Col RS MOORTHY***MJAFI 2000; 56 : 181-183****KEY WORDS : Transvaginal Sonography.**

Widespread availability of ultrasound imaging in the past two decades has dramatically changed the practice of obstetrics and gynaecology. These specialists rely heavily upon this technology to make major decisions about management of their patients.

Trans abdominal sonography (TAS) images the pelvic organs through the anterior abdominal wall in the supra-pubic region. A distended urinary bladder is essential to displace the bowel loops and to provide an acoustic window. There are two major limitations of TAS. First is the need to use lower frequencies for imaging due to the longer distance between the transducer and the pelvic organs. Other disadvantage is the beam degrading effect of the anterior abdominal wall especially in obese patients. Both these limitations lead to degradation in image quality.

To overcome these limitations of TAS special transducers, which could be introduced in the vagina, were designed in 1985. The vaginal approach reduces the distance between the probe and the pelvic structures allowing the use of higher frequencies. Transvaginal sonography (TVS) produces greatly improved resolution as compared to TAS, primarily due to the higher frequencies employed and also due to the absence of beam deformation by the anterior abdominal wall. Major advantages of TVS over TAS are better image quality and avoidance of patient discomfort due to full urinary bladder. Comparison of TVS and TAS is given in Table 1.

Indications of TVS

TVS is indicated whenever a better look at the pelvic structures is required [1,2]. Common indications include the following :-

- a) Early pregnancy
- b) Lower uterine segment in late pregnancy
- c) Ectopic pregnancy

TABLE 1

Comparison of TAS and TVS

	TVS	TAS
Full bladder	Not essential	Essential
Probe frequency	5-7.5 MHz	3-5 MHz
Resolution	Very high	Moderate
Field of view	Small	Large
Contraindications	Virgins, Vaginal obstruction Premature rupture of membrane	None
Interventional uses	Many uses	Limited role

- d) Pelvic masses
- e) Retroverted or retroflexed uterus
- f) Obese or gaseous patient
- g) Emergency cases when bladder is empty
- h) Follicle monitoring
- i) Oocyte retrieval
- j) Endometrial study to assess suitability in IVF ET techniques
- k) Cervical canal mucous
- l) Doppler examination of pelvic organs
- m) Interventional procedures

The list is not exhaustive and newer indications are continuously being added.

Patient Preparation

An adequate explanation of the procedure to the patient is essential. This helps to relax her apart from fulfilling the ethical and medico-legal requirements. It is important to stress that it is a simple, painless procedure and only a part of the probe is inserted. Other patients who have undergone TVS may prove valuable in allaying the anxiety of a 'fresh' patient. Presence of a female attendant is essential if the scan is performed by a male sonologist. After obtaining verbal consent to the procedure, the patients may be offered the oppor-

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tunity to insert the probe themselves if they so choose [1].

The patient's dignity must be maintained by appropriately covering her adequately at all times. Ideally TVS is performed with the patient placed on a gynaecological table. If the patient is on a flat bed, an elevation has to be provided under the pelvis so that the probe can be tilted downwards during the sonographic examination [2]. The patient should lie supine with knees bent and the feet placed flat on the table, shoulder width apart.

Probe Preparation

To prevent cross contamination between patients a disposable cover, usually a latex condom, should be placed over the probe and secured by rubber bands or other suitable means. Between uses the probe should be soaked in disinfectant. For this instructions supplied by the probe manufacturer should be strictly followed.

Once the probe has been disinfected and wiped clean, a small amount of coupling gel should be placed inside the tip of the condom and the condom pulled over the shaft of the probe. Care should be taken to eliminate any air from the beam path. Finally the covered tip of the probe is coated with a lubricant to facilitate insertion. The ultrasound gel has been observed to have a negative effect on sperm motility in some studies [3]. During infertility work-up it is prudent to use glycerine or normal saline as a lubricant especially in the peri-ovulatory period. Condoms coated with spermicide chemicals should not be used to cover the probe in such patients [4]. The sonologist must wear gloves when preparing the probe and performing the examination.

Scan Technique

Once the probe and the patient have been prepared, the transducer is gradually inserted while monitoring the ultrasound image. The urinary bladder's normally consistent position in the pelvis relative to much more variable position of the uterus and the ovaries makes it a good landmark to use when making initial assessment of the transducer orientation.

Three basic scanning manoeuvres of the probe are useful to scan the pelvic organs comprehensively [1,2]:

- a) Sagittal imaging with side to side movements,
- b) 90° rotation to obtain semi-coronal images with angulation of probe in vertical plane,
- c) Variation in the depth of probe insertion to bring different parts within field of view/focal zone.

A pelvic survey should be done first to ascertain quickly the relative position of the uterus and ovaries as well as to identify any obvious masses. This is obtained by slowly sweeping the beam in a sagittal plane from the midline to the lateral pelvic side walls followed by turning the probe 90 degrees into coronal plane and sweeping the beam from cervix to the fundus. In multi-frequency probes proper selection is important for best results. Setting of appropriate focus in electronic arrays is equally important. In mechanical sector fixed focus probes the organ of interest is brought in the focal zone by changing the depth of insertion of the probe. Proper selection of frame averaging is also important. It should be low for fast moving structures like foetal heart and high for studying solid immobile tissues.

For Doppler studies a steady probe position is essential and it helps if the examiner's forearm is well supported.

Dynamic uses of the TVS probe

The ultrasonographic examination can be enhanced by placing a hand over the lower abdomen to bring pelvic structures within the field of view/focal range of the probe [1,2]. Localisation of the point of maximal tenderness by the probe will help in identifying the cause of pain. Dense pelvic adhesions can be diagnosed by the 'sliding organ sign'. In the absence of adhesions, the organs move freely past each other and the pelvic wall in response to pressure by the TVS probe tip. Absence of this free movement may suggest pelvic adhesions [5].

Interventional uses of TVS

There are many interventional uses of transvaginal sonography [2,6]. Newer indications are constantly being added to the list. Some of the more common ones are given below:-

- a) aspiration of ova for in vitro fertilisation (IVF)
- b) aspiration of ovarian cyst
- c) drainage of pelvic collection
- d) multi-foetal pregnancy reduction
- e) non-surgical ectopic pregnancy management
- f) early amniocentesis
- g) chorion villous sampling
- h) transvaginal embryo transfer
- i) sonohysterosalpingography

Limitation of TVS

It should be remembered that TVS provides a more limited field of view than TAS. A survey trans-abdominal scan usually be performed prior to the TVS to rule out the possibility of overlooking a mass lying

outside the field of view of the TVS transducer. To avoid the need of a full bladder it has been suggested that a TVS examination may be followed by a TAS scan with bladder empty. The rationale behind this approach is that a mass lying outside the field of view of the TVS probe will be sufficient in size to be seen trans-abdominally even if the bladder is empty [1].

The advent of the transvaginal sonography in 1985 has had a tremendous impact on the practice of obstetrics and gynaecology. The pelvic organs can now be imaged with a resolution not possible earlier. The management of infertility due to female factors depends mainly on the TVS. Addition of Colour Doppler to TVS now gives added information about the vascular supply of various pelvic organs. Details of foetal anatomy that can be depicted by TVS are far superior to that shown by TAS. As a new technique TVS has proved very useful and has a bright future.

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