

Simple ovarian cysts: frequency and outcome in girls aged 2-9 years

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Summary

Many studies have examined the sonographic appearance of human ovary in the childhood period and showed the presence of heterogeneity in the ovary due to cyst formation which may be age-related or because of hormonal stimulation. These studies classified these simple cysts into microcyst (<9 mm) and macrocyst (>9 mm). Also some of the studies reported that these cysts are frequent during childhood while others did not. We conducted this study to examine the prevalence and outcome of these simple ovarian cysts in girls aged between 2 and 9 years. One-hundred and eight girls aged 2 to 9 years were studied prospectively at Prince Zaid Hospital (PZH) in south Jordan during the period from 1 April, 1998 to 30 May, 1999. Simple cysts (micro-and macrocysts) were the aim of the study. Visualization of the ovaries was performed using a 5-MHz transducer with monthly follow-up. Among 108 girls examined, 183 ovaries were imaged and 65 simple ovarian cysts were seen with an incidence of 35.5%. Microcysts accounted for 83.1% and macrocysts for 16.9%. There was no significant difference regarding the visualization of the right or left ovary and the distribution of ovarian cysts ($p>0.2$); 89.1% of ovarian cysts resolved within 6 months, and 10.9% persisted more than 6 months. Interestingly, all persisting ovarian cysts were macrocysts. No adverse consequences for these ovarian cysts were noted. We have concluded that simple ovarian cysts can be seen in all age groups between 2 to 9 years. They are not clinically significant, and the majority resolve within 6 months.

Key words: Simple ovarian cyst; Microcyst; Macrocyst; Childhood; Ultrasonography.

Introduction

The ovary at birth is approximately 15 mm long, 3 mm wide, and 2.5 mm thick with a volume of less than 0.7 cm³, and can contain cystic follicles of varying sizes undoubtedly stimulated by the reactive gonadotrophins surge accompanying the withdrawal of the neonatal hypothalamus from the negative feedback of fetoplacental steroids, which finally can increase the total dimensions of the ovary. A gradual age-related increase in ovarian volume begins about 6 years of age, and by puberty the mean ovarian volume is about 2.5 cm³ [1]. Many studies [2, 3] reported that ovarian cysts can be occasionally detected in fetuses and newborns by ultrasonography.

The ovary in the childhood period is characterized by low levels of gonadotrophins in the pituitary and the blood with little response of the pituitary to gonadotrophin releasing hormone (GnRH) and maximal hypothalamic suppression which prevents full follicular development and function [4]. Some investigators [3, 5, 6] reported that ultrasonography can commonly demonstrate ovarian follicular cysts during childhood, ranging from 2 to 15 mm. Peters *et al.* [4] reported that these small unilocular ovarian cysts are not clinically significant. We conducted this study to determine the frequency and outcome of ovarian cysts in girls aged 2 to 9 years.

Patients and Methods

This prospective study was carried out at Prince Zaid Hospital (PZH) in the south of Jordan during the period between 1 April, 1998 to 30 May, 1999. One hundred and eight girls with ages ranging from 2 to 9 years were selected randomly. Permission to be examined by ultrasonography was given by their mothers while they were visiting the Obstetrics and Gynecology Clinic. All were asymptomatic. They were evaluated by physical examination for height, weight, and development of secondary characteristics (breast, hair distribution). Wrist X-ray was obtained for all girls to determine bone age. Girls who had evidence of premature puberty, known chromosomal or endocrinological problems, multilocular cysts, and cysts that contained calcifications were excluded. Cysts considered in our study were those which consist of thin well-defined walls, completely sonolucent, and contain no calcifications. Age was classified into seven age groups, from 2-3 to 8-9. Ages under 2 years and over 9 were excluded because of the possibility of increased ovarian follicular cysts due to gonadotrophin stimulation as mentioned above. Administration of oral fluid at least one hour before ultrasonographic examination was allowed for better visualization of the ovaries with a full-bladder. A 5-MHz transducer was used to evaluate the presence or absence of ovarian cysts and their measurements. We considered the criteria of Orsini [5] as appropriate to determine the ovarian cyst characteristics (microcyst: clearly outlined cysts not exceeding 9 mm in size, and macrocyst when the cyst exceeded 9 mm in size). Ovarian cysts were considered persistent when 6 months after follow-up they remained or increased in size. Monthly follow-up of all cases was carried out. No adverse consequences of these cysts were noted during the 14 months of follow-up. Statistical analyses were performed with the Pearson Chi-Square test. Differences were considered statistically significant when $p < 0.05$.

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Results

Table 1 shows the number of patients, number of visualized ovaries, and the percentage of ovarian cysts seen in both ovaries for each age group. One hundred and eighty-three ovaries in 108 girls of all age groups were adequately imaged by a 5-MHz transducer. Sixty-five ovarian cysts with diameters ranging from 2 to 16 mm were demonstrated with an incidence of 35.5%. Ovarian cysts were seen in all age groups, with a higher incidence in the age groups 3-4 and 4-5 (46.7% and 60.7%, respectively). No significant difference in the visualization of the right or left ovary was observed ($X^2=0.853$, $df=6$, $p>0.2$).

Table 2, shows the type and distribution of ovarian cysts in each age group. Microcysts account for the majority of ovarian cysts (83.1%), while macrocysts account for 16.9%. Both types were seen in all age groups. No significant difference was seen regarding the distribution of ovarian cysts in the right or left ovary ($X^2=0.981$, $df=6$, $p>0.2$).

Follow-up of all cases for 14 months showed that 89.1% of the ovarian cysts were resolved within 6 months, with a higher incidence of resolution in the first two months (62.1%), while persistence of ovarian cysts after 6 months was seen in 10.8% of cases. All persisting ovarian cysts were macrocysts, as shown in table 3.

Discussion

Physiologically in the neonatal period there is a rise in gonadotrophin levels which reach a nadir during early childhood (by about 6 months of age in males and 1-2 years in females) and then rise slightly after the age of 8. This rise of gonadotrophin levels undoubtedly promotes the formation of ovarian follicular cysts [2-4]. For this reason girls under 2 years and over 9 years of age were excluded from our study.

Some studies have evaluated the morphology of the human ovary in various age-groups, and they noted that the ovary before the age of 6 years is solid and homogeneous, but after this age the ovary started to be heterogeneous because the gonadotrophin stimulation and subsequent follicular cyst formation [1, 5]. Other investigators [3] have reported that ovarian cyst maturation and follicular cyst formation during childhood is age-related rather than hormonally stimulated.

This study indicates that simple ovarian cysts (microcyst and macrocyst) are not prevalent as reported in other studies [5, 6] Orsini *et al.* [5] reported that there were no macrocysts before the age of 12 and no microcysts before the age of 5. Cohen *et al.* [6] reported 13 macrocysts in girls between 2-13 years, and microcysts in all age groups in his study from 2-13 years, findings which support those in our study. The low prevalence of ovarian cysts (35.5%) in our study compared with 68% reported by Cohen, may be related to the use of the most recent sonographic technology

Table 1. — Number of patients, number of visualized ovaries, and number and percentage of ovarian cysts for each age group.

Age	No. of patients	Visualized RT ovary	Visualized LT ovary	Total visualized ovaries	No. of ovarian cysts %
2-3	20	18	15	33	9 (27.3)
3-4	9	8	7	15	7 (46.7)
4-5	17	15	13	28	17 (60.7)
5-6	13	11	11	22	7 (31.8)
6-7	12	12	11	23	6 (26.1)
7-8	18	17	13	30	9 (30)
8-9	19	19	13	32	10 (31.2)
Total	108	100	83	183	65 (100)

Table 2. — Type and distribution of ovarian cysts in each age group.

Age group	Microcyst < 9 mm	Macrocyst > 9 mm	No. of cysts on right ovary	No. of cysts on left ovary
2-3	7 (10.8)	2 (3.1)	5 (7.7)	4 (6.2)
3-4	6 (9.2)	1 (1.5)	4 (6.2)	3 (4.6)
4-5	14 (21.5)	3 (4.6)	10 (15.4)	7 (10.8)
5-6	6 (9.2)	1 (1.5)	3 (4.6)	4 (6.2)
6-7	5 (7.7)	1 (1.5)	3 (4.6)	3 (4.6)
7-8	7 (10.8)	2 (3.1)	5 (7.7)	4 (6.2)
8-9	9 (13.8)	1 (1.5)	6 (9.2)	4 (6.2)
Total	54 (83.1)	11 (16.9)	36 (55.4)	29 (44.6)

Table 3. — Outcome of simple ovarian cysts.

	No. of ovarian cysts	%
Resolution	58	89.2
by 2 months	36	62.1
by 4 months	18	31
by 6 months	4	6.9
Persistence	7	10.8
< 9 mm	0	0
> 9 mm	7	10.8

(higher frequency transducers, annular array and curved linear-array transducers with electronic focusing) [6]. While the outcome of these cysts was not reported by Cohen and Orsini, our study demonstrates that 89.2% resolved within 6 months with a higher incidence of resolution by 2 months, and 10.8% persisted after 6 months. Interestingly, all persisting ovarian cysts were macrocysts (> 9 mm). Although the cause of these cysts is unknown, we agree with Salardi in that these ovarian cysts are age-related rather than hormonally stimulated. In our study, no complications of ovarian cysts were noted, in agreement with Cohen and Peters *et al.* [4, 6], who reported that these cysts are not clinically significant. In conclusion, simple ovarian cysts (micro- or macrocysts) can be seen in all age groups between 2-9 years. They are not clinically significant and the majority resolve within six months. Persisting ovarian cysts tend to be macrocysts.

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