Original Article

# Cysts of the fetal abdomen: Antenatal and postnatal comparison

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## ABSTRACT

**Background:** To evaluate cases diagnosed with fetal abdominal cyst diagnosed in prenatal period. **Methods:** We retrieved the cases diagnosed with fetal abdominal cyst between the years 2018 and 2020 from hospital's database. The localization, origin, dimensions, properties (simple or complex), and characteristics (solid, cystic, vascularity) were noted both in prenatal and postnatal period. We also tested the diagnostic performance of ultrasonography according to endpoint diagnosis revealed postnatally. **Results:** During the study period, a total of 29 cases diagnosed as fetal abdominal cyst. Of them, there were 11 (37.9%) gastrointestinal, 9 (31%) ovarian, 6 (20.6%) genitourinary, 3 (10.3%) hepatobiliary system cysts. In our study, we were able to identify 5 (45%) of 11 fetuses with postnatally confirmed gastrointestinal system cysts, 1 (33%) of 3 fetuses with hepatobiliary system cysts, 3 (50%) of 6 fetuses with urinary system cysts and 6 (66%) of 9 fetuses with ovarian cysts. **Conclusion:** İn this study, the most common abdominal cyst was ovarian cysts. The most difficult to diagnose cysts are those that originated from gastrointestinal system and hepatobiliary system.

**Keywords:** Congenital, fetal abdominal cyst, prenatal diagnosis, ultrasound

## Introduction

It is possible to detect fetal abdominal cysts antenatally in every trimester. Usually, they are detected during fetal anomaly screening in the second trimester but can be detected incidentally in the third trimester. The incidence of fetal abdominal cysts is 1/1000.[1] With the advanced technology of ultrasound devices, detection, imaging, and evaluation of these cysts are much easier. The most common fetal abdominal cysts are ovarian cysts, gastrointestinal duplication cysts, hepatic and biliary cysts, meconium pseudocysts, mesenteric cysts, splenic cysts, hydrometrocolpos, and intestinal dilatations.[1-3]

Clinically, first the detection of the cyst then the origin of the cyst is very important. When defining the cyst, the system from which it originates, the location in the abdomen, the characteristic properties of the cyst, and accompanying ultrasound findings are important in guiding the postnatal follow-up. The postnatal management of antenatally detected cysts of nonspecific origin can be complicated.[4,5] In this study, we planned to compare prenatal diagnoses of 29 fetuses with fetal abdominal cyst and the postnatal follow-up and results.

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## Material and Methods

In this study, we retrospectively examined pregnancies diagnosed as having fetal abdominal cysts admitted to the perinatology clinic between 2018 and 2020 in Etlik Zübeyde Hanım Obstetrics and Gynecology Training and Research Hospital, which is a tertiary hospital with 15,000 births annually.

This study was approved by the Medical Specialty Education Board of the Etlik Zübeyde Hanım Women's Health Practices and Research Center (Decision Number: 10/27). Maternal age, the gestational week during the ultrasound imaging, gravidity, parity, and fetal sex was recorded. All patients were evaluated in detail using a Voluson E6 (GE Healthcare GmbH and Co OG, Austria) via targeted ultrasound by the same experienced perinatologist [Figure 1]. As the final diagnosis, the postnatal diagnosis of the fetus was used.

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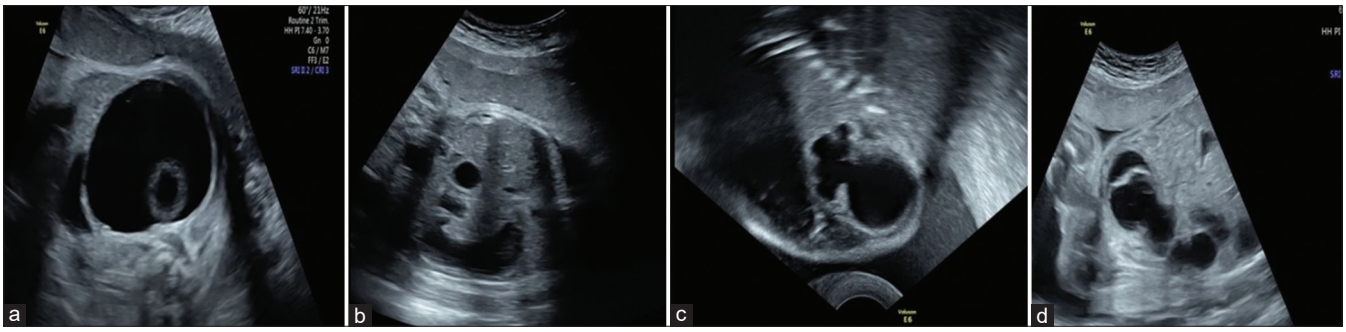



**Figure 1:** Ultrasound images of fetal abdominal cysts, (a) ovarian cyst (Case 2); (b) double bubble (Case 6); (c) mesenteric cyst (Case 28); (d) ureterocele (Case 15)

In the routine evaluation of fetal abdominal cysts with ultrasound imaging, the dimensions of the cyst, properties and characteristics (solid, cystic, vascularity), localization, whether the cyst was simple or complex and other accompanying ultrasound findings were recorded. Unilocular, nonseptated, and anechoic cysts were deemed as simple cysts. Cysts with septation, with solid components or completely solid cysts, were deemed to be complex cysts. The location of the cysts was classified as the right upper and right lower quadrant, and left upper and left lower quadrant. The antenatal diagnosis was made using the properties, location, relation to other organs of the cyst, and fetal sex.

To access the necessary data for the study, the hospital records of patients treated in our center were used (48.2%). Pregnant women who we diagnosed but were treated in another center were invited for interview (24.1%). For pregnant women, who refused our invitation, the necessary data were obtained through phone communication (27.5%). Postnatally operated and not-operated cysts were recorded. Postnatal fetal outcomes were classified as follows: in good health, follow-up treatment, termination of pregnancy, intrauterine ex fetus, and postnatal ex fetus.

The obtained data were statistically analyzed using the IBM SPSS.23 (SPSS Inc, Chicago, IL) statistics program. For continuous variables, mean and standard deviation, and for categorical variables, frequency (n) and percentage (%) values were used. For continuous variables outside normal distribution in three or more level comparisons, if data were normally distributed, one-way analysis of variance was used, if they were not normally distributed, the Kruskal–Wallis test was used. To analyze the relation between categorical variables, the Chi-square test was used. For all analyses, $P < 0.05$ was accepted as the level of statistical significance.

## Results

The incidence of fetal abdominal cysts in our study was 9.6/10,000 due to our hospital having 15,000 annual births. The sociodemographic and clinical characteristics of the 29 pregnant women included in this study are shown in Table 1.

Our study consisted of 16 female (55.2%) and 13 male fetuses (44.8%). According to the gestational weeks, 14 (48.3%) fetuses were in the second trimester and 15 (51.7%) were in the third trimester. The mean gestational age of diagnosis was 27.41 ± 5.64 (range, 18–36) weeks. The mean maternal age was 31.34 ± 6.16 (range, 21–41) years. The mean maternal gravida was 2.52 ± 1.41 (range, 1–6). The mean parity number was 1.34 ± 1.23 (range, 0–4).

In our study, there were 16 (55.2%) simple cysts and 13 (44.8%) complex cysts. The location of these cysts was the right upper quadrant ($n = 2$), the right lower quadrant ($n = 9$), the midline ($n = 10$), the left upper quadrant ($n = 1$), the left lower quadrant ($n = 6$), and the right-left lower quadrant ($n = 1$). Fifteen (51.7%) women had a vaginal delivery, 13 (44.8%) had a cesarean, and only one (3.4%) had an abortion. Twenty-one (72.4%) fetuses had no surgery, eight (27.6%) underwent surgery, and overall, 18 (62.1%) fetuses had good results. In our study, the mean fetal abdominal cyst diameter was found as 41.3 ± 25.9 mm.

The detailed antenatal and postnatal properties of the fetal abdominal cysts are shown in Table 2 and Figure 2. As shown in Table 2, out of the antenatally diagnosed cysts, 11 (37.9%) were in the gastrointestinal system-related group, three (10.3%) were in the hepatobiliary system-related group, six (20.6%) were in the urinary system-related group, and nine (31%) were in the ovarian-related group. As shown in Table 2 and Figure 1, eight (27.6%) fetuses underwent postnatal surgery, nine (31%) cysts resolved spontaneously, three (10.3%) fetuses resulted in postnatal and intrauterine death, and nine (31%) remain under follow-up.

In our study, due to not having autopsies for intrauterine and postnatal deaths, 17 out of 29 fetal abdominal cysts (58.6%) had matching antenatal and postnatal diagnoses. We were able to identify 5 (45%) of 11 fetuses with postnatally confirmed gastrointestinal system cysts, 1 (33%) of 3 fetuses with hepatobiliary system cysts, 3 (50%) of 6 fetuses with urinary system cysts and 6 (66%) of 9 fetuses with ovarian cysts [Figure 3]. There were two postnatal and intrauterine deaths due to additional anomalies. All fetuses with isolated fetal abdominal cysts had a good prognosis. When we excluded fetal abdominal cysts with unknown outcomes (spontaneous resolution, intrauterine death, postnatal death), prenatal ultrasonography was able to identify 6 of the 9 fetuses with

**Table 1: Detailed medical and sociodemographic characteristics of each case included in the study**

| Case | MA, GP | Sex | GW | USG] | USG localization | Cyst diameter (mm) | USG additional findings | Antenatal diagnosis | Trimester of birth | Type of birth | Postnatal diagnosis | Surgery | Outcome |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 25, G1P0 | Female | 25 | Simple | Left upper quadrant | 17 | Renal anomalies | Urınary | III | Vaginal birth | Renal cyst | No | Follow-up |
| 2 | 37, G3P2 | Female | 33 | Complex | Right lower quadrant | 41 | Polyhydramnios | Ovarian | III | C/S | Ovarian cyst | Yes | Good |
| 3 | 24, G1P0 | Male | 22 | Complex | Midline | 23 | Polyhydramnios | GİS | III | Vaginal birth | Meconium pseudocyst | No | Follow-up |
| 4 | 28, G2P1 | Male | 32 | Simple | Right upper quadrant | 36 | Renal anomalies | Urinary | III | C/S | Renal cyst | No | Follow-up |
| 5 | 40, G6P4 | Male | 23 | Simple | Left lower quadrant | 15 | No | GİS | III | Vaginal birth | Spontaneous resolve | No | Good |
| 6 | 37, G2P1 | Female | 33 | Simple | Left lower quadrant | 75 | Polyhydramnios | GİS | III | C/S | Duodenal atresia (Trisomy 21) | Yes | Good |
| 7 | 38, G3P2 | Female | 22 | Simple | Right lower quadrant | 50 | İntestinal anomalies | Ovarian | II | Abortus | Spontaneous resolve | No | Intrauterine death |
| 8 | 22, G1P0 | Female | 30 | Simple | Right - left lower quadrant | 44 | No | Ovarian | III | Vaginal birth | Ovarian cyst | No | Follow-up |
| 9 | 36, G3P1 | Male | 29 | Complex | Midline | 20 | İntestinal anomalies | GİS | III | C/S | Bowel volvulus | Yes | Good |
| 10 | 27, G1P0 | Female | 21 | Simple | Right lower quadrant | 90 | Polyhydramnios | GİS | II | C/S | Annular pancreas | Yes | Good |
| 11 | 30, G2P1 | Male | 21 | Complex | Midline | 69 | İntestinal anomalies | GİS | III | Vaginal birth | Spontaneous resolve | No | Good |
| 12 | 31, G4P3 | Female | 30 | Complex | Midline | 61 | No | GİS | III | Vaginal birth | Ovarian cyst | No | Follow-up |
| 13 | 30, G2P1 | Female | 33 | Complex | Right lower quadrant | 14 | No | Ovarian | III | C/S | Ovarian cyst | Yes | Good |
| 14 | 26, G3P2 | Male | 24 | Complex | Right upper quadrant | 10 | Renal anomalies | Urinary | III | Vaginal birth | Urinary lipoma | No | Follow-up |
| 15 | 35, G1P0 | Male | 20 | Complex | Left lower quadrant | 46 | Renal anomalies | Urinary | III | Vagianl birth | Ureterocele cyst | Yes | Good |
| 16 | 41, G5P3 | Female | 22 | Complex | Midline | 19 | Renal anomalies | Urinary | II | Vaginal birth | No diagnosis | No | Postnatal death |
| 17 | 25, G4P1 | Male | 36 | Simple | Right lower quadrant | 16 | Renal anomalies | Urinary | III | Vaginal birth | Spontaneous resolve | No | Good |
| 18 | 27, G5P4 | Male | 33 | Simple | Left lower quadrant | 81 | Hepatobiliary | Hepatobiliary | III | C/S | Spontaneous resolve | No | Good |
| 19 | 30, G1P0 | Female | 22 | Simple | Midline | 10 | Intestinal anomalies | GİS | III | C/S | No diagnosis | No | Postnatal death |
| 20 | 21, G1P0 | Male | 24 | Simple | Midline | 24 | Hepatobiliary anomalies | Hepatobiliary | III | C/S | Spontaneous resolve | No | Good |
| 21 | 39, G4P3 | Female | 32 | Complex | Right lower quadrant | 48 | Polyhydramnios | Ovarian | III | C/S | Spontaneous resolve | No | Good |
| 22 | 39, G3P2 | Female | 35 | Complex | Left lower quadrant | 70 | Polyhydramnios | Ovarian | III | C/S | Hematocolpos | Yes | Good |
| 23 | 33, G2P1 | Female | 23 | Simple | Right lower quadrant | 13 | Hepatobiliary anomalies | Hepatobiliary | III | C/S | Hepatic cyst | No | Follow-up |
| 24 | 36, G1P0 | Male | 21 | Simple | Midline | 51 | Renal anomalies | GİS | III | Vaginal birth | Renal cyst | No | Follow-up |

*Contd...*

**Table 1: Contd...**

| Case | MA, GP | Sex | GW | USG] | USG localization | Cyst diameter (mm) | USG additional findings | Antenatal diagnosis | Trimester of birth | Type of birth | Postnatal diagnosis | Surgery | Outcome |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | 26, G3P2 | Male | 18 | Complex | Midline | 62 | No | GİS | III | Vaginal birth | Spontaneous resolve | No | Good |
| 26 | 25, G2P1 | Female | 35 | Simple | Right lower quadrant | 20 | No | Ovarian | III | Vaginal birth | Ovarian cyst | No | Good |
| 27 | 26, G1P0 | Male | 31 | Complex | Midline | 21 | Polyhydramnios | GİS | III | Vaginal birth | Spontaneous resolve | No | Good |
| 28 | 34, G3P2 | Female | 32 | Simple | Left lower quadrant | 96 | No | Ovarian | III | Vaginal birth | Mesenteric cyst | Yes | Good |
| 29 | 41, G3P2 | Female | 33 | Simple | Right lower quadrant | 57 | No | Ovarian | III | C/S | Ovarian cyst | No | Good |

USG: Ultrasonography, MA: Maternal age; GIS: Gastrointestinal system; G: Gravidity; P: Parity; GW: Gestational weeks; C/S: Cesarean section

ovarian cysts that were confirmed postnataly. There were three false-positive prenatal diagnoses of ovarian cysts in 1 fetus with hematocolpos and another fetuses withy resolved spontaneously.

### Ovarian

Four fetuses diagnosed as having ovarian cysts underwent surgery postnatally and had favorable prognoses. Two surgical fetuses had complicated-looking ovarian cysts with a size smaller than 40 mm. These fetuses underwent oophorectomy due to ovarian torsion postnatally. Another fetus with an antenatally diagnosed complicated-looking ovarian cyst (larger than 50 mm) underwent surgery postnatally. Another fetus who we diagnosed as having an ovarian cyst underwent surgery with a diagnosis of an imperforate hymen. Another antenatally diagnosed fetus had follow-up examinations and did not undergo surgery. Two of our ovarian cysts resolved spontaneously in the postnatal period.

### Gastrointestinal system

Four out of 11 fetal abdominal cysts that we presumed as gastrointestinal-originated cysts resolved spontaneously (36.4%) and three had follow-up examinations [Figure 1]. Among the patients who were followed up postnatally, one was postnatally diagnosed as a mesenteric cyst, one was diagnosed as a renal cyst; the other fetus died postnatally before a diagnosis could be made [Figure 1]. One fetal abdominal cyst antenatally diagnosed as duodenal atresia underwent surgery with the indication of duodenal atresia and was confirmed to be annular pancreas. Another fetal abdominal cyst that we considered as a gastrointestinal system-originated meconium cyst underwent surgery postnatally and a meconium pseudocyst was found. One fetal abdominal cyst that was diagnosed as jejunal atresia underwent emergency surgery due to intestinal volvulus [Figure 1]. The overall accuracy of ultrasonography was low in fetal gastrointestinal cysts.

### Hepatobiliary system

One fetal abdominal cyst that we diagnosed as a possible hepatic cyst was postnatally confirmed as a hepatic cyst. Two other cysts that we considered as biliary and choledochal cysts resolved spontaneously in the postnatal period [Figure 1].

### Urinary system

Some (6.8%) of the cysts we considered as renal cysts had the same diagnosis postnatally and had follow-up examinations [Table 2 and Figure 1]. In these urinary tract-originated cysts, one fetus was diagnosed as having a ureterocele and underwent postnatal surgery with a good prognosis. One fetus who we considered as having a renal cyst was postnatally diagnosed as having urinary system-originated lipoma and had follow-up examinations. We were unable to determine the outcome of our two remaining fetuses and the other died in the postnatal period without a diagnosis.

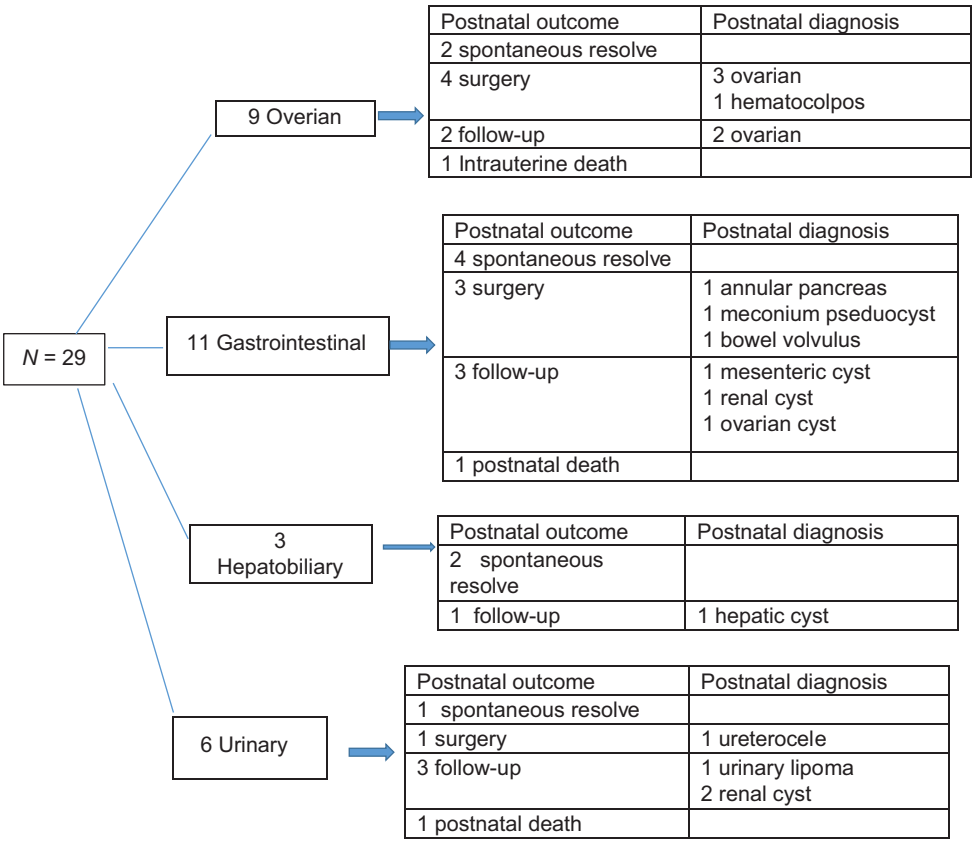
## Discussion

Due to advancing technology in ultrasound devices, it is possible to detect fetal abdominal cysts. These cysts are usually

**Table 2: Examination of cases according to prenatal diagnosis**

| Prenatal diagnosis | *n* (% of total) | Gender | | Postnatal diagnosis | *n* (% of total) | Mean±SD | | Postnatal surgery | | Postnatal outcomes | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Female | Male | | | Maternal age | Geatational week at diagnosis | No, *n* (%) | Yes, *n* (%) | Follow-up, *n* (%) | Good, *n* (%) | Intrauterine death, *n* (%) | Postnatal death, *n* (%) |
| GIS | | | | | | | | | | | | | |
| Mesenteric cyst | 7 (24.1) | 1 | 6 | Mesenteric cyst | 1 (3.4) | 36 | 29 | 1 (100) | | 1 (100) | 1 (100) | | - |
| | | | | Spontaneous resolve | 4 (13.6) | 30.4±5.8 | 23.7±4.9 | - | - | - | 4 (100) | - | - |
| | | | | Renal cyst | 1 (3.4) | 30 | 22 | 1 (100) | - | - | - | | 1 (100) |
| | | | | No diagnosis | 1 (3.4) | 29 | 28 | | | | | | |
| Duodenal atresia | 2 (6.9) | 1 | 0 | Meconium pseudocyst | 1 (3.4) | 28 | 30 | | 1 (100) | - | 1 (100) | | - |
| | | 1 | | Duodenal atresia, annular pancreas + down syndrome | 1 (3.4) | 36 | 24 | | 1 (100) | | 1 (100) | | |
| Jejunal atresia | 1 (3.4) | 1 | 0 | Bowel volvulus | 1 (3.4) | 30 | 22 | 1 (100) | - | - | - | | 1 (100) |
| Meconium pseudocyst | 1 (3.4) | 0 | 1 | Meconium pseudocyst, Cystic fibrosis | 1 (3.4) | 28 | 30 | | 1 (100) | - | 1 (100) | | |
| Hepatobiliary system | | | | | | | | | | | | | |
| Gall bladder cyst | 1 (3.4) | 0 | 1 | Spontaneous resolve | 1 (3.4) | 21 | 24 | 1 (100) | - | - | 1 (100) | - | - |
| Splenic cyst | 1 (3.4) | 0 | 1 | Spontaneous resolve | 1 (3.4) | 27 | 33 | 1 (100) | - | - | 1 (100) | - | - |
| Hepatic cyst | 1 (3.4) | 1 | 0 | Hepatic cyst | | 33 | 23 | 1 (100) | - | 1 (100) | - | - | - |
| Urinary system | | | | | | | | | | | | | |
| Renal cyst | 5 (17.2) | 2 | 3 | Renal cyst | 2 (6.8) | 29.0±6.8 | 27.8±5.9 | 5 (100) | - | 3 (60.0) | 1 (20.0) | - | 1 (20.0) |
| | | | | Spontaneous resolve | 1 (3.4) | | | | | | | | |
| | | | | Urinary lipoma | 1 (3.4) | | | | | | | | |
| | | | | No diagnosis | 1 (3.4) | | | | | | | | |
| Ureterocele cyst | 1 (3.4) | 0 | 1 | Ureterocele cyst | 1 (3.4) | 35 | 20 | - | 1 (100) | - | 1 (100) | - | - |
| Ovarian | | | | | | | | | | | | | |
| Ovarian cyst | 9 (31) | 9 | 0 | Ovarian cyst | 6 (20.7) | 33.9±6.8 | 31.7±3.9 | 5 (55.6) | 4 (44.4) | 1 (11.1) | 7 (77.8) | 1 (11.1) | - |
| | | | | Spontaneous resolve | 2 (6.8) | | | | | | | | |
| | | | | Hematocolpos | 1 (3.4) | | | | | | | | |
| Total | 29 | 16 | 13 | | 29 | 31.3±6.2 | 27.4±5.6 | 21 (72.4) | 8 (27.6) | 8 (27.6) | 18 (62.1) | 1 (3.4) | 2 (6.9) |

SD: Standart deviation: GIS: Gastrointestinal system




| Postnatal outcome | Postnatal diagnosis |
|---|---|
| 2 spontaneous resolve | |
| 4 surgery | 3 ovarian<br>1 hematocolpos |
| 2 follow-up | 2 ovarian |
| 1 Intrauterine death | |

| Postnatal outcome | Postnatal diagnosis |
|---|---|
| 4 spontaneous resolve | |
| 3 surgery | 1 annular pancreas<br>1 meconium pseduocyst<br>1 bowel volvulus |
| 3 follow-up | 1 mesenteric cyst<br>1 renal cyst<br>1 ovarian cyst |
| 1 postnatal death | |

| Postnatal outcome | Postnatal diagnosis |
|---|---|
| 2 spontaneous resolve | |
| 1 follow-up | 1 hepatic cyst |

| Postnatal outcome | Postnatal diagnosis |
|---|---|
| 1 spontaneous resolve | |
| 1 surgery | 1 ureterocele |
| 3 follow-up | 1 urinary lipoma<br>2 renal cyst |
| 1 postnatal death | |

**Figure 2:** Flowchart of postnatal outcomes of fetal abdominal cysts, where postnatal follow-up was possible

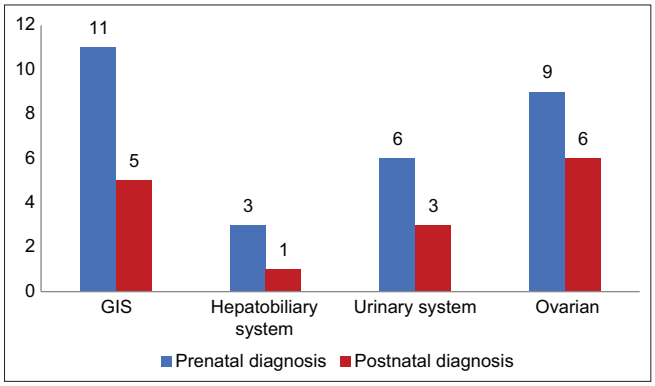



**Figure 3:** Antenatal and postnatal diagnoses according to four categories

detected during fetal anomaly screening in the second trimester but can be detected in any trimester. Although there is no diagnostic algorithm to find the origins of the cysts, clues about the organ or system from which the cyst originates are available from the location of the cyst inside the abdomen, its size, and characteristic properties. Thus the postnatal prognosis of these cases is improving with antenatal diagnosis. Ultrasound imaging has a positive predictive value (PPV) of 75% to detect the origin and structure of fetal abdominal cysts.[2] In our study, we had a PPV of 61.1% when prenatally resolved cases were excluded. This is mainly due to the cases that we considered as of gastrointestinal system origin had different postnatal diagnoses. In this study, we aimed to compare these antenatally detected cysts with postnatal symptoms and evaluate postnatal results.

Among the fetal abdominal cysts, female fetuses were found to have mostly ovarian cysts.[6,7] In our study, the most common cysts in female fetuses were ovarian cysts. Although etiologic factors are not very clear, increased levels of hormones in fetal circulation, maternal estrogen, placental human chorionic gonadotropin, and the response to the fetal gonadotropins are held responsible for fetal ovarian cysts.[8] Chen *et al*. reported that simple and smaller than 40 mm cysts regressed spontaneously, at rates of 76.1% and 89.3%, respectively.[9] Bagolan *et al*. stated in a prospective study of 73 fetal ovarian cysts that cysts smaller than 50 mm regressed spontaneously.[10] In our study, we had nine cases of ovarian cysts. One of which was 48 mm and another was 50 mm (6.8%) and these spontaneously regressed in the postnatal period. Our study does not reflect the literature accurately due to the low case count. In fetal ovarian cysts, intracapsular hemorrhage, ovarian torsion – depending on the size – and hemorrhage are the most common complications.[9,11] Chen *et al*. suggested that ovarian torsion risk was increased when the cyst was complex and had a size larger than 40 mm.[9] Contrary to the literature, in our study, two cysts, one a 40-mm complex cyst and the other a simple cyst, underwent emergency surgery due to ovarian torsion. Two other cysts larger than 40 mm underwent surgery, but these were not due to torsion [Table 1]. Our cases that underwent postnatal surgery had a good prognosis. In the literature, it is

stated that fetal ovarian cysts can be isolated and do not have to accompany any chromosomal anomalies.[12] Accordingly, in our study, only two fetuses had an additional ultrasound finding of polyhydramnios. The remaining fetuses had no other ultrasound findings. Fetal karyotyping was not offered for fetuses with ovarian cysts without additional structural abnormalities.

Another rare fetal abdominal cyst we detected in our study was hydrometrocolpos. In a study consisting of 20 fetuses, Mallmann *et al*. reported that hydrometrocolpos could be visualized as an ovarian cyst in the antenatal period. One cyst that we considered as a ≥40-mm ovarian cyst had a postnatal diagnosis of hydrometrocolpos. Hydrometrocolpos occurs due to an obstruction in the urogenital system, so the uterus and colpos are filled with blood. It can be isolated or accompanied by other anomalies. Hydrocolpos usually occurs due to an imperforate hymen, vaginal transverse septum, vaginal atresia, and persistent urogenital sinus.[13] Our case was isolated.

In our study, 37.9% of the cysts were diagnosed as gastrointestinal system originated. The cysts with which we had the most difficulties during the antenatal and postnatal periods were gastrointestinal system-originated cysts. Among the suspected mesenteric cysts, only one (3.4%) was diagnosed as a mesenteric cyst postnatally. Most of these cysts were on the midline of the abdomen. Mesenteric cysts are usually cystic differentiation in the mesenteric lymphatic system. Furthermore, it is stated that the formation of the cyst can be due to lymphatic obstruction between lymphatic and venous collaterals.[14] Mesenteric cysts usually form on the mesenteric side of the small intestine. It is known that some can occur beyond the mesocolon or retroperitoneal colon.[14]

Anomalies of the gastrointestinal system can be seen as fetal abdominal cysts in ultrasound screening. One of our fetuses we antenatally considered to be duodenal atresia underwent surgery and was found to be an annular pancreas. In general, the annular pancreas causes only 1% of intestinal obstructions and is the reason for <5% of all duodenal obstructions.[15,16] Most importantly, more than 40% of annular pancreas is related to life-threatening duodenal atresia and obstructions.[17] The surgery was performed in the early stages of postnatal life because of the antenatal diagnosis. In another case in our study, a patient who was antenatally diagnosed as having meconium pseudocysts underwent emergency surgery in the postnatal period. In a study by Chan *et al*., in their seven cases of meconium peritonitis, in 43% of patients, they discovered ascites, calcification, dilated, and hyperechogenic intestines.[18] Our neonate had a computed tomography scan postnatally and was diagnosed as having a meconium pseudocyst due to intestinal perforation. In this fetus, intestinal dilatation and hyperechogenic intestinal loops could be seen in ultrasound imaging. Although it is difficult to diagnose meconium pseudocyst and meconium peritonitis in the antenatal period, this diagnosis should be considered in the presence of ascites, calcifications, dilatation of the intestinal loops, and hyperechogenicity of the intestines.[19] As a result, the time needed for surgery postnatally can be shortened.

In the differential diagnosis of hepatobiliary system cysts, hepatic, choledochal, and gallbladder cysts should be considered. Antenatal diagnoses of hepatic cysts are very limited in the literature.[20] The postnatal incidence is 2.5% and they are usually discovered in the fourth or fifth decade.[21] Antenatal diagnosis could be made easier if the fetal cyst is in hepatic parenchyma, hepatic artery and portal veins can be visualized with colored Doppler. Bronstein *et al*. indicate that small-sized perihepatic cysts could disappear in the postnatal period.[22] In our study, a peripheral hepatic cyst of 12 mm × 11 mm was considered avascular antenatally and had the same diagnosis in the postnatal period. Postnatal results of follow-up examinations are good.

Two-thirds of the urinary tract-related cysts occurred in male fetuses. Out of the two renal cysts we diagnosed only, one was confirmed as a simple renal cyst postnatally. In the literature, it is very rare for childhood-era simple renal cysts to turn into polycystic kidney or malignancy, so they are not followed.[23] In both of our fetuses, there was no other anomaly or renal anomaly. The other cyst that we considered as a renal cyst was considered as a urinary system-related lipoma and is still under follow-up. Urinary system lipomas are very rare. In the literature, it was seen in one case in a 41-year-old man and a biopsy was taken for histopathologic confirmation using flexible ureterorenoscopy.[24]

The weakness of the study is that it is a retrospective study and fetal magnetic resonance imaging could not be used for all fetuses. Another drawback is that 6.8% of our cysts did not have a histopathologic diagnosis due to fetal loss. However, the strength of our study is that our hospital is a tertiary reference hospital, our fetuses who have fetal abdominal cyst population is sufficient as the incidence of fetal abdominal cyst, and ultrasound imaging is performed by experienced perinatologists.

In this study of fetal abdominal cysts, the most common abdominal cysts were ovarian cysts. Postnatal surgery was needed in nearly half of them. Diagnosing gastrointestinal system cysts and hepatobiliary system cysts antenatally is very difficult and they may require postnatal surgery. Postnatal diagnosis can be different from the possible antenatal diagnosis in fetal abdominal cysts.

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## Conflicts of interest

There are no conflicts of interest.

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