50 mm, presents signs of ovarian torsion (e.g., vascular changes), or ruptures, further intervention is required to prevent serious complications (Saeed et al., 2020; Tu, 2017; Heling et al., 2018). Additionally, if the cyst shows progressive growth or transforms into a complex form with a

high risk to ovarian function and fetal health, medical intervention becomes a primary consideration(Rotar et al., 2021; Saeed et al., 2020).

In some cases, in utero aspiration may be performed to reduce the risk of complications without waiting until birth(Diguisto et al., 2018; Nakamura et al., 2019). This procedure aims to relieve pressure on an enlarging cyst and prevent complications such as torsion or rupture, which can be life-threatening (Saeed et al., 2020; Hara et al., 2021; Papic et al., 2014). However, this must be performed by an experienced medical team to avoid fetal trauma and ensure the safety of both the mother and the baby during the procedure(Bascietto et al., 2017).In some cases, neonatal surgery is required for infants with ovarian torsion and intracystic hemorrhage(Bascietto et al., 2017).

Various studies have shown that approximately 80% of fetal ovarian cysts are functional and undergo spontaneous regression after birth.²³ A study involving 954 fetuses reported that spontaneous resolution of cysts occurred in 53.8% of cases, either during pregnancy or after birth.²³ The decline in maternal placental estrogen and β -hCG levels after delivery, along with the neurological maturation of the infant, contributes to the spontaneous regression of these cysts.^{23,24} However, since FSH and LH levels in newborns remain elevated until the gonadostat mechanism matures, cysts may continue to enlarge for about three months postnatally(Bascietto et al., 2017; Akin et al., 2010). The likelihood of resolution is lower for complex cysts compared to simple cysts, particularly for cysts larger than 40 mm.^{7,9} Changes in cyst morphology on ultrasonographic examination are associated with an increased risk of ovarian tissue loss due to resorption or autoamputation, with a significant proportion of cases affected (Lawrence et al., 2020; Akin et al., 2010).

In this case, a conservative approach with strict ultrasound monitoring proved effective. The cyst remained stable without complications, eliminating the need for intervention. This aligns with medical recommendations, which suggest that intervention is only necessary if there are significant changes in cyst size or characteristics (Hara et al., 2021; Papic et al., 2014).

The prognosis for Fetal Ovarian Cysts (FOCs) is generally favorable, especially if the cyst spontaneously regresses within the first few months postnatally (Saeed et al., 2020; Nakamura et al., 2019). However, complications such as ovarian torsion can lead to loss of ovarian function, potentially affecting future fertility (Saeed et al., 2020; Nakamura et al., 2019). Therefore, postnatal monitoring remains crucial to ensure cyst resolution, prevent long-term consequences, and avoid unnecessary surgery (Heling et al., 2018; Chen et al., 2020).

Beyond clinical aspects, psychosocial factors also play a role in the management of FOCs. A prenatal diagnosis indicating an abnormal mass can cause significant anxiety for parents (Tyraskis et al., 2017; Chen et al., 2020). Thus, patient education and effective communication between doctors and families are essential to provide clarity on prognosis and available treatment options. With an appropriate approach, FOCs can be successfully managed (Tyraskis et al., 2017; Chen et al., 2020).

Conclusion

Fetal Ovarian Cysts (FOCs) are a rare condition that should be recognized early through prenatal ultrasonography. Early detection allows for optimal monitoring and helps determine the appropriate management strategy. Most cases can be managed conservatively with serial ultrasonographic monitoring to evaluate cyst progression and detect potential complications. However, if complications such as ovarian torsion or rupture occur, surgical intervention may be necessary to prevent long-term effects on the infant's reproductive function. The management of FOCs requires a multidisciplinary approach, involving maternal-fetal medicine specialists, neonatologists, and pediatric surgeons to ensure the safest and most effective treatment plan. With close monitoring and strong collaboration, the prognosis for infants with FOCs is generally favorable, as most cysts undergo spontaneous regression within the first few months after birth. A systematic

approach to the detection, monitoring, and management of FOCs is crucial to ensure optimal outcomes for both mother and baby.

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LS contributed to data acquisition and drafted the manuscript. PML was responsible for the critical revision of the manuscript, the radiology examination, and its interpretation. All authors read and approved the final version of the manuscript.

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