

SYLLABUS FOR CERTIFICATE COURSE IN ULTRASOUND MEDICINE

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FOGSI - ICOG

DIPLOMA

The practice of ultrasound and the use of diagnostic and interventional ultrasound is like a stethoscope to the Gynecologist today. It is impossible to even conceive an Obstetric Care unit and Fetal Medicine unit or even Gynecology and Infertility Diagnostic unit without ultrasound.

It has now been acknowledged in the modified P.N.D.T. act that ultrasound practice can be done by a trained Gynecologist who will keep proper records as mandated by the law and will adhere to the indications, safety and ethical practice.

The Indian College of Obs. & Gyn. (ICOG) is the academic wing of FOGSI and the college feels the need of training its members and the members of FOGSI in the science and art of ultrasonography.

To practise ultrasound in India it is mandatory to be trained in ultrasonography under proper guides and to do 100 cases minimum of Obs. Gyn. Ultrasound and 6 months of observership.

Keeping the above requirements in mind the ICOG along with AOFOG distant learning programme, AEC Singapore and Ian Donald School, Croatia has devised a 6 month Diploma course in Diagnostic & Interventional Obs. Gyn. Ultrasound for FOGSI members in India.

The Diploma will be awarded to candidates who will successfully attend & complete the theoretical course and a practical training programme set to a very high standard.

The theoretical course is designed for both the general gynecologist and the specialized feto-maternal high risk obstetrician. The lectures will be given by a group of experts who are leading academics in their respective fields.

THEORETICAL COURSE

The theoretical course will be held at 4 ICOG recognised centres at Agra, Mumbai, Manipal and Kolkata. The participants will be given study material (Books/journals etc.). A MCQ & short question evaluation test will be taken on the last day of theory lectures. The theoretical course will cover lectures on Physics of ultrasound, ultrasound machines & probes, How to use ultrasound, PNDT Act, laws of ultrasound, Medicolegal aspects, Methodology, patient preparations, Complete Obstetric Ultrasound uses including use in first, second & third trimesters, Diagnosis of threatened abortion, ectopic pregnancy, biometry, anomaly scanning, IUGR, Placental evaluation, Amniotic fluid evaluation, color doppler uses and 3D & 4D ultrasound.

Complete Gynecological uses including use of TVS, Color and 3D in evaluating female pelvis and evaluating infertility. Complete Interventional procedures.

A detailed practical training will be given as observer on patients with audio visual aids in form of CDs and videos. Hands on training will be allowed on certain patients.

TRAINING SCHEDULE

AIMS

- (1) Ability to visualise in two dimensional image and a three dimensional structure.
- (2) Hand-Eye co-ordination.
- (3) Supervision is essential.
- (4) Level of training depending on competence.

FIRST LEVEL (At least 30 hours a week for two months)

- (1) Confirm intrauterine pregnancy.
- (2) Confirm viability.
- (3) Determine no. of gestations.
- (4) Fetal Biometry.
- (5) Assessment of growth.
- (6) Presentation.
- (7) Amniotic fluid assessment.
- (8) Placental assessment.

- (9) Cervix measurement.
- (10) Suspect abnormalities.

SECOND LEVEL (About 100 sessions & 300 hours)

- (1) Detect & specify early Pregnancy Problems.
- (2) Detect & specify abnormalities.
- (3) Assessment of Growth restriction.
- (4) Fetal Biophysical profiling.
- (5) Understanding color doppler.
- (6) Accurately sampling various blood vessels by Doppler and analysing them.
- (7) Knowledge of Interventional procedure.
- (8) Knowledge of 3-D & 4-D.
- (9) Analysis of malignancies.

THIRD LEVEL (3 years)

- (1) Acquiring 3-D & 4-D image.
- (2) Perform interventional procedures.
- (3) Research & development.
- (4) Ability to teach Basic stalls.

SUGGESTED LOGBOOK FOR TRAINING

VIABLE PREGNANCIES	10
NON VIABLE PREGNANCIES	10
NORMAL BIOMETRY	10
GROWTH RESTRICTIONS	10
ABNORMAL PREGNANCY (ECTOPIC / MULTIPLE ETC.)	10
COLOR DOPPLER STUDIES OBSTETRIC	10
GYNAEC	10
IUCD'S	5
FIBROIDS	10
OVARIAN CYSTS	10
GYNAEC DISORDERS	10
TRANSVAGINAL SCAN	10

These are minimum no. of scan for Level-I training.

ANOTHER 100 CASES OF DETAILED OBSTETRIC & GYNAEC CASES FOR VARIOUS INDICATIONS INCLUDING COLOR AND 3-D SHOULD BE LOGGED FOR LEVEL II TRAINING.

A STANDARD REPORTING FORMAT FOR GYNAEC & OBSTETRICS SHOULD BE ADHERED TO WITH DETAILS OF DIFFERENT DESCRIPTIVE TERMINOLOGY.

ORGANISATION OF ULTRASOUND UNIT

Infrastructure, documentation, quality control, computerisation data storage.

Medicolegal Implications of Ultrasound

Examination Ethics and Patient Information

PRACTICAL TRAINING

Required Skills

- (1) The trainee to be able to identify early pregnancy and emergency gynecological problems by transvaginal and transabdominal ultrasound.
 - (a) Early pregnancy :
 - Fetal viability;
 - Description of the gestational sac, embryo, yolk sac;
 - Single and multiple gestation (chorionicity).
 - (b) Pathology :
 - Early pregnancy failure;
 - Ectopic pregnancy;
 - Gross fetal abnormalities such as nuchal translucency, hydropic abnormalities;
 - Hydatidiform mole;
 - Associated pelvic tumors.
 - (c) Gynecology :
 - Normal pelvic anatomy;
 - Uterine size and endometrial thickness;
 - Measurement of ovaries;
 - Pelvic tumors, e.g., fibroids, cysts hydrosalpinx;
 - Peritoneal fluid;
 - Intrauterine contraceptive devices.
- (2) The trainee to be able to recognise the following normal fetal anatomical features from 18 weeks onwards by abdominal ultrasound.
 - (a) Shape of the skull : nuchal skinfold;
 - (b) Brain : ventricles and cerebellum, choroid plexus;
 - (c) Facial profile;
 - (d) Spine : both longitudinally and transversely;
 - (e) Heart rate and rhythm, size and position, four-chamber view;
 - (f) Size and morphology of the lungs;
 - (g) Shape of the thorax and abdomen;
 - (h) Abdomen : diaphragm, stomach, liver and umbilical vein, kidneys, abdominal wall and umbilicus;
 - (i) Limbs : femur, tibia and fibula, humerus, radius and ulna, feet and hands—these to include shape, echogenicity and movement;
 - (j) Multiple pregnancy : monochorionic and dischorionic, twin-twin transfusion syndrome;
 - (k) Amount of amniotic fluid;
 - (l) Placental location;
 - (m) Cord and number of vessels.
- (3) Fetal biometry
 - (a) Crown rump length, biparietal diameter, femur length, head circumference, abdominal circumference, interpretation of growth charts.
- (4) Activity : recognize and quantify
 - (a) Fetal movements;
 - (b) Breathing movements;
 - (c) Eye movements.

Certification

- (1) One hundred hours of supervised scanning to include :
 - (a) 100 gynecological *examinations* and early pregnancy problems (principally by transvaginal sonography but transabdominal experience also required).
 - (b) 200 obstetric scans covering the full spectrum of obstetric conditions.

(2) Logbooks :

30 cases on one A4 page with ultrasound picture, at least 15 anomalies should be included.

(3) Examination :

General guidelines : the examination would be included as part of the normal obs-gyn training. The options are to have a multiple-choice paper of short written examination paper (3-4 cases). On the practical side, a transvaginal scan and a fetal anatomy scan, 30 minutes for both, would be recommended. The candidate would take ultrasound pictures and interpret the images.

BASIC AND ADVANCED DIPLOMA COURSES IN OBS GYN ULTRASONOGRAPHY

Introduction

Ultrasonography is the most commonly used imaging modality in Obstetrics and Gynecology. Since the popularization of ultrasonography in obstetrics by Professor Ian Donald in the 60's, the diagnostic capability of sonology has improved tremendously especially after the mid 80's. This tremendous improvement of machines over the last ten years has made it the most revolutionizing investigative tool introduced into the practice of Obstetrics and Gynecology.

Unfortunately, most obstetricians and gynecologists have not kept in the time with the rapid advancement with the diagnostic potential of this equipment. This has lead to Obstetric and Gynecological use of sonology (80%) as the number one cause of medicolegal litigation in entire sonology. Number one being missed diagnosis of ectopic pregnancy followed by missed diagnosis of congenital malformation. This situation has been primarily due to no clear cut guidelines set up in countries for training of obstetricians in usage of sonology.

Basic Course

Basic training constitutes three days of intensive lectures. The topics have been listed below. Following which, part-time participants have to return to their respective hospitals of origin with logbooks. They are supposed to log a total of four hundred cases (400) cases over a period of one year which includes :

- (a) 40 First trimester scans (20 Transvaginal scans)
- (b) 200 Second trimester scans (Follow basic recommendation)
- (c) 40 Third trimester scans (Follow basic recommendation)
- (d) 60 cases of normal uterus and ovaries (Follow basic recommendation)
- (e) 40 cases of gynecological pathology (Follow basic recommendation)

All cases need to be filled in the logbook and the requirement must be completed within maximum of one year.

The logbook and the video recording is certified by the training faculty. After that, the candidate to be assessed with patients; which involves one first trimester scan, one second trimester scan, one third trimester scan for growth and fetal assessment and one transvaginal gynecological scan over a period of two hours. If the categorising of cases in the logbook the video cassette recordings and clinical assessment all satisfactory, then the candidate will be issued a Diploma in Basic Ultrasonography in Obstetrics and gynecology by the ICOG—FOGSI.

On completion and obtaining the Basic Ultrasound in O and G Diploma course, the candidate is qualified to get enrolled for the advanced course.

Advanced Course

This entails a few lectures, followed by two weeks attachment at training centre for hands-on experience. Following which, the part-time candidates return to their hosopitals of origin with their logbooks. They are supposed to log a total of 4 hundred (400) cases over a period of one year which includes :

- (a) 20 transvaginal abnormal first trimester scanning least one case for each week up to 2 week for missed abortion, molar pregnancy, ectopic pregnancy).
- (b) 200 cases of detailed anatomical surveillance of a fetus at 22 weeks and after with fetal echocardiography (follow basic requirement given).
- (c) 10 cases of transvaginal fetal abnormality scan at 13-14 weeks (follow basic requirement given).
- (d) 20 cases of third trimester fetal well being assessment including growth, amniotic fluid assessment (detailed doppler assessment if available) and biophysical profile.

- (e) Fetal abnormalities diagnosed with one case of each major system diagnosed and documented on videotapes or pictures.
- (f) Observation of 10 invasive procedures in obstetrics.
- (g) Observation of 10 cases of Doppler assessment of fetus.
- (h) 100 cases of transvaginal assess of normal uterus and with or without follicular measurements (at least 20 cases of pathology).
- (i) Observation of 10 cases of colour flow imaging and Doppler assessment of gynecological masses.
- (j) 15 cases of cyst aspiration or ovum retrieval under ultrasound guidance to be observed.
- (k) To observe 5 cases of hysterosonography with color flow imaging.

All cases done or observed needs to be filled in the logbook and the requirement must be completed within a maximum of one year; six months after commencement, video recording of two of each of the categories for a, b and c and all abnormal conditions (both obstetrics and gynecology) with patient's references number sent to the teaching faculty.

The same procedure shall be repeated on completion of one year. The Logbook and the video recording must be certified by the teaching faculty. After that, the candidate is sent to to teaching faculty to be assessed which would include theory and practical sessions.

Both theory and practical assessments. The theory assessment would mainly involve previewing a total of 30 slides in 40 minutes.

The practical session would involve :

- (a) Early second trimester fetal abnormality scan at 14 weeks;
- (b) Detailed Fetal Abnormality scan at 22 weeks and after with Fetal Echocardiography;
- (c) Transvaginal assessment of pelvic anatomy;
- (d) One third trimester scan to assess fetal well being

All these to be completed in 1½ hours.

If the categorising of cases in the logbook, video cassette recordings and clinical assessment are all satisfactory, then the candidate will be issued a Diploma in Advanced Ultrasonography in Obstetrics by ICOG—FOGSI.

The above curriculum is meant for part-time students. For full students, the whole program could be condensed to eight months.

□ **ANTENATAL DIAGNOSTIC CENTRE DEPARTMENT OF OBSTETRICS AND GYNECOLOGY NATIONAL UNIVERSITY HOSPITAL**

Guidelines for Repeat Obstetric Ultrasonography for Fetal Growth

- (1) Fetal number, lie, presentation, FH and FM
- (2) Amount of amniotic fluid
 - excessive, normal/decreased
 - (Amniotic Fluid Index—AFI)
 - If abnormal AFI
- (3) AC-95th/75th/50th/25th/5th Percentile for data EFWT in grams
 - No other measurements necessary if AC is between 75th and 25th percentile
- (4) (PRN) HC/AC ratio {If AC is below 25th or FL/AC ratio} above 75th percentiles
 - Repeat scan 3 to 4 weekly interval from 28 weeks
 - if liquor volume decreased
 - AC is < 5th percentile
 - or abnormal H/S or FL/AC ratio

Antenatal Fetal Monitoring for High Risk Pregnancy

Verify date by—First Trimester VE

or

U/S □ 18 or 20 weeks

Serial SFH from 2nd trimester length of anow needed
FMC by mother from 3rd trimester U/S growth assessment
28-30 weeks repeat 32-34 weeks

Normal U/S
Growth

Decreased U/S
Growth

Weekly CTG
from 34 weeks
if liquor is
decreased

- (i) — CTG biweekly/
3 □ per week
— Biophysical
profile weekly
- (ii) — Serial 3 to 4
weekly U/S growth
from 28 weeks
- (iii) — Blood flow studies weekly

Suggested Scheme for Ultrasonic Scanning

(A) General scanning for ALL cases

- Number of etuses
- Lie and presentation
- Liquor volume—qualitative assessment excessive
normal
decreased
 - quantitative assessment (depth and width)
- Placenta—Location
 - grade (0-III)
 - abnormalities
 - retroplacental space
- Membranes
- Cord—vessels

(B) Systemic screening for *fetal anomalies*

- (i) Head — BPD, HC
 - OFD, OFD/BPD ratio
 - Anterior and Posterior V/H ratio
 - Thalamic and mid-brain view
 - Cerebral peduncle view
 - Cerebellar view, transverse cerebellar diameter
 - Ocular view and diameters
 - Base of skull, hard palate
 - Integrity of skull table, encephalocele
 - Face and lips
- (ii) Neck — Soft tissue swelling
- (iii) Spine — Cervical region
 - Thoracic region
 - Lumbo-sacral region

- Each region
 - longitudinal view
 - transverse view
 - lateral view
- (iv) Chest
 - Pleural effusion
 - Pericardial effusion
 - Lung parenchyma
 - Chest circumference
 - Heart
 - Four chamber view
 - Left ventricular view
 - Right ventricular view
 - Short axis view
 - Aortic root view
 - Pulmonary root view
 - TM studies
- (v) Diaphragm
 - Hermination of guts
- (vi) Abdomen
 - Presence of ascites
 - Abdominal wall, cord insertion
 - Stomach
 - Liver, umbilical veins
 - AC
 - Kidneys
 - appearance
 - size (KC, KC/AC ratio)
 - renal pelvis, ureter
 - Bladder, genitalia
 - Bowel distentions
- (vii) Extremities
 - Femur, tibia and fibula, humerus, radius and ulna
 - Fingers and toes
 - Degree of skeletal calcification
 - Femur/BPD ratio
- (viii) Soft Tissues
 - Subcutaneous thickness
 - Swelling/edema
- (ix) Fetal Behavior
 - Swallowing
 - Limb movements
 - Body tone
- (C) Screening for IUGR
 - BPD and HC
 - AC
 - H/A ratio
 - Femur/AC ratio
 - CRL □ TA
 - TIUV
 - Thigh thickness/Femur Length
 - Estimated fetal weight and FW zone

Comment on assymetrical IUGR : screen for fetal well-being.

Repeat every 3 to 4 weeks during 3rd trimester (from weeks onwards).

(D) Screening for FETAL WELL-BEING

— Biophysical profile and score

FM

BM

Tone

AFV

CTG

□ Repeat twice a week for diabetes, HDP, IUGR and post-term.

□ Once a week for maternal/physician concern, decreased fetal movement and other high risk conditions.

(E) Blood flow studies for growth retarded fetus.

□ **PROTOCOL FOR ADVANCED COURSE IN
ULTRASONOGRAPHY**

Proposed Minimum standards for Advanced Ultrasound Training in Obstetrics and Gynecology.

□ **INTRODUCTION**

It is expected from the trainee that he shall have a basic knowledge of embryology, dysmorphology, genetics, physiology and pathophysiology of pregnancy.

The theoretical training program expects the candidate to understand the full range of diagnostic possibilities of ultrasound. The practical training requirements are to ensure that the candidate develops sufficient skills that enable him to establish normal and abnormal fetal development with the objective to improve fetal outcome; to triage for gynecological emergencies and to make appropriate referrals to a tertiary (specialist) center for further investigations. There is a difference between the theoretical and practical training components. Residents will not have to accomplish and practice everything that is being taught in theory.

Theoretical Training Program

It helps the trainee to understand and be able to discuss the following :

Basic Principles of Medical Ultrasound

(1) The relevant principles of acoustics, attenuation, absorption, reflection, speed to sound;

(2) The effect on tissues of pulsed and continuous wave ultrasound beams : biological effects, thermal and non-thermal;

(3) Basic operating principles of medical instruments :

(a) Pulse echo, scanning principles and 3-D;

(b) Pulse echo instruments, including linear array, curvilinear, mechanical sector, transvaginal and rectal scanners;

(c) Velocity imaging and recording :

— Doppler principle

□ Continuous wave

□ Pulse wave

□ Color flow mapping

□ Power Doppler

— Color velocity imaging

— Pitfalls, artifacts;

(d) Data acquisition;

(e) Signal processing (may be given in practical demonstration) :

— gray scale

— time gain compensation

- dynamic range
 - dynamic focus
 - gain compensation, acoustic output relationship (may be given in practical demonstration)
- (f) Artefacts, interpretation and avoidance
- reverberation
 - side lobes
 - edge effects
 - registration
 - shadowing
 - enhancement;
- (g) Measuring systems
- linear, circumference, area and volume
 - Doppler ultrasound—flow, velocity spectrum analysis;
- (h) Imaging recording, storage and analysis;
- (i) Interpretation of acoustic output information and its clinical relevance.

Obstetrics

- (1) Investigation of early pregnancy :
- (a) Ultrasound features of normal early pregnancy, including gestational sac and yolk sac, simple and multiple pregnancy, chorionicity
 - (b) Development of fetal anatomy in early pregnancy including recognition of abnormalities such as nuchal translucency, cystic hygroma and fetal hydrops
 - (c) Embryonic-fetal biometry, e.g. crown-rump length
 - (d) Fetal viability
 - (e) Ultrasound features of early pregnancy failure including hydatidiform mole
 - (f) Ultrasound and biochemical investigation of ectopic pregnancy
 - (g) Normal appearance of the cervix;
- (2) Assessment of amniotic fluid and placenta :
- (a) Estimation of amniotic fluid volume
 - (b) Examination of the placenta and cord
 - (c) Placental location
 - (d) Number of cord vessels;
- (3) Normal fetal anatomy at 18-22 weeks :
- (a) Shape of skull : Nuchal fold
 - (b) Facial profile
 - (c) Brain : Cerebral ventricles, posterior fossa and cerebellum; cisterna magna, choroid plexus cysts
 - (d) Spine : Both longitudinally and transversely
 - (e) Heart rate and rhythm, four-chamber view, including atrioventricular valves, outflow tract
 - (f) Lungs
 - (g) Shape of the thorax and abdomen
 - (h) Abdomen : Stomach, liver, kidneys and urinary bladder, abdominal wall and umbilicus
 - (i) Limbs : Femur, tibia and fibula, humerus, radius and ulna, hands and feet—these to include shape, echogenicity of the long bones and movement
 - (j) Multiple pregnancy : Chorionicity;
- (4) To study the epidemiology, differential diagnosis, natural history of abnormalities and management of :
- (a) Structural
 - Skeletal system
 - Central nervous system
 - Cardiovascular

- Intrathoracic disorders
- Renal
- Abdominal wall and diaphragm
- Gastro-intestinal
- Markers for chromosomal abnormalities
- (b) Functional
 - Polyhydramnios, oligohydramnios, hydrops, dysrhythmias
- (c) Prognosis and treatment (including intravascular therapy);
- (5) Fetal biometry :
 - (a) Measurements to assess fetal size (including biparietal diameter, head circumference, abdominal circumference, femur length)
 - (b) Measurements to aid the diagnosis of fetal anomalies; anterior/posterior horn of the lateral ventricle, transcerebellar diameter, nuchal skinfold;
- (6) Estimation of gestational age :
 - (a) Interpretation and appreciation of limitation of ultrasonic and other investigations for gestational age assessment;
- (7) Assessment of fetal growth :
 - (a) Ultrasonic assessment of fetal growth; interpretation and appreciation of limitations of standard measurements singly or serially
 - (b) Fetal weight estimation;
- (8) Biophysical scoring systems : interpretation and appreciation of limitations :
 - (a) Fetal body movements
 - (b) Fetal breathing
 - (c) Heart rate and rhythm;
- (9) Evaluation of fetal and uteroplacental blood flow :
 - (a) Methodology appropriate to obstetric investigation
 - (b) Appreciation of problems in blood flow and velocity measurements and waveform analysis in normal and complicated pregnancies
 - (c) Clinical applications and limitations in the prediction of intrauterine growth retardation and pre-eclampsia
 - (d) Clinical applications in monitoring the small for dates fetus and pregnancies complicated by rhesus isoimmunization, diabetes and fetal cardiac arrhythmias;
- (10) Knowledge of invasive diagnostic and therapeutic procedures :
 - (a) Diagnostic : Amniocentesis, chorionic sampling, cordocentesis
 - (b) Therapeutic : Shunting and draining procedures.

Gynecology

- (1) Normal pelvic anatomy :
 - (a) Uterus
 - Uterine size, position, shape and movement
 - Cyclical morphological changes in the endometrium
 - Measurement of endometrial thickness
 - (b) Ovaries
 - Size, position, shape and measurement
 - Cyclical morphological changes
 - Measurement of follicles and corpus luteum
 - Assessment of peritoneal fluid
- (2) Gynecological complications :
 - (a) Uterus
 - Fibroids

- Adenomyosis
- Endometrial hyperplasia
- Endometrial cancer
- Polyps
- Location of intrauterine contraceptive device
- (b) Tubes
 - Hydrosalpinx and other abnormalities of the fallopian tubes
- (c) Ovaries
 - Cysts; benign and malignant, morphological scoring systems
 - Endometriosis
 - Ovarian carcinoma
 - Differential diagnosis of pelvic masses;
- (3) Infertility :
 - (a) Monitoring of follicular development in spontaneous and stimulated cycles
 - Diagnosis of hyperstimulation syndrome
 - Diagnosis of polycystic ovaries
 - Sonosalpinography
- (4) Invasive procedures :
 - (a) Oocyte retrieval
 - (b) Injection of ovarian cysts
 - (c) Aspiration of ovarian cysts
 - (d) Drainage of pelvic abscesses
 - (e) Extraction of intrauterine contraceptive device;
- (5) Doppler in gynecology
 - (a) Infertility and oncology

□ **ORGANIZATION OF ULTRASOUND UNIT**

Infrastructure, documentation, quality control, computerization and data storage.

**Medicolegal Implications of Ultrasound Examination—
Ethics and Patient Information**

PRACTICAL TRAINING

Required skills

- (1) The trainee to be able to identify early pregnancy and emergency gynecological problems by transvaginal and transabdominal ultrasound.
 - (a) Early pregnancy
 - Fetal viability
 - Description of the gestational sac, embryo and yolk sac
 - Single and multiple gestation (chorionicity)
 - (b) Pathology
 - Early pregnancy failure
 - Ectopic pregnancy
 - Gross fetal abnormalities such as nuchal translucency, hydropic abnormalities
 - Hydatidiform mole
 - Associated pelvic tumors
 - (c) Gynecology
 - Normal pelvic anatomy
 - Uterine size and endometrial thickness
 - Measurement of ovaries

- Pelvic tumors e.g. fibroids, cysts, hydrosalpinx
- Peritoneal fluid
- Intrauterine contraceptive devices;

- (2) The trainee should be able to recognize the following normal fetal anatomical features from 18 weeks onwards by abdominal ultrasound.
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 - (e) Heart rate and rhythm, size and position, four-chamber view
 - (f) Size and morphology and of the lungs
 - (g) Shape of the thorax and abdomen
 - (h) Abdomen : Diaphragm, stomach, liver and umbilical vein, kidneys, abdominal wall and umbilicus
 - (i) Limbs : Femur, tibia and fibula, humerus, radius and ulna, feet and hands these to include shape, echogenicity and movement
 - (j) Multiple pregnancy : Monochorionic and dichorionic, twin to twin transfusion syndrome
 - (k) Amount of amniotic fluid
 - (l) Placental location
 - (m) Cord and number of vessels;
- (3) Fetal biometry :
- (a) Crown-rump length, biparietal diameter, femur length, head circumference, abdominal circumference, interpretation of growth charts;
- (4) Activity : recognize and quantify :
- (a) Fetal movement
 - (b) Breathing movements
 - (c) Eye movements.

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COURSE FEES

Training Fees Rs. 50,000/-

TO BE PAID TO I.C.O.G. (FOGSI) MUMBAI.

This course guidelines have been prepared by **Dr. Narendra Malhotra** for I.C.O.G. Certification Courses inputs from ISUOG / RCOG / AEC & IAN DONALD COURSES.

Contact for Details—

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