

ULTRASOUND GUIDED ENDOCAVITORY INTERVENTIONAL PROCEDURES IN GYNAECOLOGY

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Abstract: *Ultrasound guided procedures have been used with endocavitary probes, more so on female genital organs and related structures that are situated deep in pelvis which often cannot be approached directly. The proximity of the transducer to the pelvic organs makes possible the use of high frequency probes, thereby enhancing the resolution and clinical efficiency. The advantage of these procedure over surgery are easy to do, precise needle placement, rare chance of injury to adjacent organs, shorter time of stay in hospital and low cost. The complications are rare which can be bleeding, infection and unintentional puncture of organs. In practice, the interventional procedures most commonly performed by endocavitary ultrasound include oocyte retrieval, ovarian cyst aspiration, fine needle aspiration for cytology, drainage of pelvic abscesses, culdocentesis, management of ectopic pregnancy, multiple embryo reduction. besides the other procedures, that can be done by the help of transvaginal ultrasound include embryo transfer, transcervical fallopian canulation, fetal reduction in multiple pregnancy, chorionic villus sampling and early amniocentesis. The extreme accuracy, least invasiveness and fewer complications are making endocavitary ultrasound guided procedures widely acceptable.*

INTRODUCTION

Ultrasound guided abdominal aspirations were started way back in 1974 when Smith & Bartrum performed percutaneous aspiration of intraabdominal abscess. Female genital organs and related structures are deeply situated in the pelvis and cannot be approached directly because of presence of urinary bladder and bowel loops anterior to these organs. Percutaneous abdominal approach of these structures is difficult and more traumatic. With the advancement in sonographic equipments and techniques, now endocavitary procedures are preferred over abdominal approach wherever it is possible.

The proximity of the transducer to the pelvic organs makes possible the use of high frequency probes, thereby enhancing the resolution and clinical efficiency. The elastic vault of vagina allows approximation of the ovaries by increased pressure of the tip of the probe. Since there is no need for full urinary bladder, pelvic anatomy is undistorted and ovaries are kept beyond the focal zone of the transducer. Obesity or adhesions do not significantly inhibit the visualization of pelvic structures and pathologies.

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The punctures are usually performed with the guidance of 5.0 to 7.5 MHz vaginal transducer probes through a needle guide that is attached to the shaft of the probe. A software-generated fixed "biopsy guide" line is displayed on the ultrasound monitor screen, which marks the path of the entering needle. Needle ranging from 16G to 2G is employed, depending on the nature of the procedure itself; the narrowest possible needle able to perform the desired task should be used. For better imaging, the "zoom" feature of the equipment should be used as frequently as possible. After the initial withdrawal the needle, the pelvic structures and cul-de-sac must be observed sonographically for approximately 10 minutes and rescanned after a 2 to 3 hours observation period to check for internal bleeding or previously undetected complications.

ENDOCAVITORY INTERVENTIONAL PROCEDURES

Following interventional procedures are most commonly performed by endocavitary ultrasound :

1.Oocyte retrieval; 2.Ovarian cyst aspiration; 3.Fine needle aspiration for cytological ex.; 4. Drainage of pelvic abscesses; 5.Culdocentesis; 6.Management of ectopic pregnancy ; 7.Multiple embryo reduction

OOCYTE RETRIEVAL

Initially in IVF the ovum pick-up or oocyte retrieval was done by the laproscopic route. In 1981, Lenz was first to demonstrate transabdominal transvesical route for pick-up.

Gliecher made a major breakthrough by using vaginal ultrasound for ovum pick-up. Now this is most widely used method as it is less traumatic, no injury to urinary bladder and most important is of all, the follicle can be accurately located due to their close proximity to the transducer. Vagina is cleaned by normal saline. No antiseptic is used. Mild sedation or general anaesthesia is given if multiple pricks are to be made. Otherwise local anaesthesia with 10 ml of 1% Lignocaine is sufficient to do the procedure comfortably.

Before inserting the probe into the cover, operator should apply the ultrasonic coupling gel. The cover (sterile condom, surgical rubber glove or specially produced rubber cover) is stretched over the gel to expel the air from the tip of the probe. This can prevent the artefacts during the procedure. The gel or lubricant should not be used while inserting the probe because of spermicidal action and reported embryotoxicity. Instead, one can use a physiologic saline or culture medium. Sterile needle guides are used for transvaginal puncture of the follicles. The keyboard of the ultrasound machine is covered with a sterile cover, which enables the operator to make any readjustment under sterile conditions. The patient's legs and perigenital area are then covered using the sterile drapes. After cleaning the vagina with isotonic saline or cultured medium the vaginal probe is inserted into the vagina.

TECHNIQUE

- (i) Place the transducer alongwith its biopsy guide in the vagina.
- (ii) Scan ovaries, uterus and iliac vessels.
- (iii) Face the biopsy line marker on the USG screen.
- (iv) Move the transducer till the biopsy marker crosses the maximum diameter of the follicle.
- (v) Introduce needle through the vaginal mucosa and parametrium into the follicle, with a sharp jabbing movement.
- (vi) Normally try to aspirate the middle, larger follicle first.
- (vii) This is important because it can give access to both lateral and medial follicles without having to withdraw the needle completely.
- (viii) It is essential to gently rotate the needle in its axis while aspirating the follicle.
- (ix) Majority of the gynaecologists do not flush the follicle at the time of aspiration. This is done only in case of natural cycle IVF where there is only one egg to be retrieved. In this case, the follicle may be flushed multiple times to recover the egg.
- (x) When aspirating the opposite ovary, the needle should be withdrawn, transducer repositioned and needle reintroduced.

- (xi) The needle should be occasionally flushed with media to prevent clotting and blockage.
- (xii) In highly mobile ovaries, it may be difficult to puncture the ovary. This is overcome by fixing the ovary between the transducer and the lateral pelvic wall prior to puncture. In ovaries, which are high up, one may have to go transuterine.
- (xiii) Iliac vessel identification is essential in preventing inadvertent vessel puncture.

This is done by looking for the following.

- (a) Constant relation of the iliac artery and vein.
- (b) Pulsation's of vessels.
- (c) In case of vessel mimicking of follicle, a rotation of transducer by 90 degree will result in cylindrical appearance of the vessel. In addition, a side-to-side movement of the transducer will result in varying diameter in case of follicle and constant diameter in case of vessel.
- (d) Ovarian capsule demarcation between ovarian tissues and vessels.

COMPLICATIONS

- (i) Vaginal bleeding : Normally, this can be controlled by pressure, vaginal packing, occasional vault stitch.
- (ii) Inadvertent puncture of : iliac vessels, ovarian vessels, hydrosalpinges, endometrioses and ureter.
- (iii) Acute pelvic inflammation.

OVARIAN CYST ASPIRATION

Transvaginal guidance permits direct visualization and aspiration of persistent follicular cyst. Such cysts may impair folliculogenesis due to elaboration of hormones, or as a result of decreased perfusion by parenchymal compression. In the puncture of an ovarian or paraovarian cyst the center of the cyst is targeted and the needle is inserted. Such a procedure is highly debated in the literature. The concern of cell spillage from potentially malignant ovarian cyst into the abdominal cavity prevents many from using it more frequently. Although the aspirated fluid is necessarily submitted for cytologic evaluation, a negative cytologic examination may sometimes represent a false-negative result. High sensitivity and specificity of transvaginal color Doppler in differentiation between benign and malignant adnexal lesions seems to increase the reliability in decision making which cysts should be aspirated.

Bret et al published two papers describing their experience using transvaginal sonography in the aspiration of the ovarian cysts. They reported a 48% recurrence rate after cyst aspiration in premenopausal patients, and an 80% recurrence rate in postmenopausal women. This group attempted to prevent cyst recurrence by injecting alcohol immediately after cyst aspiration, but this procedure was successful in

only 4 of 7 patients.

The aspiration of endometriomata is considered to be relatively contraindicated. Aboulghar et al studied 21 patients in which transvaginal ultrasonically guided aspiration of pelvic and endometriotic cysts was performed. Reaccumulation occurred in only 6 cases during a 12-month follow-up. Certainly, the aspiration of endometriotic cysts is technically simple; however, its overall benefit and safety are still inconclusive due to the lack of experience obtained by evaluating larger series.

In infertility program waegemaekers et al aspirated 32 unilocular anechoic cysts with an average diameter of 45 mm transvaginally. The authors concluded that ovarian cysts puncture in the early follicular phase could diminish the cancellation rate of *in vitro* fertilization cycles.

DRAINAGE OF PELVIC ABSCESSSES

Infertility is attributed to tubal obstruction or dysfunction in 30-40% of patients. It is well known that tubal occlusion is common sequelae of pelvic inflammatory disease (PID). Since recurrent episodes of PID are frequent, one should expect high incidence of this entity in infertile population. In patients with a tubo-ovarian abscess, abscess drainage with sonographic guidance can hasten the recovery process and improve the efficacy of antibiotic therapy. Once the needle is placed into the abscess cavity, the fluid can be aspirated as completely as possible and the needle withdrawn, or an indwelling drainage catheter can be placed. Teisala et al used transvaginal ultrasound guided aspiration to drain 10 tubo-ovarian abscesses receiving antimicrobial treatment. Only light sedation was required, and the procedure was well tolerated by the patients. This technique is accepted as an alternative to open laparoscopy for treating the tubo-ovarian abscess.

DIAGNOSTIC CULDOCENTESIS

The introduction of transvaginal sonography has limited the need for diagnostic culdocentesis. The presence or absence of fluid in the pelvic cavity is easily established by the vaginal approach, but it may be necessary to differentiate between different biological fluids (clear fluid, blood or pus). The wide availability of transvaginal color Doppler sonography to distinguish the dominant pelvic pathology in the presence of pelvic fluid on the basis of different vascularity patterns is very helpful in routine investigations. Sometimes, in conjunction with clinical signs, subjective symptoms, transvaginal color Doppler findings and the rapid β -human chorionic gonadotropin (β -hCG) test, the clinician still requires the information provided by culdocentesis. Inserting a needle in the cul-de-sac is a simple technique that can be performed safely and accurately with transvaginal ultrasound guidance. High quality B-mode transvaginal sonography with

superimposed color Doppler flow allows accurate simultaneous identification of the main pelvic vessels, physiological angiogenesis (corpus luteum) and ectopic peritrophoblastic blood flow. Color will help in accurate needle placement and in diminishing the risk of injury to adjacent vessels, especially in women who have had previous inflammatory disease of the pelvis with an obliterated cul-de-sac.

FINE NEEDLE ASPIRATION FOR CYTOLOGICAL EXAMINATION

FNA of solid as cystic lesion is done by 22 G or 23 G needle. Thus this procedure is quick safe and there are least chances of cell spillage from potentially malignant ovarian masses into the abdominal cavity.

Zanetta et al reported on transvaginal ultrasound guided fine needle sampling of deep cancer recurrences in the pelvis. For aspirates and biopsies, sensitivity was respectively 76 and 91, while accuracy was 83 and 91. This technique is a safe procedure with limited invasiveness and extremely high specificity even when performed on small targets (median diameter in the study was 30 mm). Whenever possible, biopsies should be preferred. A negative fine needle biopsies obtained from a clinically suspicious lesion requires a repeat sampling.

CONSERVATIVE MANAGEMENT OF ECTOPIC PREGNANCY

In past most of the cases of ectopic pregnancy used to present with ruptured ectopic or unstable haemodynamic state. Gynaecologists were left with no other choice than salpingectomy or salpingoophrectomy.

Now with the advancement of more sensitive serological tests and transvaginal color Doppler ultrasound, it has become possible to diagnose ectopic pregnancy at an early stage. Thus, making the medical treatment possible. Patient with enraptured ectopic pregnancy and adnexal mass less than 3 cm are treated with local administration of Inj Methotrexate. It is injected at the site of maximum trophoblastic flow. The total dose is calculated by 1 mg/kg body weight. Estimation of serum β -hCG levels and TVS color Doppler ex. in done every second day until β -hCG levels reached non gravid levels. In case of live foetus in an ectopic gestational sac, first Inj KCl is injected in foetal heart and then Inj Methotrexate in the sac. For cervical and cornual ectopic pregnancies also similar procedure is adopted.

OTHER PROCEDURES

There are many more interventional procedures, which can be done by the help of transvaginal ultrasound. These are :

- Embryo transfer
- Transcervical fallopian cannulation

- Fetal reduction in multiple pregnancy
- Chorionic villus sampling
- Early amniocentesis

CONCLUSION

With the time endocavitary interventions are being used more and more often. Newer applications are being introduced. Although their major role is in Assisted Reproductive Techniques (ART), these procedures can be performed for diagnostic as well as therapeutic purposes. Its therapeutic role is tubo ovarian abscess and ectopic pregnancy is becoming treatment of choice. The extreme accuracy, least invasiveness and fewer complications are making these procedures widely acceptable.

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IMSA NEWS

IMSA Chapter Activities

CME Hyderabad

- 13-10-2006 : Dr. W.H.Allum, "Challenges in Cancer Surgery Marsden experience"
 : Dr. C. Subramanyeswar Rao, "Management of Oesophageal Cancer Indian Experience"
 29-12-2006 : Dr. Guidubaldo Querci della Rovere, "Management of Axilla in Breast Cancer"
 : Dr. P. Raghu Ram, "Retro areolar Breast Cancer - Extending the boundaries of Breast Conserving Surgery"

CME Delhi Chapter

- 11-02-2007 : General Discussion "Rheumatology Update 2007"
 23-02-2007 : Dr. Madhur Yadav, "Hypertension and its Management"

Tamil Nadu Chapter

- 14-01-2007 : Dr. O.P.Kapoor, "My Concept of Sensitivity and Specificity of the Results of Investigations as applied to a family physician"
 11-02-2007 : Dr. Michiel Arul Doss, "The Mechanism Underlying the gender bias in thyroid cancer"
 11-03-2007 : Prof. Dr. B. Krishnaswamy, "Frail Elderly"

CME Bihar Chapter

- 17-12-2006 : Dr. H.K.Singh, "Diabetes & Eye - Update"
 : Dr. Ajay Sinha "Diabetes & Eye - Update"

Rural CME Delhi Chapter

- 16-03-2007 :Dr. Ranjan Sachdev, USA, "Arthritis - Pain Management update"
 : Dr. Goswami, "Yogic Exercises in all types of Arthritis" & Practical Demonstration of Yogic exercise
 : Dr. Y.D. Sharma, "Aurvedic Management of pain in Arthritis"

Election of Fellows/Members

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Dr. Anju Aggarwal Delhi	Dr. Amarjit Singh Pune (Maha)	Dr. Yashpal Sharma Jammu (J&K)
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HONOURS

- **Dr. Tarun Gupta** has been elected as President of IMA NDB for the year 2007.
- **Dr. S.N.A.Rizvi** received the prestigious "Netaji Oration" of Association of Physicians of India at the 62nd Annual Conference of API, held at Goa on 16th Feb, 2007 for his outstanding work on "Metabolic Bone Disease".
- **Prof. N.S.Neki** has been awarded fellowship of American College of Physicians; he will receive the Scroll at the annual conference to be held at San-Diego, California, USA on April 19, 2007. He has also been awarded "J NagMemorial Award" for year 2006 in recognition of his work on growth of clinical nutrition.

REVISED IMSA FELLOWSHIP / MEMBERSHIP FEE

It has been decided to revise the Fellowship and Membership fee of IMSA with effect from 1/7/2007 as under:

	Revised	Existing
Fellowship	Rs. 5,500/-	4,500/-
Membership	Rs. 3,500/-	3000/-

There will no change in the fee in respect of applications received up to 30/6/2007. For Fellows elected from abroad, there will be no change in the fee structure.

Secretary General