FOLLICULAR MONITORING: COMPARISON OF TRANSABDOMINAL AND TRANSVAGINAL SONOGRAPHY

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ABSTRACT

Transabdominal sonography (TAS) and Transvaginal sonography (TVS) were compared for follicular monitoring in 73 patients of infertility. These patients were referred for follicular monitoring in normal and stimulated cycles from infertility clinic. Patient compliance and acceptance was excellent for TVS technique as compared to TAS technique. The overall resolution of ovarian and follicular anatomy was much better in TVS. With TAS only 35.6% had good visualisation of follicles as compared to 80.8% ($p < 0.05$) in TVS. TVS offered advantage of much better detection rate of smaller follicles ($< 10\text{mm}$) and higher accuracy in assessing number of follicles.

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KEY WORDS: Follicular monitoring; Infertility; Transabdominal Sonography (TAS); Transvaginal Sonography (TVS).

Introduction

It is well established that diagnostic and therapeutic ultrasound is now indispensable in the investigation and management of infertility. Follicular monitoring is one of the various applications of ultrasound in the management of infertility. Ultrasound is unique in its ability to document the morphologic changes in the ovary and uterus during normal and induced cycles [1,2]. Hackeloer [3] in 1978, was the first to demonstrate with ultrasound the sequential events of ovary in the normal menstrual cycle. After that several studies were done in early eighties regarding sonographic evaluation of normal and induced ovulation [1,2,4-6]. With the introduction of transvaginal ultrasonography, between 1983-1985 the scenario changed rapidly. Transvaginal sonography (TVS) quickly gained acceptance among radiologists and obstetricians. Several investigators demonstrated that improved visualisation of follicular structure is possible with transvaginal (TV) scanning than transabdominal (TA) scanning in majority of patients [7-9]. The present study was designed to compare the usefulness of transabdominal sonography (TAS) and Transvaginal sonography (TVS) in follicular monitoring in patients of infertility.

Material and Methods

A six month prospective study was conducted during the period of Mar 98 to Aug 98, to compare the usefulness of TAS and TVS in follicular monitoring in our hospital. The study population consisted of patients of infertility referred for follicular monitoring during either natural or stimulated cycles. TA scanning always preceded TV Scanning and in any given case, the same sonologist interpreted both the scans. All TA scans were obtained with commercially available real time sonographic unit with appropriately focussed 5 MHz electronic convex transducer. All patients had moderately distended urinary bladder during TAS. All Transvaginal (TV) scanning were obtained with a 6.5 MHz electronic vaginal probe with 120 degree scanning angle. After taking the TA scan, all patients voided completely before the TV scanning. TVS was done in the same sitting immediately after the TAS. The TVS probe was sheathed with a condom containing coupling gel. Additional coupling gel was then placed on the covered probe. TVS was performed with the patient in supine position and knees flexed. At the end of the study each patient was asked if she had any discomfort during the examination, and given a choice, whether she would prefer TA or TV technique. We examined the resolution of follicles obtained with the transvaginal technique and compared them with scans of the TA technique. The sonographic findings were classified as good visualisation, poor visualisation or non visualisation. Good visualisation was defined as visible ovaries and follicles with distinct borders. Poor visualisation was defined as visible ovaries with inadequate definition of follicles. After the completion of each case the examining sonologist recorded the diagnostic features visualised with each technique. The results were reviewed retrospectively by the authors. Statistical significance was compared by means of X^2 analysis.

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Fig. 1a : Transabdominal pelvic scan showing uterus and right ovary. No distinct follicles are seen in right ovary

Fig. 1b : Transvaginal scan of right ovary of same patient, same sitting. Multiple peripheral follicles are distinctly seen.

Fig. 2a : Transabdominal pelvic scan showing uterus and both ovaries with large follicles

Fig. 2b : Transvaginal scan of both ovaries of same patient, same sitting showing both ovaries with large follicles. Note the clarity of follicular margins and contents

Results

A total of seventy three patients were studied. Patient tolerance and acceptance for TVS was excellent. None of our patients reported to be more uncomfortable with TVS. Initial apprehension and hesitancy was noted in 12 (16.43%) cases regarding TVS. That was easily overcome by proper explanation about the procedure and its better results. Two (2.73%) patients had excessive apprehension leading to vaginismus at the attempt of introduction of TV probe. Both these patients were from higher socio economic strata, of which one was a medical practitioner herself. They were allowed to witness another patient being examined without any discomfort. This helped in relieving of apprehension and we succeeded in TV scanning in both these patients. In TAS majority (90%) of patients expressed some discomfort with full bladder technique and at least 17(23.28%) patients described full bladder TAS as a painful procedure. Some patients (20% approx) had underdistended bladder but still were unable to hold urine further. Some others (approx. 15%) had over distended bladder, making it difficult to examine. These patients had to void urine partially, which in itself is very discomforting. Some of these patients had to be rescheduled for the next day. In a busy department like ours, it was very difficult to synchronise the timing schedule for each and every patients. However we instructed the patients to report to us whenever they felt full bladder. During TVS scanning 5(6.85%) patients experienced pain while introducing TV probe; which later on was found to be related to vaginitis due to infection. 12(16.43%) patients reported mild discomfort while maneuvering

Fig. 3 : Bar diagram depicting state of comparative visualisation with transabdominal (TAS) and transvaginal scan (TVS)

the TV probe at the extremes of the fornices to locate deep seated ovaries. This was related to excessive stretching of the vaginal vault. The resolution of the ovaries and follicles was excellent with TVS (Figs. 1 and 2). With TA approach only 26 (35.6%) had good visualisation of follicles, 37 (50.7%) had poor visualisation. Ovaries and follicles could not be identified in 10 (13.7%) pa-

tients with TAS. Whereas, with TVS 59 patients (80.8%) had good visualisation of follicles, 12 (16.43%) had poor visualisation of follicles, (Fig 3). One ovary could not be located in one (1.36%) patient and both ovaries could not be located in another patient (1.36%). Both these cases were found to have extensive omental adhesions and the ovaries were placed quite high up in the pelvis.

Besides resolution of the follicles, we also examined the relationship between the follicular size and detection rates of follicles by both the scanning methods. For follicles > 18mm in size, no significant difference was noted in detection rate (63 vs 71) between TAS and TVS. However, in smaller follicles especially below 10 mm the TVS offered definite improvement in the detection rates. TVS even enabled us to detect and count follicle as small as 3-4 mm accurately. No TA scanning could identify such small follicle and in all these cases the ovaries appeared as uniformly hypoechoic structures. It is important to record the number of follicle with their respective sizes in gonadotrophin stimulated cycles. Here again the TVS detection rate of follicles far exceeded TAS detection rate. The frequency of 5 or more growing follicles were detected in 48.2% in transvaginal scanning as compared to 8% in transabdominal scanning.

Discussion

After Hackeloer's pioneering study [3] of the morphological changes in ovary during normal cycles many studies have been conducted to evaluate cyclic changes in the ovaries both during normal and stimulated cycles [1,2,4-6]. After the introduction of TV scanning method many investigators concentrated on the accuracy of assessment of follicular dynamics [7-9]. A good number of studies were done later comparing transabdominal (TA) and transvaginal (TV) methods of studying the pelvic organs [10-13]. TVS is still to achieve momentum in India mainly due to (i) non availability of TV probes, (ii) ignorance/reluctance of the referring physicians (iii) lack of adequate knowledge of TVS and altered anatomical orientation. The present study was undertaken to see patients response/acceptability of TVS and also to compare the anatomical information available in these two modalities. To our surprise, nearly all the patients preferred the TV mode of scanning. This acceptability was probably partially biased as these patients were examined immediately after a relatively uncomfortable study with full bladder. Another reason for better patient compliance was that all the patients were referred to us by the gynaecologists at infertility clinic who already explained the necessity, simplicity and accuracy of TVS. So these patients were already psychologically primed for TVS. However, the fact that TVS is much more comfortable cannot be denied. Another fact we admit is that, it is extremely difficult to synchronise the optimum bladder distention for TAS at the scheduled time in a busy department. So scheduling these patients was another problem although we instructed the patients to report fullness of bladder im-

mediately. Again there is a great deal of individual difference in the perception of full bladder and need to void. Some patients have been found to be uncomfortable with as little as 150-200 ml of urine, while some others were found to tolerate 700-800 ml of urine quite comfortably. For a good TAS neither under distended nor over distended bladder is desirable. The major advantages of TVS includes (i) excellent tissue characterisation of the uterus and ovaries (ii) closeness of the transducer to the target organs producing high resolution sonograms especially in presence of bowel gas or obesity when TAS is very difficult (iii) rapid performance of the examination without the need for a full bladder permitting better patient scheduling (iv) high degree of patient compliance and acceptability (v) accurate serial assessment of follicular and endometrial dynamics in infertility management programme (vi) guiding oocyte retrieval in in-vitro fertilization (IVF) programmes. The disadvantages of TVS are (i) initial difficulty in anatomical orientation (not a problem for experienced sonologist) (ii) limited field of view (These days wide scanning angle transducers are available allowing wide field of view) (iii) inability to image highly placed ovaries (iv) initial hesitancy and reluctance on the part of the patients, especially in the Indian setup (easily overcome by proper counseling). It is important to document serial follicular dynamics in normal as well as stimulated cycles in the management of infertility, TV scanning helps us to do that accurately. The sonologists can accurately guide the infertologist for timing of administration of HCG, titrating dosage of gonadotrophin administration. Detection of occurrence of ovulation helps in timing of Intra Uterine Insemination (IUI). Yee et al [14] demonstrated a very good correlation of number of follicles detected with TVS and laparoscopic findings. Evidences also suggest that transabdominal methods underestimates the number of follicles than does TVS. TV ultrasound measurement of follicular size has lower intra and inter observer variability [12]. Yee et al [14] and Musoles et al [15] have demonstrated that TV scanning methods showed a higher correlation between follicular diameter and follicular fluid volume as compared to the TAS method. In follicles of smaller diameter (<14 mm) significant correlation exists between TVS and laparoscopic findings [14]. The present study confirms higher resolution of ovaries and follicles obtained by TVS. The higher degree of patient compliance and acceptance of TVS has already been confirmed in our study. This highlights the need to make use of this mode of investigation for wider indications.

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