TITLE:

FETAL ABDOMINAL CYSTS: ANTENATAL COURSE AND POST NATAL OUTCOMES.

Single centre experience over 11 years.

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ABSTRACT

Background: There is little information on which to base prognostic counselling as to whether an antenatally diagnosed fetal abdominal cyst will grow or shrink, or need surgery. This study aims to provide contemporary data on prenatally diagnosed fetal abdominal cysts in relation to their course and postnatal outcomes.

Methods: Fetal abdominal cysts diagnosed over 11 years in a single centre were identified. The gestational age at diagnosis and cyst characteristics at each examination were recorded (size, location, echogenity, septation, vascularity) and follow-up data from postnatal visits collected.

Results: Eighty abdominal cysts were identified antenatally at 28+4 weeks (range 11+0 – 38+3). Most (87%) were isolated and the majority were pelvic (52%), simple (87.5%) and avascular (100%). Antenatally, 29% resolved spontaneously; 29% reduced in size; 9% were stable and 33% increased in size. Forty-one percent of cysts under 20 mm diameter increased in size; while, only 20% of cysts with diameter over 40 mm increased in size. The majority of cysts were ovarian in origin (n=45, 56%), followed by intestinal (n=15, 18%), choledochal (n=3, 4%), liver (n=2, 3%) and renal/adrenal origin (n=2, 3%) respectively. In 16% (n=13) the antenatal diagnosis was not obvious. 75% of the cysts that persisted postnatally required surgical intervention.

Conclusions: Most antenatally diagnosed fetal abdominal cysts are ovarian in origin. Though most disappeared antenatally, nearly three quarters required surgical intervention when present after birth. Cysts of intestinal origin are more difficult to diagnose antenatally and often require surgery.

KEYWORDS : prenatal, cystic, pelvic, surgery, ultrasound.

INTRODUCTION

Fetal abdominal cystic lesions are relatively common, with an incidence of 1 in 1000 (1). The greater resolution of modern ultrasound (US) technology has enabled more precise assessment and early identification of numerous fetal abnormalities. Fetal abdominal cysts are usually dectected during the second trimester anomaly scan or discovered incidentally at later gestations. However, identification of abdominal cysts in the first trimester, and their significance, has also been reported (2,3). Excluding those that are of urinary origin, the most common aetiologies of fetal abdominal cysts are: ovarian, gastrointestinal cystic duplication, liver and choledochal, meconium pseudocysts, mesenteric and adrenal (1,4,5). Following identification of a cyst, careful morphological assessment allows the prediction of their natural history and importantly, the likelihood of surgical intervention being required postnatally (5,6,7,8).

Studies to date comprise case series whose numbers are limited or span at least two decades, a period within which the technical capabilities of prenatal US has developed hugely. Here we report a large single centre case series and in doing so determine particular characteristics of the cyst (size, position, whether septated and vascularity). We detail their antenatal course and compare with postnatal diagnoses, and subsequent outcomes.

MATERIALS AND METHODS

All cases of fetal abdominal cysts diagnosed at our unit between January 2005 and December 2016 were identified by a search from our electronic database (Astraia ™, Munich, Germany). Gestational age at the time of diagnosis, maternal age, and parity were also recorded. All sonographic examinations were reviewed and the characteristics of the cysts were recorded, including size, position, presence of septations and vascularity. Any associated anomaly and the necessity for fetal intervention were also documented. A simple cyst was defined as a single, unilocular, anechoic, cystic mass without septations. A bilocular cyst was defined as the presence of any septation within the cyst or when there were two cysts in close proximity. A complex cyst indicates the presence of multiple septations within the cyst or cysts with/without solid areas. A solid cyst was defined as visualisation of a mass that is predominantly solid in structure. The localization of the cyst was recorded as abdominal or pelvic. The reported antenatal diagnosis was recorded and classified into systems according to the origin of the cyst as intestinal, genitourinary, hepatobiliary, mesenteric or ovarian for the purpose of comparison with the postnatal results.

All cases of fetal abdominal cysts had follow up in the same unit and were counselled antenatally by a pediatric surgeon. Outcomes including gestational age at delivery, gender, and postnatal diagnosis were recorded.

The antenatal course was described only for cysts with two or more ultrasound examinations during the antenatal period. In each of these cases, cysts size was inferred from reported dimensions at the time of the scan.

Postnatal ultrasound reports and paediatric clinic letters were reviewed to determine the postnatal diagnoses. Neonatal outcomes were determined from patient notes and the Badgernet neonatal data recording system (© Clevermed, Edinburgh, UK).

Postnatal follow-up was reviewed for all the cysts in which the fetal abdominal cyst was persistent. The fetal outcomes were classified as resolved postanatally, persistent did not require surgery, and persistent required surgery. For all persistent cysts the diagnoses from postnatal imaging or

histopathology reports were also recorded.

Data were anonymized and retrospectively ascertained and this study did not require research ethics submission. The study was registred with the Imperial College Healthcare NHS Trust audit department (WCCS_MAT_1617x_007).

RESULTS

Between January 2005 and December 2016 80 fetal abdominal cysts were identified from our search. The median gestational age at the time of diagnosis was 28.5 weeks (range 11.0–38.4). The median age of the pregnant women was 30.9 years. The median number of antenatal follow up scan was 3. All pregnancies resulted in a live birth with no terminations of pregnancy (TOP) or intra-uterine death occurring in the study population. We had four cases of cysts diagnosed in the first trimester: three resolved antenatally and in one case the outcome was not known.

The majority of the cysts (69/80; 87%) were isolated, with no additional structural abnormalities identified in the fetus. The additional ultrasound findings for the remaining 13% are shown in Table 1.

The cysts were classified as simple in the 70/80 (88%) of the cases; while presented with a mixed or with a solid component in the 8/80 (10%) of the cases. The location of the cyst was pelvic in 45/80 (56%) and abdominal in the remaining 35/80 (44%). No cysts demonstrated vascularity on Colour Doppler during antenatal imaging. Fetal intervention by cyst aspiration was performed in 5/80 (6%) of cases and of those 3/5 (60%) resolved following aspiration whilst 2/5 (40%) remaing visible in follow-up scans. Cyst aspiration was performed when the size was greater than 40 mm.

The antenatal diagnosis was ovarian in 45 cases; intestinal in 15 cases, choledocal in three cases, liver cysts in two cases, and renal/adrenal in two cases. In 13 cases there was no clear antenatal diagnosis. The antenatal course is shown in Figure 1. During the antenatal course, 20/69 (29%) resolved spontaneously in-utero; 20/69 (29%) reduced in size; 6/69 (9%) were stable; and 23/69 (33%) increased in size. The ovarian cyst group had the highest proportion of spontaneous cyst resolution 10/35 (28.5%).

Cysts under 20 mm in size at the initial scan increased in size in 41% whilst cysts over 40 mm increased in 20%.

Fifty three cysts persisted during the antenal follow-up. Postnatal follow-up was available in 38 of these cases. The post natal outcomes are documented in figure 2.

Post natal follow-up of persistent ovarian cysts was available in 25 cases (25/35; 71%). Sixteen resolved

spontaneously (64%). Surgical intervention was required following birth in six cases (24%); of these five were confirmed as benign ovarian cysts following resection and one was reclassified as a mesenteric cyst. One of 25 (4%) antenatally suspected ovarian cyst was reclassified as a multi-cystic dysplastic kidney (MCDK) postnatally. In one case the diagnosis of ovarian cyst was confirmed on postnatal imaging and subsequently managed non-surgically. The percentage of spontaneous resolution of antenatally diagnosed ovarian cysts in both, antenatal and postnatal follow-up, was 57% (26/45). Surgery was performed in the 13% (6/45) of all antenatally suspected ovarian cysts and in the 71% (5/7) of the those that persisted following birth.

Nine of the fetal abdominal cysts were classified as of intestinal origin. Postnatal follow-up was available for seven cases (78%). Of those, two resolved (29%); three were postanatally confirmed as enteric duplication cysts and one as a mesenteric cyst. One of the duplication cysts required surgery. In one case the diagnosis was revised postnatally as bowel dilatation. The percentage of spontaneous resolution in both antenatal and post-natal follow-up was 53% (8/15). Surgical intervention was required in 1/15 (6.6%) of all antenatally suspected intestinal cysts. However, three cysts that required surgical intervention had an alternative antenatal classification, and were re-classified as of intestinal origin postnatally.

Of the ten cysts with a non-specific antenatal diagnosis two underwent surgery, with a surgical diagnosis of ileal duplication cysts in both cases.

DISCUSSION

In this, the largest contemporary case series of antenatally diagnosed abdominal cysts we found that the most common presentation of a fetal cyst was a unilocular anechoic masses with no vascularity. During the antenatal course one third increased in size. There was no relationship between the presence of complex cysts and the necessity for surgical intervention, a finding consistent with the current literature (9). There were no cases of neonatal malignancies identified, consistent with the current literature, where the incidence is reported as 1/12,500-27,500 live births (10). Similarly, there were no cases of termination of pregnancy, intra-uterine deaths or neonatal deaths, with all pregnancies resulting in a

live birth.

Over half the cysts are ovarian in nature, consistent with the other reports (11,12). Over two thirds spontaneously resolved, more than reported previously (8). This finding might be explained by the technical advances of US imaging allowing the identification of smaller, less clinically significant cysts. However, ovarian cysts that persisted after birth required surgical intervention in over two thirds of cases; this information is useful for antenatal couselling.

The antenatal detection of intestinal cysts was less accurate. Where there was a 'non-specific' diagnosis there were two cases of postnatal diagnosis of intestinal cyst, both requiring surgical intervention. These findings showed the difficulty of detecting intestinal cysts. Cysts defined as hepatobiliary and choledocal cysts were less common, and most spontaneously resolved.

Overall, the percentage of spontaneous resolution in both antenatal and postanatal follow up was 56%, which is higher than reported in other series. Thakkar et al. (8) analysed retrospectively 118 cases of antenatal intra-abdominal cysts identified over a period of 22 years. They reported that 90 cysts persisted post-natally with 52 % requiring surgical intervention. In our series, 14% required surgery but this proportion was much higher when the cysts persisted postnatally.

The strength of our study is the fact that we described the management and follow up of fetal abdominal cysts from initial diagnosis to the postnatal period. We recorded all antenatal characteristics, changes in size, and necessity of fetal intervention for all fetal abdominal cysts diagnosed at our unit over a period of 11 years. The weaknesses are that one third of our outcomes could not be established postnatally, and most likely we have under estimated abdominal cysts where these were part of a multiple abnormality condition.

CONCLUSION

Most antenatally diagnosed fetal abdominal cysts are ovarian (63% in female fetuses), and amongst male fetuses, cyst of intestinal origin were most common (55%). The antenatal detection of ovarian cysts was high and the outcome was good, with 75% resolving and only 14% ultimately requiring surgery. However, when a cyst persisted after birth there was a high percentage of these requiring surgical intervention (71%). Cysts of intestinal origin are more difficult to determine antenatally and they often require surgery. Our data will facilitate and enhance evidence based counselling following the diagnosis of a fetal abdominal cyst.

	Echogenic bowel	TTTs-donor	Polyhydramnios	Pelvic kidney	Tricuspid atresia	Hydronephrosis	Double-bubble
n=11	3	2	2	1	1	1	1

Table 1. Associated findings in the antenatal course.

Characteristic of the cyst n= 80	**Localization**	**Antental diagnosis**
simple (70)	pelvis (40)	ovarian (29) intestinal (5) non-specific (6)
	abdomen (30)	intestinal (9) ovarian (9) non-specific (9) left renal fossa (1) hepatobiliary (2)
septated (3)	pelvis (1)	ovarian (1)
	abdomen (2)	intestinal (2)
mixed/solid component (8)	pelvis (3)	ovarian (2) suprarenal (1)
	abdomen (5)	ovarian (3) intestinal (1) hepatobiliary (1)

Table 2. Characteristic of the cysts in the antenatal course and antenatal diagnosis. Septation and mixed component were associated in one case of intestinal cyst.

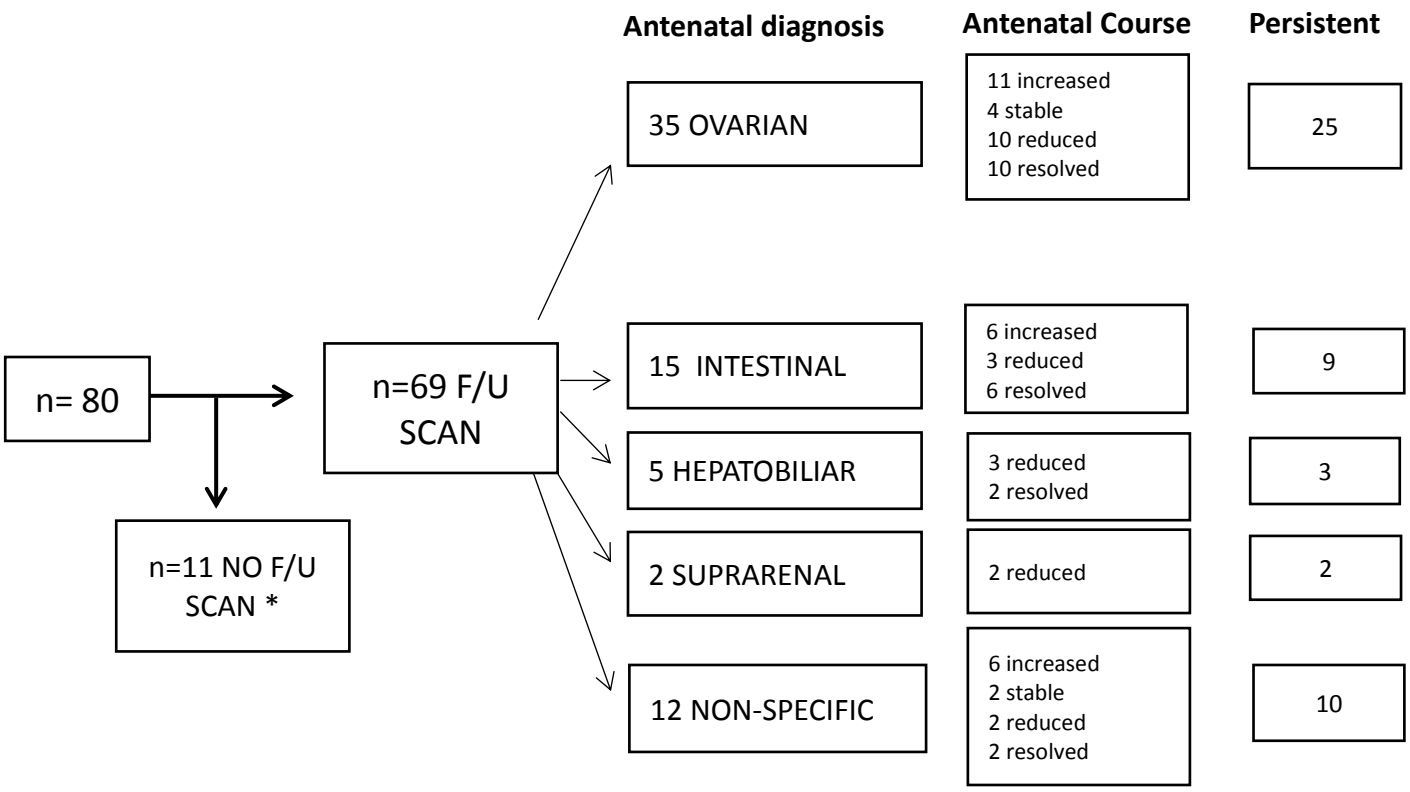


Figure 1. Diagram of the antenatal course. The antenatal course was described for all the cysts with two or more ultrasound examinations during the antenatal period.
*10 in the ovarian group and one in the non-specific group.

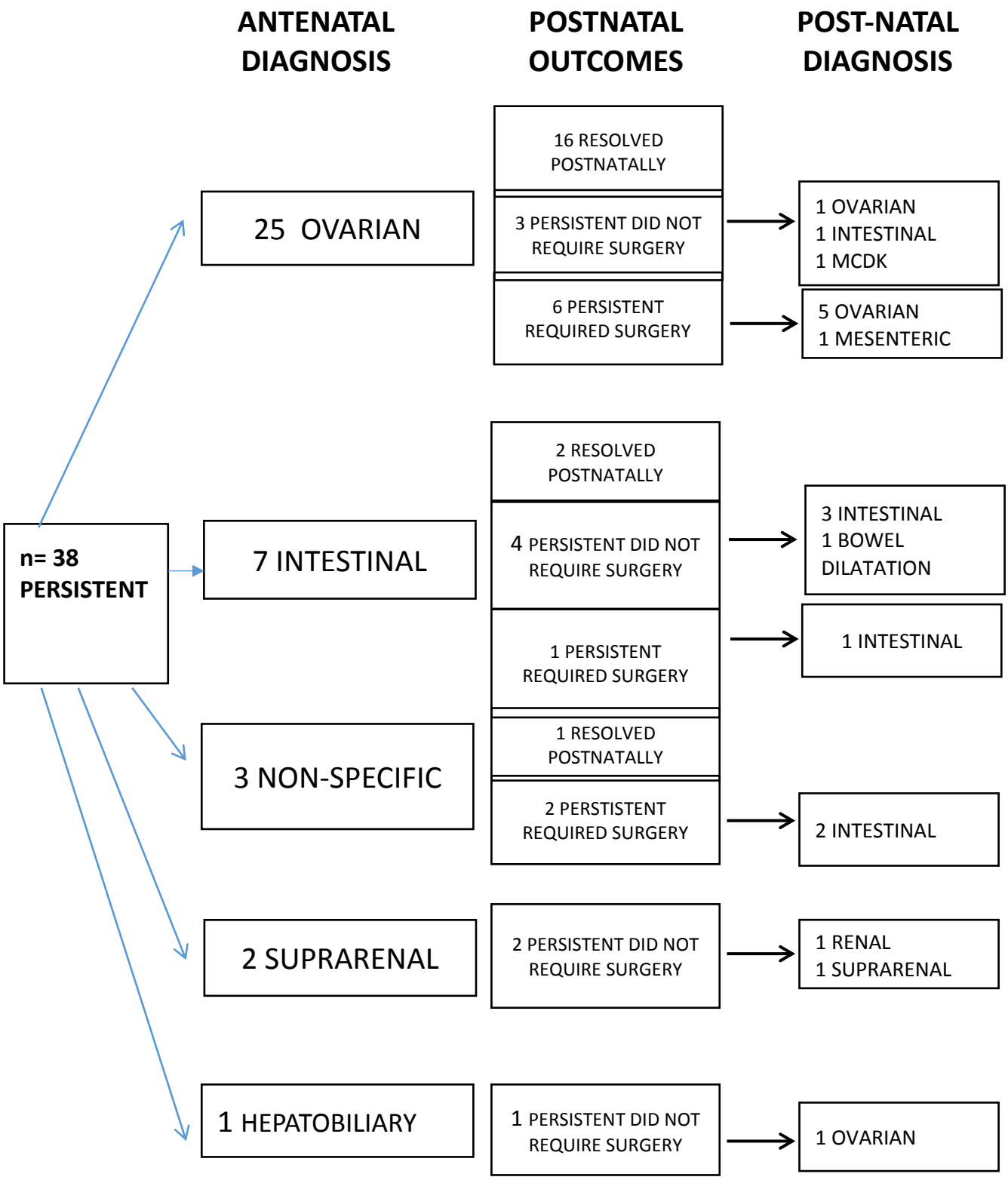


Figure 2. Flowchart of postnatal outcomes of persistent cyst, where postnatal follow-up was possible.

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