

Sonographic Spectrum of Hemorrhagic Cysts of the Ovary on Trans-Vaginal Sonography: A Study of 50 Cases

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Abstract: A hemorrhagic cyst is one of the most common complex cystic masses of the ovary, and is frequently encountered during routine pelvic sonography. Hemorrhagic cysts have a variety of imaging appearances on sonography, which may mimic various complex adnexal masses in the female pelvis, including ovarian malignancy. With transvaginal sonography, confident diagnosis of a hemorrhagic ovarian cyst is possible. An accurate and confident diagnosis, depending on the sonographic evaluation, can prevent unnecessary biopsies and surgical explorations. We present a descriptive study of 50 female patients, presenting with complaints of adnexal pain, who were referred to our department for pelvic sonographic examination. **Objective:** Detailed description of the sonographic spectrum of ovarian hemorrhagic cysts using trans-vaginal sonography in 50 patients.

Keywords: ultrasound, ovarian, cyst, hemorrhagic, adnexa, sonography, mass

1. Introduction

A hemorrhagic cyst is one of the most common complex cystic masses of the ovary, and is frequently encountered during routine pelvic sonography. Hemorrhagic cysts have a variety of imaging appearances on sonography, which may mimic various adnexal masses in the female pelvis.^[1] The most common clinical features include pelvic pain and the presence of a pelvic mass, however, hemorrhagic ovarian cysts may also be found in asymptomatic patients. The classic presentation of a hemorrhagic ovarian cyst is the abrupt onset of pelvic or lower abdominal pain.^[2] Hemorrhagic cysts show a spectrum of findings because of the variable sonographic appearance of blood. The sonographic appearance depends on the amount of hemorrhage and the time of hemorrhage relative to the time of sonographic evaluation.^[3] The internal characteristics are better appreciated on transvaginal sonography because of its higher resolution. In early stage, a hemorrhagic cyst may contain clotted blood, appearing intensely echogenic on sonography. The clot can occasionally appear to have a bizarre contour compared to the lobulated contour found in malignancies. With time, the clot may retract and liquefy, resulting in an undulating and concave surface. In later stages, resolved clots with fibrin strands result in a pattern that is referred to with a variety of terms, including 'cobweb', 'honeycomb', 'reticular' and 'fishnet' pattern.^[4] Ultrasonography continues to be the widely-accepted, primary imaging modality used to identify and characterize adnexal masses, being safe, non-invasive, reliable and reproducible.^[5]

2. Material and Methods

All the female patients, ranging in age from 21 to 45 years, with chief complaints of adnexal pain were referred to the Department of Radiodiagnosis for pelvic sonographic examination. The patients were evaluated trans-vaginally, with a 7.5 MHz endovaginal transducer, with proper written consent of the patient and in the presence of a female

attender. Multiple sections of both the ovaries were obtained in all patients. A total of 50 patients diagnosed with ovarian hemorrhagic cysts were included in the study. The sonographic appearances of each lesion were noted and the results were tabulated. A follow-up transvaginal scan was performed at 6-8 weeks after the initial diagnosis to see for the resolution of the lesions.

3. Results

A total of 50 female patients diagnosed with hemorrhagic ovarian cysts, between the ages of 21-45 years, were included in the study. (Chart 1) A total of 50 hemorrhagic ovarian cysts were diagnosed in 50 patients—all the cases were unilateral. 36 masses were noted in the right ovary and 12 in the left, whereas 2 masses were predominantly retrouterine. (Chart 2).

A varied spectrum of sonographic appearances of the ovarian hemorrhagic cysts was found. According to their internal composition and sonographic morphology, the ovarian hemorrhagic cysts were classified into the following 5 groups: (Chart 3)

Group I: Predominantly Hyperechoic Lesion

In our study, 8 patients presented with a well-defined, round-to-oval, predominantly hyperechoic, solid-appearing mass arising from the ovaries, with smooth margins. A variable degree of posterior acoustic enhancement was shown by the lesions, indicating their cystic nature. (Image 1)

Group II: Intracystic Solid Clot

A total of 12 cases showed the presence of a solid clot of variable echogenicity and of varying sizes within the lesions, showing no flow on Color Doppler evaluation. In few of the lesions, the remainder of the cystic mass appeared anechoic, while others showed the presence of internal echoes within. (Image 2)

Group III: Reticular Pattern

This group was the most common category of hemorrhagic ovarian cysts, comprising of 24 lesions, showing a reticular-type pattern with internal echoes and inter-digitating fibrin strands. On Color Doppler evaluation, no flow was noted in the fibrin strands. (Image 3)

Group IV: Homogenous Internal Echoes

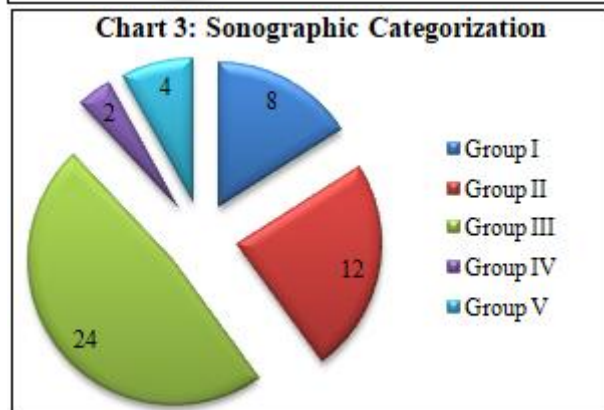
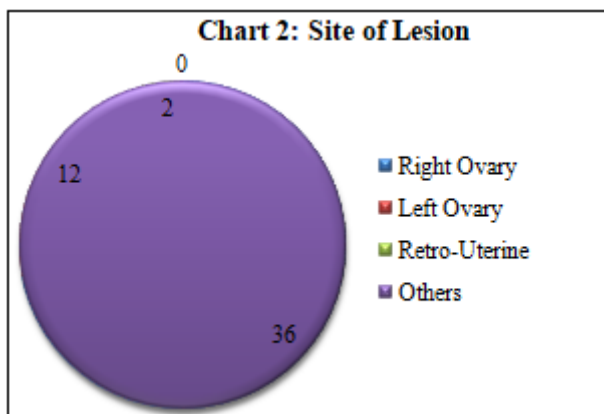
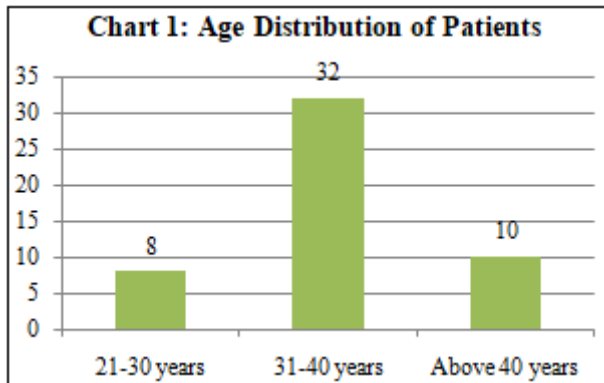
Diffuse low-level homogenous internal echoes were noted in a total of 2 lesions. (Image 4)

Group V: Fluid-Fluid Level

In 4 lesions, a fluid-fluid level or a fluid-debris level was noted. (Image 5)

the most common causes of acute pelvic pain in an afebrile, premenopausal woman presenting to the emergency room.^[7] The imaging features on sonography are variable depending on the age of the hemorrhage within the cyst. Usually, these cysts resolve within 8 weeks. Typically, the patients present with a sudden-onset pelvic pain, a palpable pelvic mass, or they may be asymptomatic in which case the hemorrhagic cyst may just be an incidental finding.^[8] Hemorrhagic cysts show a spectrum of findings because of the variable sonographic appearance of blood. The majority of ovarian hemorrhagic cysts have typical sonographic appearances which allow a confident diagnosis to be made.^[9]

On the basis of sonographic appearances on trans-vaginal examination, the hemorrhagic ovarian cysts can be mainly categorized under 5 groups:



Group I: Predominantly Hyperechoic Lesion

In the early stages, ovarian hemorrhagic cysts are usually hyperechoic on sonography and even may mimic a solid mass lesion. However, they usually have smooth margins and show posterior acoustic enhancement, which indicates the cystic nature of the lesion. A completely hyperechoic solid-appearing hemorrhagic cyst on sonography in the early stage may mimic features of the solid ovarian masses, such as teratoma. (Image 1)

Group II: Intracystic Solid Clot

As the clot retracts, it develops a concave outer margin with mild angularity rather than a solid mural nodule, which has a convex outer margin. On Color Doppler evaluation, no evidence of any flow is noted within the retracted clot. Theremainder of the cystic mass appears anechoic as it contains serum which has separated after formation of the clot. On sonographic evaluation, a blood clot may sometimes be recognized by its jelly-like movement on applying pressure with the transducer.^[10] Occasionally, the cysts may show a mildly echogenic interface, most likely representing a partially solid clot.^[11] (Image 2)

Group III: Reticular Pattern

As the clot undergoes hemolysis, the internal pattern becomes more complex, with a reticular-type pattern containing internal echoes and inter-digitating fibrin strands. On Color Doppler evaluation, no flow is noted in these fibrin strands. This is the most characteristic sonographic appearance of a hemorrhagic ovarian cyst. This pattern is referred to with a variety of terms, including “cobweb,” “honeycomb,” “reticular,” “lacy,” “fishnet,” and “sponge” pattern. (Image 3)

Group IV: Homogenous Internal Echoes

Diffuse low-level homogenous internal echoes may be seen within hemorrhagic cysts of the ovaries, however, this sonographic appearance is more commonly seen in endometriomas. (Image 4)

Group V: Fluid-Fluid Level

A fluid-fluid level may occasionally be seen in a hemorrhagic ovarian cyst.^[8] The blood products can separate into layers of slightly different echogenicities, resulting in a fluid-fluid level or a fluid-debris level. (Image 5)

4. Discussion

Hemorrhagic ovarian cysts usually result from hemorrhage into a corpus luteum cyst or other functional cysts of the ovary. They are most frequently observed in premenopausal women.^[6] A hemorrhagic ovarian cyst is one of

On Color Doppler evaluation, hemorrhagic ovarian cysts may show low to moderate flow resistance at the periphery, while solid component representing blood clot is avascular. Ultrasound is considered the cornerstone in the diagnosis of hemorrhagic ovarian cysts, irrespective of the clinical condition of the patient.^[4]

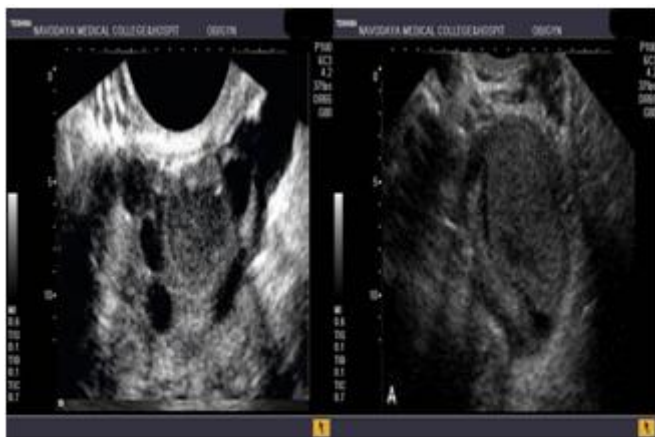


Image 1: 2 ovarian lesions showing the presence of a well-defined, solid-appearing, predominantly hyperechoic lesion (Group I)



Image 2: 2 anechoic cystic lesions showing the presence of a retracted clot within them. (Group II)

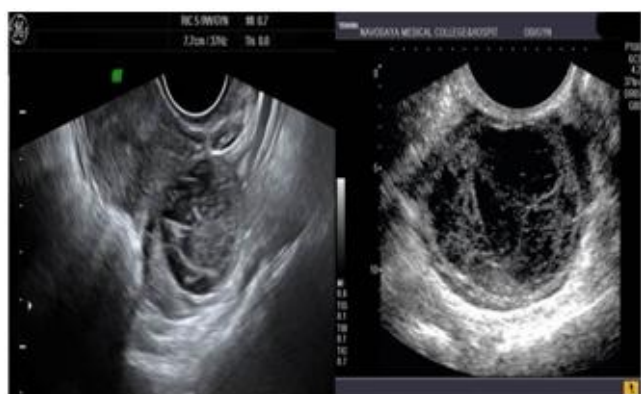


Image 3: 2 ovarian lesions showing the characteristic reticular (fish-net) pattern with internal echoes and interdigitating fibrin strands. (Group III)



Image 4: An ovarian lesion showing homogenous hypoechoic internal echoes. (Group IV)

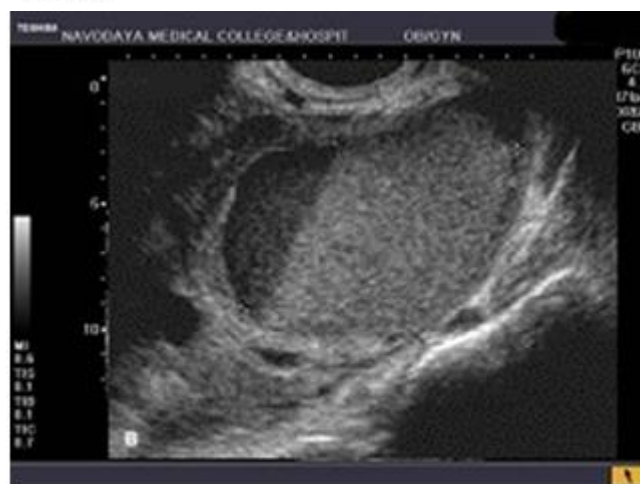


Image 5: An ovarian lesion showing fluid-fluid level of variable echogenicities. (Group V)

5. Management

The management of HOCs depends on clinical symptoms, the size of the lesion and the sonographic appearances.^[12] Most hemorrhagic cysts usually resolve completely within 8 weeks. A follow-up ultrasound examination or further imaging by MR is indicated if the cyst is large in size (>5 cm in diameter) in a pre-menopausal patient or a cyst of any size if the patient is perimenopausal.^[13] In a postmenopausal patient, surgical evaluation is indicated.

6. Conclusion

Hemorrhagic ovarian cysts can mimic several adnexal masses, including ovarian cancer, if its characteristic sonographic features are not recognized. Sonography is able to provide a fast, accurate and confident diagnosis of hemorrhagic ovarian cysts, which can prevent unnecessary biopsies and surgical explorations.

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