Society News

ISUOG Education Committee

Update on proposed minimum standards for ultrasound training for residents in Ob/Gyn

INTRODUCTION

We would expect the trainee to have a basic knowledge of the following areas: embryology, dysmorphology, genetics, the physiology and pathophysiology of pregnancy.

The theoretical training program would expect the candidate to understand the full range of diagnostic possibilities of ultrasound. The practical training requirements are to ensure the candidate develops sufficient skills to 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 do not have to accomplish in practice everything that is being taught in theory.

THEORETICAL TRAINING PROGRAM

The trainee to understand and be able to discuss the following:

Basic physical principles of medical ultrasound

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

(2) The effects 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, artefacts;
 (d) Data acquisition;
 (e) Signal processing (may be given in practical demonstration):
  - gray scale
  - time gain compensation
  - dynamic range
  - dynamic focus
  - digitization
  - 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) Image 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 tumors in early 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 18–20 weeks
 (a) shape of the skull: nuchal skinfold
 (b) facial profile
 (c) brain: cerebral ventricles, posterior fossa and cerebellum; cysterna 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
• gastrointestinal
• 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 arrhythymias;

(10) Knowledge of invasive diagnostic and therapeutic procedures
(a) Diagnostic: amniocentesis, chorionic villus sampling, cordocentesis
(b) Therapeutic: shunting and draining procedures.

Gynecology

(1) Normal pelvic anatomy
(a) Uterus
• uterine size, position, shape and measurement
• 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 devices
(b) Tubes
• hydrosalpinx and other abnormalities of the Fallopian tube
(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
• sonosalpingography;

(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, 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 recognize 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 dichorionic, 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
  (a) 30 cases on one A4 page with ultrasound picture – at least 15 anomalies should be included;

(3) Examination
  (a) General guidelines: the examination would be included as part of the normal Ob-Gyn training. The options are to have a multiple-choice paper or 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.