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Ultrasonographic and Clinical Appearance of Hemorrhagic Ovarian Cyst Diagnosed by Transvaginal Scan

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Abstract

We examined clinical and sonographic findings in 112 patients diagnosed as having hemorrhagic ovarian cyst (HOC) who had clinical and transvaginal sonographic follow up. The patients were classified into group A (n=40) with signs and symptoms of acute abdomen and group B (n=72) with no symptoms or mild abdominal pain, and their ultrasonographic and clinical findings were compared. Significant differences were found in mean age, white blood cell (WBC) count, greatest diameter of the mass, shortest diameter of the mass, and size of cross section of the mass. The internal echograms of HOCs were grouped into 4 types: (1) hyperechoic and hypoechoic solid type; (2) reticular or sponge-like type; (3) mixture type of solid and cystic components; and (4) cystic types. In all image types, septum-like or thread-like echoes were seen. Transvaginal sonography (TVS) of type 1, type 2, and type 3 images showed a clear division into hyperechoic and other areas with the passing of time which was finally changed into a cystic pattern and disappeared. HOCs were found more frequently in nulliparous patients (n=79, 70.5%) than in multiparous (n=33, 29.5%). There were many luteal phase (n=86, 76.8%) in comparison with follicular phase (n=13, 11.6%). Thirteen cases were detected during early gestation (n=13, 11.6%). In group A, severe pain reduced or disappeared within 3 h in 37/40 (92.5%) of the patients. Blood flow inside the masses was analyzed in 14 patients by the color Doppler method and showed no significant change. Taken together, this study elucidated the ultrasonographic and clinical characteristics of HOCs, which provide useful information to differentiate HOCs from organic masses and help to avoid unnecessary laparotomy. (J Nippon Med Sch 2003; 70: 243–249)

Key words: hemorrhagic ovarian cyst, transvaginal sonography, functional cyst

Introduction

Hemorrhagic ovarian cyst (HOC) is an abdominal mass formed by bleeding into a follicular ovarian cyst or corpus luteum cyst[1–5]. Its clinical signs and symptoms are variable and include such patients as asymptomatic cases or patients showing symptoms of acute abdomen. HOC is detected as pelvic masses by ultrasonography, but it is often misdiagnosed with other organic masses because of its variable clinical and sonographic findings, and in some cases may lead to laparotomy[4–6]. However, HOC does not need surgical intervention since it is a functional

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Table 1 Comparison of clinical findings in 112 HOC patients classified by symptoms

Feature	All cases	Group A	Group B	P value
Total	112	40	72	
Age (years)*	29.8 ± 8.2	26.3 ± 6.8	31.8 ± 8.3	< 0.05
Para-no. (%)				
Nullipara	79 (70.5)	28 (70.0)	51 (70.8)	
Multipara	33 (29.5)	12 (30.0)	21 (29.2)	
Detection time-no. (%)				
Follicular phase	13 (11.6)	4 (10.0)	9 (12.5)	
Luteal phase	86 (76.8)	34 (85.0)	52 (72.2)	
Pregnant	13 (11.6)	2 (5.0)	11 (15.3)	
WBC ($/mm^3$)*	7,195.8 ± 2,159.1	8,149.1 ± 2,427.9	6,550.9 ± 1,708.6	< 0.05
Hgb (g/dl)*	12.8 ± 1.2	12.6 ± 0.9	12.9 ± 1.4	0.38

* Values are mean ± SD.
P value represent group A versus group B.

ovarian cyst. In this study, we reviewed a large number of cases diagnosed as HOC, to clarify the characteristic findings in terms of clinical and ultrasonographic features. The information gained from these studies could help to avoid unnecessary laparotomy and lower the risk of patient's morbidity and mortality.

Materials and methods

One hundred-twelve female patients who had been diagnosed as having HOCs and had not shown any complications such as abnormality in the blood coagulation system were enrolled in this study. Informed consent was obtained from the patients. As for the definition of HOCs, pelvic masses detected using transvaginal sonography (TVS) were examined every 7～10 days, and they were diagnosed as HOCs when their sonograms changed with time and finally disappeared. We reviewed blood flow in the masses by the color Doppler method in 14 patients, and in three patients, abdominal operations were done. We collected all echograms by jet type print photography, Polaroid photography, and a video recording. Vaginal sonography was performed using Mochida SONOVISTA EX, ET, and Mochida Color II (6.0～7.5 Mhz transvaginal probe) models at an angle of 115°, 180°, and 220° (Mochida Co., Tokyo, Japan).

The patients were classified into two groups. Group A represented 40 cases showing signs and symptoms of acute abdomen and hospitalized. Group B represented 72 cases having no symptoms or mild abdominal pain (51 were followed ambulatory and 21 were found to have HOCs at physical examination). Ultrasonographic and clinical findings of these two groups were compared. We analyzed the following findings obtained at the first medical examination: age, number of deliveries, detection time, white blood cell (WBC) count, hemoglobin (Hgb) value and persistence time of pain. Sonographic findings obtained at the first medical examination were analyzed in terms of the greatest diameter of the mass, shortest diameter of the mass, and size of cross section of the mass. The menstrual cycle, menstrual period, endometrium image, and size of ovarian follicle at the HOC detection time were also evaluated.

The statistical significance of the data was tested by the Mann-Whitney U test using StatView J 4.02 software (Abacus Concepts Inc., Berkeley, CA, USA). All statistical analyses were reviewed by a statistical consultant. A p value of <0.05 was considered significant.

Results

1. Clinical findings

Table 1 shows clinical findings in 112 patients diagnosed with HOCs. The mean age was 29.8±8.2 years (range: 13～52 years old) for all cases and 26.3 ±6.8 and 31.8±8.3 years for group A and B patients,

Table 2 Classification of HOC sonograms at first detection

Type 1: Amorphous images with various scattered septum-like or thread-like echoes, and a background of solid mass echoes with a combination of hyper- and hypo- echoes
Type 2: Echograms with a hypoechoic background, reticular-like or sponge-like patterns with thread-like echoes running longitudinally, transversely and with curves
Type 3: Echograms with cystic areas distinct from solid parts
Type 4: Echograms of mostly cystic patterns with a small solid part on the wall

respectively ($p<0.05$). The frequency of nulliparous patients (70.5%) was greater than multiparous (29.5 %) cases. There were many luteal phase (n = 86, 76.8 %) in comparison with follicular phase (n = 13, 11.6 %), but there was no significant difference between Group A and Group B. Thirteen cases were detected during early gestation (n = 13, 11.6%). The mean WBC count was 7,195.8 ± 2,159.1/mm^3 for all cases. The mean WBC counts for group A and B were 8,149.1 ± 2,427.9/mm^3 and 6,550.9 ± 1,708.6/mm^3, respectively ($p<0.05$). The mean Hgb values for group A and B were 12.6 ± 0.9 g/d*l* and 12.9 ± 1.4 g/d*l* respectively, and no significant difference was found between them. In group A, severe pain reduced or disappeared within 3 h in 92.5% (37/40) of the patients. In only 3 cases, severe pain continued for 4～6 h, and they underwent laparotomy. The removed ovaries were enlarged to a round or oval shape and their surfaces were dark-red. They contained blood and clots. Parts of the three ovaries were examined histologically and were pathologically diagnosed as containing hemorrhagic luteal cysts.

2. Ultrasonographic findings

Cases were categorized as follows according to the sonographic images (**Table 2**): Type 1, amorphous images with scattered various septum-like or thread-like echoes, and a background of solid mass echo with a combination of hyper- and hypo-echoes (**Fig. 1**); Type 2, with the hypoechoic background, reticular-like or sponge-like patterns with thread-like echoes running longitudinally, transversely and with curves (**Fig. 2**); Type 3, images with cystic areas distinct from solid parts

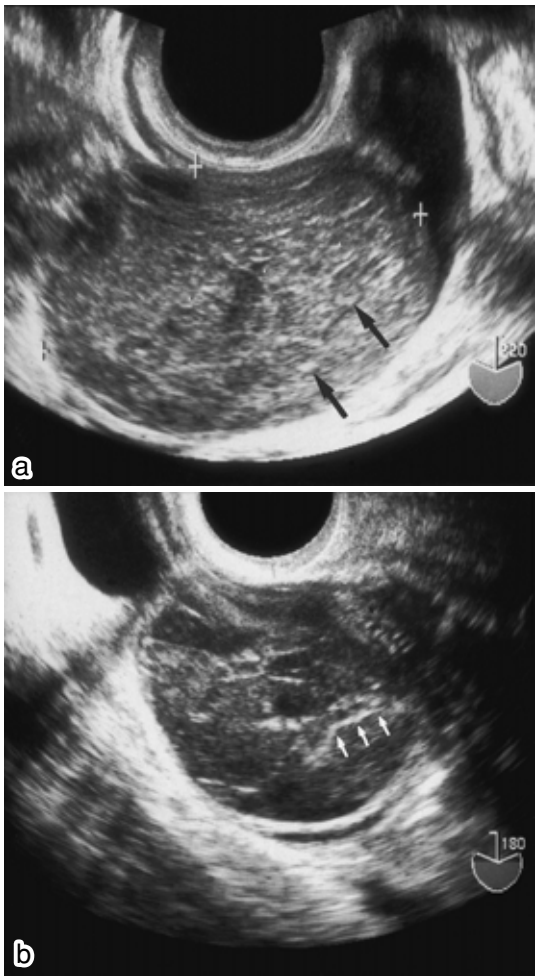

Fig. 1 HOC of Type 1. The internal echograms show hyperechoic and hypoechoic solid patterns with thread-like echoes (arrows) (a). The internal echograms show mixed hypoechoic and hyperechoic areas, the demarcation line between which appeared as a thin or thick septum-like echo (arrows) of smooth formation (b).

(**Fig. 3**); and Type 4, mostly cystic areas with a small solid part on the wall (**Fig. 4**). Type 1 and Type 2 comprised 97.5% of group A (39/40) patients. Type 1, Type 2, and Type 3 (94.4%) were almost equally detected in group B (**Table 3**). Blood flow inside the masses was analyzed in 14 cases by the color Doppler method, but there was no significant change (**Fig. 5**). For all cases, the mean lengths of the greatest and shortest diameters were 44.8 ± 9.7 mm and 35.2 ± 7.5 mm, respectively, and the mean size of cross sections of the echoic masses along their greatest diameters was 1,278.2 ± 518.8 mm^2. In group A, the mean greatest diameter and the mean

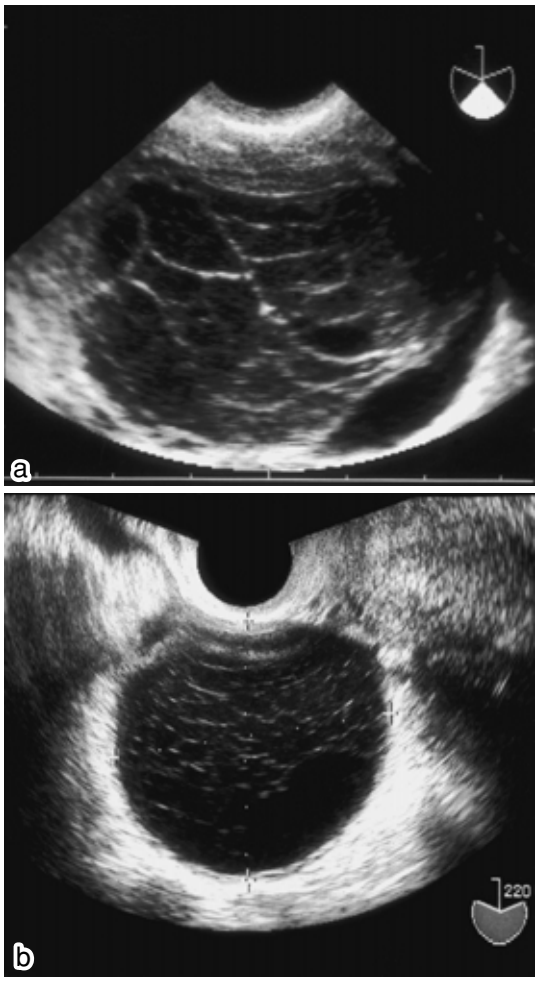

Fig. 2 HOC of Type 2. The internal echograms show reticular-like patterns with a hypoechoic background (a). The internal echograms show sponge-like patterns with a hypoechoic background (b).

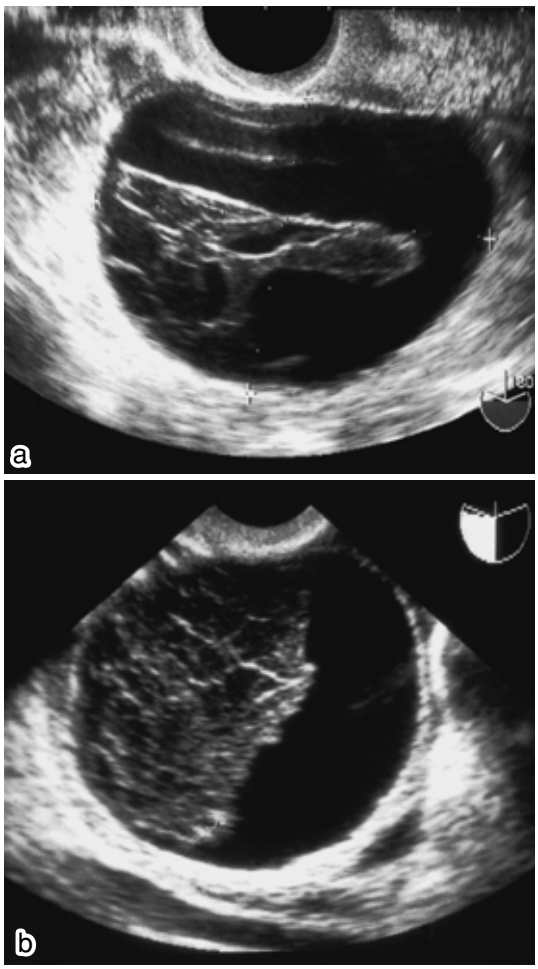

Fig. 3 HOC of Type 3. The internal echograms show a clear division into a cystic part and a solid part (a) (b).

shortest diameter were 48.3±10.2 mm and 37.5±7.3 mm, respectively, and that of cross sections was 1,456.1±545.7 mm^2. In group B, the mean greatest diameter and the mean shortest diameter were 42.9±8.9 mm and 34.0±7.3 mm, respectively, and that of cross sections was 1,179.4±479.0 mm^2. Thus, the values in group A were significantly greater than the values in group B ($p<0.05$, **Table 4**).

The sonographic images of Type 1 gradually changed with time to match those of Type 2 within 2～3 days and those of Type 1 and Type 2 changed to Type 3 within 3～7 days and further to the images in Type 4. The masses disappeared within 4 weeks (2～8 weeks) in 92.5% (37/40) of the group A patients, and in 94.4% (68/72) of the group B patients.

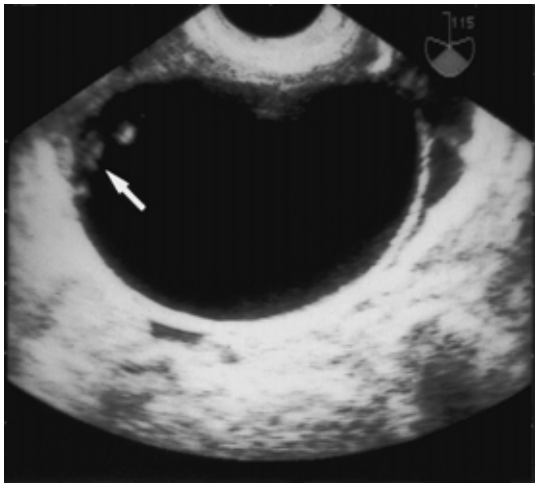

Fig. 4 HOC of Type 4. The internal echograms show cystic patterns with a small solid part on the wall (arrow).

Discussion

Thorough clinical investigation of HOCs has rarely been reported. The ovary is an organ that often bleeds, and HOC is a mass formed by bleeding excessively into corpus luteum cysts or follicular ovarian cysts[3-5], being one of the functional ovarian cysts. HOCs are clinically manifested mainly as lower abdominal pain, the degree of which varies from asymptomatic to colic pain. Intrapelvic mass formation and clinical manifestations often lead to incorrect diagnosis. HOCs showing mild symptoms have been confused with endometrial ovarian cysts[7-10], ovarian dermoid cysts[7,8,11], or malignant tumors[12-14], while those showing symptoms of acute abdomen have been misdiagnosed as having ruptures of the endometrial ovarian cysts, tubo-ovarian abscesses, acute appendicitis, torsion of ovarian cysts, and thus some cases had been subjected to unnecessary laparotomy[4,5].

Table 3 Frequency of HOC sonogram type at first detection

	Group A (n=40)	Group B (n=72)
Type 1	24 (60.0%)	14 (19.4%)
Type 2	15 (37.5%)	28 (38.9%)
Type 3	1 (2.5%)	26 (36.1%)
Type 4	0 (0.0%)	4 (5.6%)

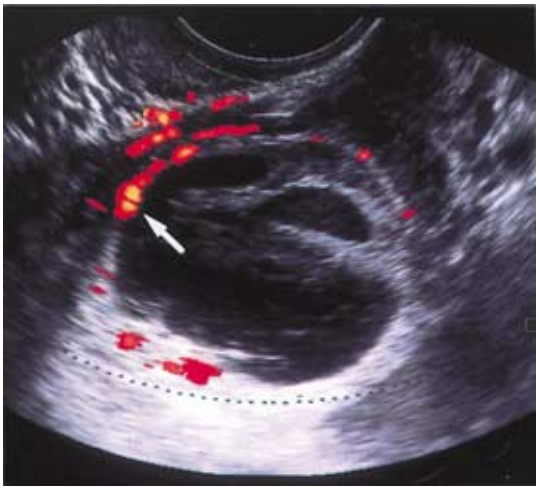

Fig. 5 Blood flow in the HOC was analyzed by the color Doppler method, but there was no significant change. Blood flow is depicted outside the HOC (arrow).

In general, HOCs are diagnosed by ultrasonography, irrespective of the presence of clinical symptoms providing evidence for diagnosis. Therefore, it is necessary to fully understand the characteristic images by ultrasonography to avoid giving incorrect information to patients or avert surgery[15-17]. Especially, the differential diagnosis from malignant tumors is important for reducing the risk of patient's morbidity and mortality, and that from endometrial ovarian cysts is important for enhancing the patient's quality of life.

There have been few reports on sonographic images of HOCs. In 1987, Baltarowich et al[6] examined HOCs using transabdominal ultrasonography and reported their sonographic findings. In 1991, Yoffe et al[5] investigated ultrasonograms and clinical findings of HOCs using transvaginal sonography. These reports agreed closely with our present report concerning the appearances of HOCs. However, using a state-of-the-art instrument with far advanced electronic engineering could provide more reproducible images with finer texture compared with the images reported previously. Especially, thread-like echo image, one of the rationales for

Table 4 Comparison of sizes of 112 HOCs classified by symptoms

Feature	All cases	Group A	Group B	P value
Total	112	40	72	
Size of HOC				
Greatest Diameter (mm)	44.8 ± 9.7	48.3 ± 10.2	42.9 ± 8.9	< 0.05
Shortest Diameter (mm)	35.2 ± 7.5	37.5 ± 7.3	34.0 ± 7.3	< 0.05
Cross Section (mm^2)	1,278.2 ± 518.8	1,456.1 ± 545.7	1,179.4 ± 479.0	< 0.05

Values are mean ± SD.
P value represent group A versus group B.

diagnosis of HOCs, had not been pointed out before.

In our previous study[18], we demonstrated that septum-like echoes or thread-like echoes were uniformly detected and were considered as characteristic features of HOCs. In this study, we analyzed more particularly the sonographic images of HOCs. Characteristic amorphous or reticular-like images with septum-like or thread-like echoes were observed in 100.0% of the cases having a colic pain and in 94.4% of the cases having no symptoms or mild abdominal pain. These echoes were the images of clot or flowing blood in combination with those of precipitated fibrin[19–21]. The characteristic images of HOCs, such as septum-like echoes or thread-like echoes are sonographically similar to the images of malignant tumors or endometrial ovarian cysts. Therefore, we should be cautious not to make erroneous diagnostic interpretations. However, sonographic scans of HOCs changed dramatically into amorphous or reticular-like images with time, and such characteristic changes have never been observed in echograms of malignant tumors or endometrial ovarian cysts. In addition, the sizes of HOCs decreased rapidly with time and the echoic regressions of HOCs were usually of short duration. These features were the foundation for the differential diagnosis of HOCs from organic tumor masses.

It was supposed that the onset of colic pain corresponded to that of HOCs. On the image, the mass separated into cystic and solid parts with time; subsequently the cystic part became larger; and finally all the solid parts disappeared. This change had been induced due to stepwise changes of clotted blood in HOC masses, i.e., coagulation and solubilization of clotted blood. The images of HOCs in cases with mild clinical symptoms were taken at some time during this time-course. Almost all of the masses disappeared within 4 weeks (2～8 weeks).

Blood flow inside the masses was analyzed in 14 cases by the color Doppler method[22], but there was no significant change (**Fig. 5**). This procedure was very useful in differential diagnosis of HOCs from other organic tumor masses. The lengths of the greatest diameters of the echoic masses ranged from 4 to 6 cm. We did not detect any masses more than 7 cm in size. According to the sizes of HOCs, the cases showing symptoms of acute abdomen were larger than the cases having no symptoms or mild abdominal pain. Colic pain is thought to be a reflex pain caused by rapid retention of blood in the ovarian cysts and its distention. HOCs have been frequently found in nulliparous young women and their onset has most frequently been noticed during the luteal phase followed by the follicular phase[23]. The reason for the high occurrence of HOCs in the luteal phase has been thought to be due to the fact that the rupture of blood vessels and bleeding into a corpus luteum cyst or the peritoneal cavity will occur easily during the luteal phase when angiogenesis is actively in progress[5,24–26].

Our finding that HOCs were frequently found in young women suggests that HOCs are associated with the dynamic changes in blood hormones in young women which are actively changing in a short period. Slow bleeding is thought to cause mild symptoms. It was characteristic that blood tests, including WBC count and Hgb concentration, showed no abnormality and general condition was good even in cases with colic pain. The mean WBC counts were significantly higher in cases with colic pain than in the asymptomatic cases. It was speculated that this was caused by the severe regional inflammation due to the rapid distention of the mass. Irrespective of the lower abdominal pain, Hgb concentration was normal, because the amount of bleeding was not significant. Three cases subjected to laparotomy were pathologically diagnosed as having HOCs. Their volumes of bleeding had been less than 200 m*l* and thus we considered that they could have been treated conservatively.

In this study, the ultrasonographic and clinical characteristics of HOCs were determined, providing useful information for differentiating HOCs from an organic mass, and avoiding unnecessary surgery.

Acknowledgement: The authors with to thank Dr. M. Ghazizadeh, Associate Professor, Department of Molecular Pathology, Institute of Gerontology, Nippon Medical School, for the review and revision of our manuscript.

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(Received, November 5, 2002)

(Accepted, December 9, 2002)