

Role of Ultrasonography (USG) in Female Subfertility

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Abstract

Background: In modern era of conservative therapies and minimal invasive surgeries, imaging plays an important role in diagnosis, treatment and determination of prognosis of a disease. Role of ultrasonography (USG) in female subfertility has been documented in World Medical literature. Hence, in this study, we aim to determine the accuracy of USG in determining variety of causes of female subfertility using hysterolaparoscopy as a gold standard in our conditions. **Subjects and Methods:** One hundred and thirty females in reproductive age-group presenting with primary and secondary subfertility were included in the study. Females with primary amenorrhea were excluded from the study. All patients underwent endovaginal USG (EVS) while Color Doppler Flow Imaging (CDFI) was used whenever indicated. Imaging was done after 8th-10th day of menstrual cycle and a minimum of 3-4 days after complete cessation of menstrual blood flow. **Results:** USG is very accurate in detecting polycystic ovaries, leiomyoma / adenomyoma, etc with nearly 100% accuracy while has considerable limitations in tubal disease and in cases of pelvic inflammatory disease (PID) where the accuracy may fall up to 50%. **Conclusion:** USG should be first investigation of choice in all patients presenting with subfertility as it is highly accurate in detecting polycystic ovaries, leiomyoma, endometriosis / adenomyosis, endometrial thickening and uterine and ovarian anomalies. Further imaging, should be used reserved tool in patients with complex clinical disease showing unremarkable or non-characteristic USG.

Keywords: Ultrasonography, Fertility.

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Introduction

Female subfertility has gained significant attention owing to its rising trend and availability of different modes of its management in modern medicine. As modern medicine is evidence-based and shows inclination towards conservative therapies & minimal invasive surgeries, imaging assumes pivotal role. Among the imaging armamentarium, ultrasonography (USG) is the key modality utilised in the evaluation of subfertile females. Hence, this study aims to determine the role and accuracy of USG in determining the various causes of subfertility in females using hysterolaparoscopy (HLA) as a gold-standard technique.

Aims of Study

1. Role of Ultrasonography (USG) in determining causes of subfertility in females
2. Accuracy of USG in detecting various causes of subfertility in females

Subjects and Methods

A multicentric study involving 130 females in reproductive age-group was performed including primary and secondary subfertility. All the patients included in the study underwent both Transabdominal (TAS) & Endovaginal (EVS) USG. Imaging was done between 8th-10th day of menstrual cycle with minimum of 3-4 days after complete stoppage of menstrual blood flow. All the included patients underwent HLA within one week of imaging.

Twenty patients including those with primary amenorrhea or in whom HLA was performed after one week were excluded from the study-group. Hence, a total of 110 patients were included in our study for statistical evaluation.

Observations

Age of the patients included in the study ranged from 22 years to 38 years.

Out of 110 patients, 66 patients had primary and rest 44 female patients had secondary subfertility.

Patients in the study-group were subcategorised in to those with polycystic ovaries (PCO), tubal disease, pelvic

inflammatory disease (PID) and miscellaneous (endometrial disease, myometrial leiomyoma / adenomyoma, endometrioma ovary and uterine congenital anomalies) groups.

Patients with multiple findings were included in multiple disease groups viz. fourteen patients were included in both PCO & PID; ten patients in PCO & miscellaneous and ten in tubal disease & PID.

Results

PCO Group

The study reveals that USG has 100% accuracy in detecting polycystic ovaries with positive and negative predictive values of 100%. (Table 1, Figure 1). In our study, out of 54 cases of polycystic ovaries, 34 patients (63%) had primary subfertility and 20 patients (37%) had secondary subfertility. This shows that PCO is a commoner cause of primary infertility.

Tubal Disease Group

Patient included in this group are those having salpingitis, hydrosalpinx / pyosalpinx and tubal disease. In our study, out of 20 patients with tubal disease USG could diagnose only 8 patients accurately revealing a low accuracy of 40% (Table 2, Figure 2). 12 out of 20 patients (60%) with tubal disease had primary while rest had secondary subfertility suggesting its common prevalence in primary cases.

PID Group

USG detected less than one-third cases of PID, those that revealed thickened tubes, tubo-ovarian masses, collection in endometrial / pelvic cavity and subendometrial calcification (Table 3, Figure 3 & 4). In our study, out of 50 cases of PID, 22 patients (44%) had primary while 28 patients (66%) had secondary subfertility showing PID as a commoner cause of latter.

The above data also reveals that USG is suboptimal for visualisation of tubes and broad ligament.

Miscellaneous Causes Group (Table 4)

USG detected uterine anomaly in two patients of our study. One patient had uterus subseptus while other had bicornuate uterus (Figure 5).

USG accuracy was similar to HLA in detection of adenomyosis and leiomyoma (Figure 6).

Endometrial hyperplasia was accurately detected by USG but presence of cystic endometrial hyperplasia could be seen in two patients on USG while infective endometrial thickening was recognised only on HLA in two patients. Endometrial calcification was used as an indirect marker of tubercular endometritis (Figure 7).

Table 2: Distribution of Patients with Tubal Disease

Tubal Status	USG	HLA
Dilated	8	14
Damaged	0	6
Total	8	20

Table 3: Distribution of Patients with PID

USG	HLA
16	50

Table 4: Distribution of Patients with Miscellaneous Causes

Factors	USG	HLA
Anomaly of tubes Adnexa	0	4
Hypoplasia/ Aplasia of Ovary	10	10
Uterine anomaly	2	2
Endometrioma	6	6
Adenomosis	2	2
Leiomyoma	12	12
Endometrial Hyperplasia	6	6

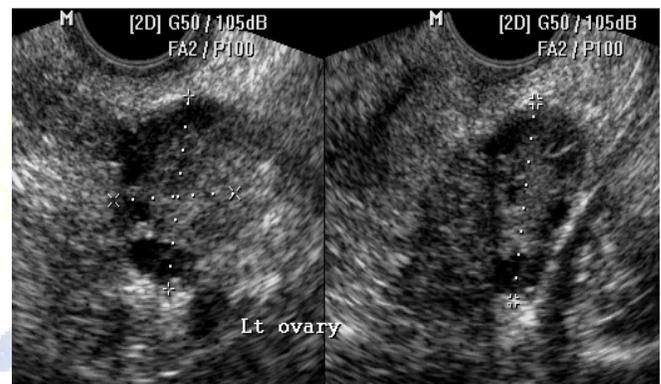


Figure 1: EVS images show a polycystic ovary

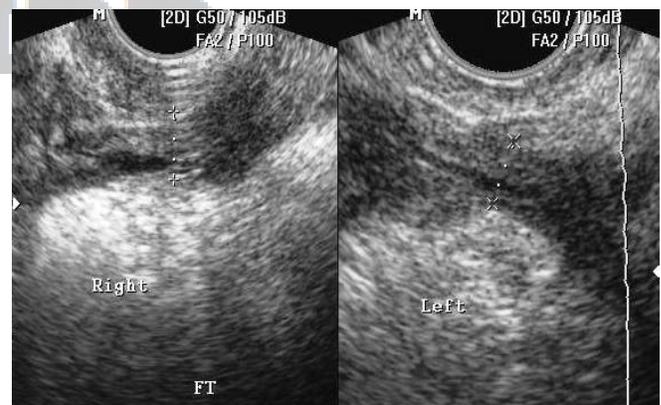


Figure 2: EVS images show thickened & dilated fallopian tubes in salpingitis

Table 1: Distribution of Patients with PCO

USG	HLA
54	54

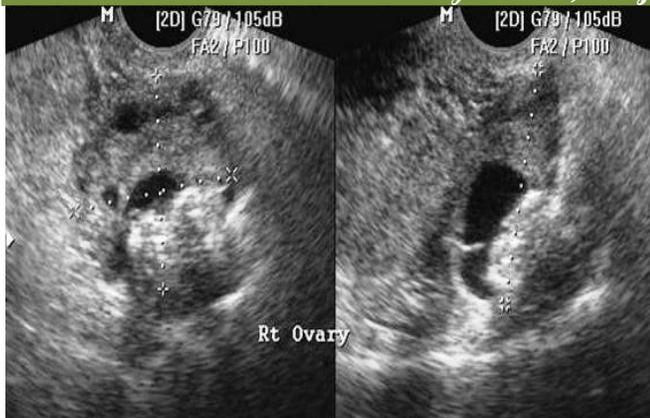


Figure 3: EVS images show tubercular abscess in ovary

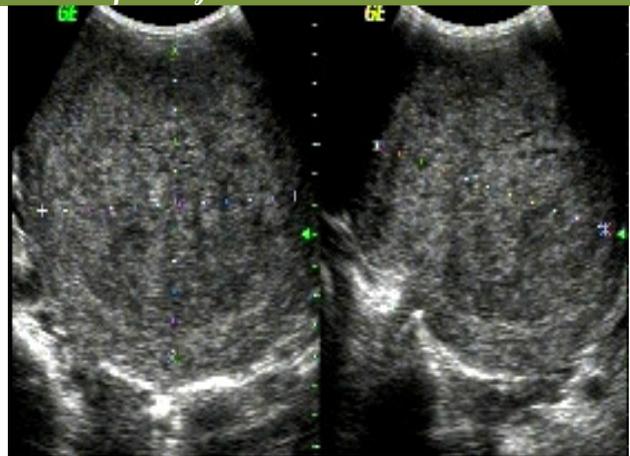


Figure 6: TAS image shows fibroid uterus

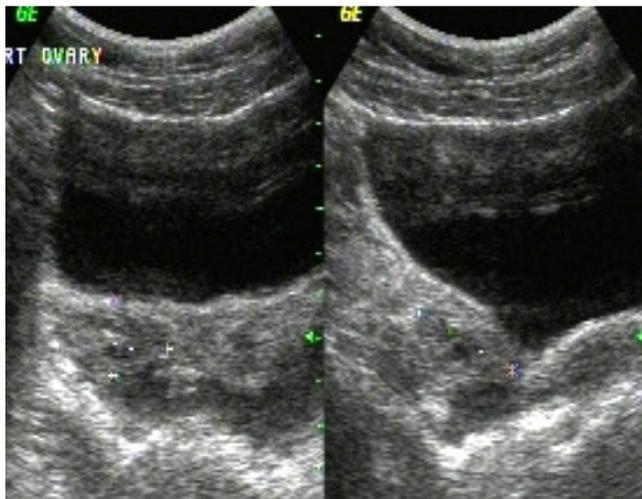


Figure 4: TAS images show collection in PID



Figure 7: EVS image shows dense endometrial calcification



Figure 5: TAS image shows bicornuate uterus

Discussion

Since female subfertility is quite common and is also a common indication of USG evaluation, hence a study determining the role & accuracy of USG keeping HLA results as gold-standard was planned by the authors of this study.

Various role of USG in female subfertility has long been described in the medical literature.^[1] It is the first screening tool guiding the clinician for further course of action.^[1, 2]

USG is shown to be highly accurate in detecting variety of causes of subfertility including endometriosis, adenomyoma, leiomyoma, pelvic inflammatory disease, etc.^[3-5] It is not very accurate in detecting tubal disease because of thin tubes and due to lack of soft tissue contrast with adjacent structures.

Very few studies in the medical literature have been done comparing the accuracy of various imaging modalities with that of HLA findings. The results of our study are similar to those described in literature.^[4]

With the advent of modern USG scanners and increasing competence of imaging specialists in evaluation of subfertile females, this accuracy may further increase helping in determining the next step of

evaluation / management and avoiding unwarranted procedures.

Conclusion

USG should be standard investigation in all subfertile females as it is highly accurate in detecting majority of the causes of subfertility including polycystic ovaries, leiomyoma, endometriosis / adenomyosis, endometrial thickening and uterine and ovarian anomalies.

Further imaging / invasive procedures, should be used reserved for patients with complex clinical disease showing unremarkable or non-characteristic USG.

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