Section: Radiodiagnosis

Original Research Article

ROLE OF ULTRASOUND IN DIAGNOSIS OF PARAOVARIAN CYSTS BY CORRELATING WITH HISTOPATHOLOGY

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ABSTRACT

Background: Paraovarian cysts (POCs) arise from either mesothelium or from paramesonephric elements or rarely, from mesonephric remnants and accounts for 5-20% of adnexal masses. They present as lower abdominal pain or detected incidentally on ultrasound (u/s), done for some other reason or rarely present as torsion. Accurate preoperative diagnosis by ultrasound (u/s) helps in management of these cysts. Aims and objectives of the study: To evaluate the accuracy of ultrasound in diagnosis of paraovarian cysts by correlating with histopathology. To classify them as simple and complex based on ultrasound findings.

Materials and Methods: A cross sectional, prospective, descriptive and Analytical study was done on 42 patients over a period of 3 yrs from January 2021 December 2023.

Results: Painabdomen was most common symptom seen in 18(47.3%) cases. The most common age of presentation was seen is 4th decade and most of the POCS were seen on right side.

In u/s detected cases, most of lesions were seen in between 5-10cms accounting for 13(56.5%) cases. The accuracy in detection by ultrasound is 55.5%.

Among u/s detected cases, simple serous cyst was the most common POCs seen accounting for 7 (30.43%) cases.

Detection rate of ultrasound in identifying POCs as simple and complex is 76.47%.

Keywords: POC, histopathology, ultrasound, detection rate, simple, complex

INTRODUCTION

Paraovarian cysts arise from either mesothelium or from paramesonephric elements or rarely, from mesonephric remnants,[1] and represent 5-20% of adnexal masses.[2]

Clinically, it is difficult to differentiate POCs from ovarian mass and therefore require imaging for accurate diagnosis.

Visualization of ipsilateral ovary separate from the cyst is the most consistent finding in paraovarian cysts.

MRI is preferred for better delineation of the mass in pelvis, however, it is expensive.[3]

They present as lower abdominal pain or incidentally detected on ultrasound, done for some other reason or rarely present as torsion.[4,5]

Accurate preoperative diagnosis by ultrasound helps in management of these cysts. Classifying POCs as simple or complex based on ultrasound features, helps to plan the type of operation.

In cases suspected malignant, they may be removed through an endobag and spillage of the cysts fluid is avoided.[6]

Aims and objectives of the study

1. To evaluate the accuracy of ultrasound in diagnosis of paraovarian cysts by correlating with histopathology.
2. To classify them as simple and complex based on ultrasound findings.

Inclusion Criteria

Patients referred to Dept of Radiodiagnosis for ultrasound of abdomen or pelvis, with clinical history of pelvic pain or uneasiness or asymptomatic patients

referred to ultrasound for some other reasons, found to have adnexal cyst on ultrasound or separate from the ipsilateral ovary are included in the study.

Only cysts showing ultrasound findings: large size >3cms,[9] septae / loculations / solid elements / fluid showing internal particles and thickened wall were operated.

Symptomatic patients presenting with torsion / persistent pain or pressure symptoms were also operated. Any sizes, in older women aged more than 45yrs, due to possibility of neoplasia.

Exclusion Criteria

Ovarian cysts, endometriotic cyst, ectopic pregnancy, tubal mass and broad ligament fibroid are excluded from the study.

Paraovarian cysts having no histopathology records or not operated or intervened were excluded from the study.

Review of literature

Many retrospective studies are done in radiological diagnosis of paraovarian cysts and have inherent limitations such as reliance on the medical records.[6]

Avantika et al, have reported that ultrasound can diagnose POC accurately in 87.5% of patients.[6] they have also reported that classifying POCs as simple and complex helps in deciding the type of intervention needed.

A study by Muolokwu Et al,[14] and Darwish Et al,[15] have also reported that POCs can be misdiagnosed as ovarian cyst , hydrosalphinx and peritoneal inclusion cyst.

Honore LH, have reported that the most common histologic type of POC is paramesonephric cyst.[17]

Korbin et al, have classified POCs as mesothelial, mesonephric and paramesonephric cysts. Cysts originating from paramesonephric remnants are lined with secretory, ciliated columnar or cuboidal epithelium.

Mesonephric type cysts on the other hand are lined with cuboidal or flattened epithelium.[16] They are further defined histologically as simple or neoplastic according to tissue origin. Simple POCs originating from embryonic remnants of the urogenital system or from the invagination of fallopian tubes serosa creating a mesothelial cyst. Neoplastic POCs originate from a neoplastic transformation of a paraovarian simple cyst or from the adjacent ovary.[16]

Smorgick N et al,[5] reported non -neoplastic cysts in 85 (74.56%)cases and neoplastic cysts in 27 (23.7%) cases.

MATERIALS AND METHODS

Study design: hospital based cross sectional study

Study analysis: Descriptive and Analytical.

Sample size: The sample size was estimated depending on the positive predictive value of the diagnosis of the paraovarian cyst is 95 %.[10]

Using the formula; Sample size n = [DEFF*Np(1-p)]/ [(d2/Z21-α/2*(N-1)+p*(1-p)] p=95%, p=1-P, d=5, Zα=1.96.

The sample size calculated is 31 and adding the 10% of non compliance and rate ie about 3. 31+3=34~ 35 sample was collected.

Data was coded and entered in MS excel and analysed using standard statistical software.

Descriptive variable will be presented as percentage and mean.

Informed written consent was obtained from each patient for the procedure of ultrasound (abdomen or pelvic) and ethical clearance was sought.

Proposed methodology

1. All data of patients were recorded including age, onset, duration of complaints, interval and amount of bleeding, obstetrical, medical, and surgical interventions and any previous treatment history.
2. Patient underwent ultrasound either transabdominal or transvaginal route or both. Detailed ultrasonographic findings such as laterality, size, shape, location, content, wall thickness, septations and papillary projections was looked for. Cyst was measured in largest cyst diameter.
3. Demonstration of an adnexal cyst, separate from the ipsilateral ovary, clinched the diagnosis of paraovarian cyst. The paraovarian cysts were classified as simple or complex. They were classified as simple, when thin walled, if the contents were clear with one or two loculations and complex, when solid elements / fluid showing internal particles and thickened wall, more than 2 loculatios /when papillary projections or solid areas were seen.
4. Paraovarian cysts showing ultrasound findings: large size >3cms,[9]/ septae / loculations / solid elements / fluid showing internal particles and thickened wall were operated. Symptomatic patients presenting with torsion / persistent pain or pressure symptoms were also operated. Any sizes, in older women aged more than 45yrs, due to possibility of neoplasia.
5. Finally, paraovarian cysts were confirmed by histopathology, which is a gold standard. The pathological examination included gross examination of the cyst for loculations, presence of any papillary projections or any solid areas. Microscopy was done to evaluate the cyst for tissue of origin and type (benign or malignant).
6. Histologic findings were defined as simple or neoplastic according to tissue origin.
7. Ultrasound findings were compared with histopathological findings and final diagnosis was made.

RESULTS

Pain abdomen was most common symptom and seen in 18(47. 3%) cases. Torsion was seen in 5 cases.

2(5.8%) patients underwent cystectomy, 22 (64.7%) hysterectomy and 10(29.4%) cystectectomy and salphingectomy.

Table 1: Age of presentation of POCs

Age	Number	Percentage
<20	2	9.09%
21-30	5	22.72%
31-40	6	27.27%
41-50	7	31.81%
>50	2	9.09%

The most common age of presentation was seen in fourth decade accounting for 7 (27.27%) cases.

Table 2: Showing side of the POCs on Ultrasound

Side	Number	Percentage
Right	14	43.75%
Left	10	31.25%
POD	5	15.62%
Bilateral	3	9.37%

POCs were most commonly seen on right side accounting for 14(43.75%) cases and left in 10(31.25%)cases, and seen in POD in 3(9.3%) cases and bilaterally in 5 (15.6%)) cases.

Table 3: Size of POCs on ultrasound

Size	Number	Percentage
<1.0cms	14	41.17%
>1.0cms<3.0cms	1	2.94%
3.1-5.0cms	8	23.52%
5.1-10cms	10	29.41%
>10cms	1	2.94%

Among those detected by ultrasound, one case (1.6%) was seen between 1.1 and 3.0cms, between 3.1-5cms in 8 cases (50%) cases, between 5.1-10 in 11(55%) cases and > 5cms in 2 (10%) cases.

Table 4: Ultrasound diagnosis of POCs

Ultrasound diagnosis	Number	Percentage
POC	20	71.42%
Ovarian cysts	7	25.00%
endometrioma	1	3.575

Among cases detected POCs on ultrasound, 20(71.42%) cases were correctly identified. 8 (34.7%) cases were misdiagnosed; 7 as ovarian cysts and 1 as endometrioma.
5 cases were wrongly diagnosed as POCs; in one case there was no cyst; one each was hydrosalphinx and dermoid and 2 cases were ovarian cyst. Figure 5.

Table 5: Ultrasound classifications of POCs as simple and complex cysts

Type of cyst	Size	Percentage
Simple	17	73.91%
Complex	6	26.08%

17/23(73.91%) of POCs were simple and 6/23 (26.08) % were complex cysts.

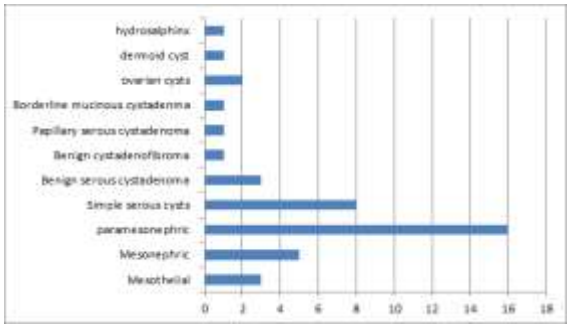

Figure 5: Showing histopathological diagnosis and their percentage

Paramesonephric cysts were most common histological proven cases seen in 16(43.2%) cases. Among u/s detected cases,
simple serous cyst was most common POCs seen accounting for 7/23 (30.43%) followed by paramesonephric cyst in 5 cases (21.73%) Figure 7

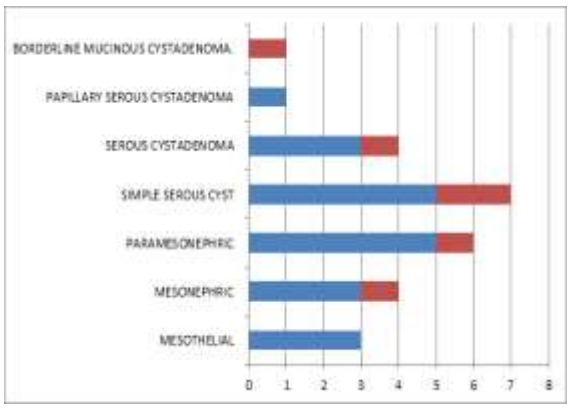

Figure 7: Ultrasound diagnosis of paraovarian cysts as simple and complex, correlating with HPE

17/23(75.9%) of POCs had simple features and 6/23(26.08%) had complex features.

DISCUSSION

Paraovarian cysts account for 5–20% of all adnexal masses in histologically verified series.[1,2]

Histologically, they are classified into one of three categories: paramesonephric, mesonephric, or mesothelial.[4]

It can be diagnosed as a pelvic mass incidentally on ultrasound or can be associated with abdominal pain or suspected adnexal torsion.[7]

Clinically, it is difficult to distinguish a paraovarian cyst from an ovarian mass. Therefore, imaging is essential for preoperative diagnosis.

The most common age of presentation is seen in the fourth decade, similar to study done by Genadry R et al.[7]

Symptoms

Pain abdomen: was most common symptom and seen in 18(47.3%) cases, Tamar Tzur et al,[11] have also reported pain abdomen in 77.2% of cases.

Severe pain abdomen was seen in 3 (7.8%) cases, AUB/PMB in 10 (31.25%), incidentally detected in 3 (7.8%)cases and 1 (2.6%) case each presented with pressure symptoms, amenorrhea, dysmenorrhea and cystitis. Table 1

Side

On ultrasound, 20 (47.6%) POCs were situated on right side, whereas 12 (28.5%) were present on left side. Bilateral POCs were seen in 5 cases and cyst was seen in POD in 3 cases.

In the study by Durairaj A et al have reported 56.86% of POCs were seen on right side and 37.25 on left side.[12]

In our study we had 5 patients presenting with bilateral POC, which have been reported,[13] on HPE, but 7 were less than 1.0cms and was not detected by u/s.

In one patients, both the cysts were more than 3cms, but misdiagnosed as bilateral ovarian cysts on u/s and in another patient having bilateral POC, only one cyst was identified on ultrasound as it was > 3.0cms. Table 2

Size

A total of 42 cases were studied, and 14 cases were less than 1.0cms in size and were not detected by U/S. Among those detected by ultrasound, one case (1.6%) was seen between 1.1 and 3.0cms, between 3.1-5cms in 8 cases (50%) cases, between 5.1-10 in 11(55%) cases and > 5cms in two (10%) cases.

Largest was 11.5cmsand smallest was 1.5cms. (Figure 3) Among 42 cases, 14(33.33%) cases were of size <1.0cms and were missed by ultrasound.

Among cases detected by ultrasound, 15(65.2%) cases were correctly identified. 8/23 (34.7%) cases were misdiagnosed; 7 as ovarian cysts and 1 as 5 endometrioma. (Figure 4). A study by Muolokwu et al,[14] and Darwish et al,[15] have also reported that POCs can be misdiagnosed as ovarian cyst , hydrosalphinx and peritoneal inclusion cyst. Table 3

Ultrasound diagnosis

5 cases were wrongly diagnosed as POCs; in one case there had no cyst, one case each was hydrosalphinx and dermoid and 2 cases were ovarian cysts. [Table 4]

The accuracy of detection by ultrasound when the cysts are less than 1.0cms is 35.7%, as small cysts cannot be detected by ultrasound.

When the cyst is more than 1.0cms, as in our case, the detection rate increases by 53.57%, and when cysts are more than 3.0cms the detection rate is 55.5%.

Avantika et al,[6] have demonstrated that ultrasound can diagnose POC accurately in 87.5% of patients. Table 4

Histological diagnosis

Histologically, POCs are classified as mesothelial, mesonephric and paramesonephric cysts. Cysts originating from paramesonephric remnants are lined with secretory, ciliated columnar or cuboidal epithelium. Mesonephric type cysts on the other hand are lined with cuboidal or flattened epithelium.[16]

Histologically proven POCs in this study were mesothelial cysts seen in 3(8.1%) cases, mesonephric cysts in 5 (13.5%)cases, PMP in 16(43.2%)cases, simple serous cyst in 7 (18.9%) cases, serous cystadenoma in 3 (8.1%)cases, papillary serous cystadenoma in 1 case(2.7%) and borderline mucinous cystadenoma in 1 (2.7%)case.

Paramesonephric cysts were most common histologically proven cases seen in 16(43.2%) cases, also seen in cases showing <1.0cms in size in 14 cases and in bilateral 7 cases. Figure 5.

Among u/s detected cases, simple serous cyst was most common POCs seen accounting for 7/23 (30.43%) followed by paramesonephric cyst in 5 (21.73%) cases.

This is consistent with study done by who also reported PMC as the most common histologic type of POC. (17) Figure 5

Simple/ complex cysts

Diagnosing POCs as simple and complex helps in deciding the type of intervention required, when a neoplastic paraovarian cyst is suspected preoperatively, it may be removed through an endobag and spillage of the cyst's fluid is avoided.[6]

Histologically, they are defined as simple or neoplastic according to tissue origin.

Simple POCs originate from embryonic remnants of the urogenital system or from the invagination of fallopian tubes serosa creating a mesothelial cyst.

Neoplastic POCs originate from a neoplastic transformation of a paraovarian simple cyst or from the adjacent ovary.[18]

On u/s 17 (75.9%) cases were simple cysts 6(26.08%) cases and 17 (75.9%) cases were complex. [Table 6]

Simple cysts showed features such as thin wall, clear contents; no septae or single septa; no papillary projections/solid elements and was seen in 2 mesothetial, 3 mesonephric, 4 paramesonephric and 5 simple serous cyst. 2 simple appearing cysts turned out to be 2 benign cystadenoma and one papillary serous cyst. [Figure 7]

6(26.08%) cases on ultrasound showed complex cyst features in the form of multiloculations, was seen in three cases, turned out serous cysts in two cases and one in borderline mucinous cysadenoma.

Aymmetrical wall thickening was noted in 2 cases; seen one in benign simple serous cyst and one in borderline mucinous cystadenoma.

Solid lesion was seen in 1 case and it turned out to be cystadenofibroma. Internal echoes were seen in 2 cases, one resembling endometrioma, but turned out to be one paramesonephric cyst and another one a borderline mucinous cystadenoma.

1 case having thick irregular wall, multiple septae and internal echoes features suggestive of borderline neoplasia was identified both on ultrasound and HPE, but ultrasound diagnosed it as ovarian borderline mucinous cystadenoma and HPE turned out to be borderline paraovarian mucinous cystadenoma.

There were no features of frank malignancy in this study, in the form of thick septae and papillary projections. And HPE also showed no definite malignant lesion in this study.

A Study by Avantka et al, also showed 78% of the paraovarian cysts were found to be simple cyst with clear contents.[6]

Simple appearing cyst features were seen in 9/17(52.9%) non-neoplastic and 8/17 (47.05%) cases of neoplastic cyst.

complex appearing cyst features were seen in 2/6 (33.33%) of non-neoplastic POCs and 4/6 (66.66%) were of neoplastic POCs, similar to study done by Smorgick N et al,[5] reported non –neoplastic in 85 (74.56%) and neoplastic cysts in 27 (23.7%)cases.

Overall detection rate of ultrasound in identifying POCs as simple and complex was 76.47%.

CONCLUSION

Accurate preoperative diagnosis of POCs helps in management.

Ultrasound could accurately detect POCs in 55.5% of cases and help in differentiating it from ovarian cysts.

Classifying POCs, as simple or complex cysts helps in making preoperative decision making.

Overall detection rate of ultrasound in identifying POCs as simple and complex was 76.47%.

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