PRELIMINARY REPORTS

FETAL ULTRASOUND SCAN – PREROGATIVES FOR THE BASIC LEVEL

Aleksandra NOVAKOV MIKICI, Đorđe ILIĆI, Tihomir VEJNOVIĆI, Vesna KOPITOVIĆI, Aleksandra KAPAMADŽIJAI and Slobodan SEKULIĆ

Summary – Adequate level of prenatal ultrasound scan is a prerequisite for a successful definition of high risk population that needs further investigations. "Basic", standardized fetal mid-trimester scan, with an informative report enables not only diagnosis of anomaly but also evaluation of state of pregnancy in general. This paper was aimed at reviewing the benefits of and requirements for a complete basic mid-trimester fetal ultrasound scan and the necessary documentation. Potential directions for development of organization of basic mid-trimester fetal ultrasound scans are standardization of the scan, with establishing the number and the level of examination, and continual education of both the doctors and the patients. In order to standardize the exam, a uniform check list is needed, so that the examination should always be done in the same manner and at the same level, no matter where it is done and by whom. International and national guidelines should be agreed upon and they should state clear standards on who should do the scan, how, what kind of ultrasound machine should be used and what documentation should be kept. This paper presents a possible standardization of basic level mid trimester fetal ultrasound scan. A routine complete second trimester ultrasound between 18 and 22 weeks and a complete ultrasound report will provide the best opportunity to diagnose fetal anomalies and to help in the management of prenatal care. It will also reduce the unnecessary number of ultrasound examinations done during the second trimester for completion of fetal anatomy survey, which would decrease the costs.

Key words: Ultrasonography, Prenatal; Pregnancy Trimester, Second; Practice Guideline; Prenatal Diagnosis; Prenatal Care

Introduction

Contemporary obstetrics and gynecology require skilled, educated operators at least for the basic level of ultrasound scan [1]. Organization of ultrasound scans in the health care system can be realized at three levels – primary, secondary and tertiary one and presented as a pyramid, in which the base is the primary level at the bottom, and encompasses the majority of women, so it has to be appropriately organized. Since the majority of patients belong to the general population at low risk, the method is the same, but the dedicated time and level of details differ from the scans at the secondary and tertiary level. On the other hand, it is of utmost importance for the level of "basic" scan to be high, since this level is the one from which the suspected anomalies will be referred to a higher level and additional examination; therefore, the better the basic level of ultrasound scan of general population is, the better defined will be the group being referred to further consultation.

The call for the maximum rationalization of work load of an obstetrician aimed at rendering a greater number of high quality scans shows that it is necessary to perform them with efficiency, without lowering the level of standard. The "basic", standardized obstetric ultrasound examination in the second trimester accompanied by an adequate written report enables not only an easier diagnosis of fetal anomalies, but also the evaluation of pregnancy. Satisfactory organization of ultrasound scan in the second trimester also reduces the number of unnecessary examinations [2].

The most common indications for referring pregnant women to the higher level of health care are problems with pregnancy, fetal anomalies, first trimester screening for chromosomal anomalies and fetal echocardiography. If there is a problem in organizing scans, with inadequate indications both on the primary level and for referrals to the higher level of health care, there might be too many controls too often, which would lead to inadequate number of patients per doctor, with a consequence of lower quality of exam, as well as anxiety of patients. The total health care cost rises as well, due to the higher number of unnecessary scans, since the optimal number depends on the individual need of every patient.

Material and Methods

Possible directions of strategic organization of ultrasound scans at the primary health care should have the aim of:
(a) Establishing the optimal number of scans
(b) Establishing the level of the scan
(c) Standardization of the scan

Corresponding author: Prof. dr Aleksandra Novakov-Mikić, Klinika za ginekologiju i akušerstvo, 21000 Novi Sad, Branimira Ćosića 37, E-mail: aleksandranovakov@gmail.com
Antenatal care of a pregnant woman is a set of measures carried out during pregnancy in order to preserve health and prevent disease of the mother as well as to have a healthy newborn. This field has been regulated since 1997 by Methodological guidelines for the implementation of the Decree on Health Care of Women, Children, School Children and Students issued by the state government. In November 2005, a National guide for pregnancy monitoring in primary health care was issued, and it was based on current international protocols and medicolegal documents, as well as on the experience of experts who were its authors [3]. According to the National guide, three to four ultrasound scans are planned in a low risk pregnancy of general population – at the very beginning of the pregnancy, aimed at establishing the localization of the pregnancy, number of fetuses and their vitality, then between 11 and 14 weeks, around 20 weeks and 32 weeks of gestation [3]. Scan in the third trimester is controversial – according to the literature based on meta analysis, routine ultrasound examination in low risk population or non selected population has no benefit either to the mother or the fetus, and there is no sufficient evidence about potential psychological effects in this period, while the data on the short and long term influence on the outcome of pregnancy are scant. The evaluation of the placenta (“grading”) in the 3rd trimester may be of some significance, but further investigations are needed to confirm the reproducibility of the available results [4].

International Society of Ultrasound in Obstetrics and Gynecology (ISUOG) issued "Practice guidelines for performance of the routine mid-trimester fetal ultrasound scan", stating clinical standards and instructions on who should do the scans, how, at what kind of ultrasound equipment, as well how to keep and store data on the exam. Instructions for the primary health care centers include: (I) what should be seen during the exam; (II) what the reports should look like; (III) the level of the ultrasound equipment; (IV) required education for operators; (V) audit and control of the centre [5].

I What should be seen during the exam – presence or absence of heart beat, number of fetuses and their chorionicity, estimation of gestational age according to the date of the last period and ultrasonographic biometry (in gestational weeks and days), examination of fetal morphology according to the available check list, fetal biometry, appearance and localization of placenta, quantity of amniotic fluid, with optional possibility of measurement of cervical length [6,7].

II The report – the report given after the ultrasound examination should be standardized on the national, regional or institutional level. The report given to the patient should be on paper, specifying the name and signature of the person who conducted the examination and the date of examination. The second copy of the report is kept in the archives of the institution. Database should be stored in electronic form at regular intervals. If possible, pictures of basic fetal morphology should be made, with the patient’s name and date of the scan, and kept together with the report. If it is not possible, images of fetal morphology should be kept in electronic form. Examples of reports are shown in Figures 1 and 2.

III The equipment – ultrasound machine should be real time, grey scale, with transabdominal probe (3-5 MHz), with a possibility of freeze frame, electronic calipers, possibility of electronic image filing and regular equipment maintenance. The equipment should be regularly maintained and serviced at least once a year in accordance with manufacturers’ recommendations [8].

IV Education of the operator – educations of the medical professionals should be done both during specialization and after it, in the form of continual medical education and special accredited courses.

V Audit and control – it is necessary to organize external controls of the centers on the state level,
with the possibility of getting insight into detection rates, false positive and false negative results, which is not possible unless the pregnancy outcome is followed up. In order to achieve maximum optimization of service it is necessary to have a possibility of consultation with other centers as well as to organize the network of contacts so that patients could be referred for further examinations and consultations. Institutions which are engaged in prenatal ultrasound screening and diagnostics should organize continual control of results, with regular correlation of ultrasonographic diagnosis with clinical, radiological, laboratory, surgical and pathohistological results [8].

(c) Standardization of the exam

Check list – to standardize the examination, there should be uniform check list on national level, so that it will always be done according to the same plan, at the same level regardless of where or who performs the scan. In this way the patients are given the same level of services, and it is possible to compare the outcomes of scans. Check lists should stand in all scanning rooms as a reminder and become an integral part of education during residency, so that methodology of the scan is learned early in residency (Figure 3).

The recommended check list of the ISUOG includes examination of the head, face, neck, thorax, heart, skeleton, placenta and genitals. The examination of the head includes intact cranium, confirmation of cava septi pellucidi, falx cerebri, appearance of cerebral ventricles, cerebellum and cisterna magna. The examination of the face includes confirmation of existence of two orbits, intact upper lip and appearance of the profile. The examination of the neck includes absence of masses in this region (cystic hygroma, for example). The examination of thorax and heart includes confirmation of normal shape and size of thorax and lungs, existence of fetal heart beat, normal four chamber view, normal outflows of great vessels and non-existence of diaphragmatic hernia. The examination of abdomen includes confirmation of normal shape and size of thorax and lungs, existence of fetal heart beat, normal four chamber view, normal outflows of great vessels and non-existence of diaphragmatic hernia. The examination of skeleton includes confirmation of normal spine, on transverse and sagittal...
planes, existence of arms and hands, as well as legs and feet. Localization and position of placenta are noted, as well as the presence of three vessels in umbilical cord, and if the parents wish, the sex of the baby [5].

According to Novakov et al the check list in the period around 20 weeks of gestation should include: skull – oval shape, fully mineralized, brain – existence of midline echo, homogenous choroid plexuses that fill both ventricles, normal c. septum pellucidum, intact cerebellum, cisterna magna wider than 3.5 mm, lateral ventricles horns less than 10 mm, face – continual palate, normal shape of orbits adequately separated, lens present, existence of nasal bone, regular profile, normal ratio of forehead, nose and chin, continuity of the lips, normal appearance of nostrils, tongue within the mouth, neck - normal position, continuity of skin, thorax - regular shape, normal orientation of the heart, lungs of homogenous appearance that fill the thorax, heart – continuous ventricular septum, axis of 45-60 degrees, oriented to the left, apex of the heart at the same side with the stomach, right ventricle closer to the anterior thoracic wall, occupying 1/3 of thorax, atria and chambers of the similar size, gastro-intestinal tract – appearance and echogenicity of the intestines, normal size of the stomach, which is on the left, homogenous liver, urogenital tract – bilateral existence of the normal echogenous kidneys, antero-posterior diameter of pelvis up to 5 mm, normal appearance of the bladder, abdomen – continuity of anterior abdominal wall, normal insertion of umbilical cord, spine - confirmed continuity in all three plains, legs – position of both feet, relation of all long bones, normal appearance of foot prints, hands – both hands, five fingers, normal relation of all long bones, placenta and umbilical cord [9,10].

“Extended” ultrasound examination
“Extended” ultrasound examinations are usually detailed examinations of fetal heart and brain – fetal echocardiography and fetal neurosonogram [11,12]. These examinations are performed at the tertiary level institutions and require adequate education and experience of the operators, with multidisciplinary approach of different specialties – pediatric cardiologists, cardio-surgeons, geneticist, neurosurgeons, neurologists, radiologists, etc.

(d) Education of operators
Ultrasound has promoted the field of obstetrics and gynecology more than any other technique and it is necessary for the medical professionals to keep up with the developments. It is mandatory to provide adequate education not only during specialization of obstetrics and gynecology but also on national, regional and institutional level, to organize educational seminars, courses and other forms of education aimed at maintaining and raising the level of knowledge. Besides classical text books and atlases, there are also specialized, reviewed internet sites, such as the site of Fetal Medicine Foundation (www.fetalmedicine.com), www.thefetus.net, International Society of Ultrasound in Obstetrics and Gynecology (www.ISUOG.org), Ian Donald International school for ultrason in gynecology and obstetrics (www.iandonaldschool.org), etc.

(e) Education of patients
Education of general population has an important role in raising the level of awareness of the necessity of adequate controls and in obtaining knowledge about the symptoms that should be reported to the physician. However, since many women do not have enough information on what the possibilities and restrictions of ultrasound scans are, they should be informed about them, and unless they know them, they will not be prepared to a possibility of adverse outcome of the scan, such as diagnosis of an anomaly [13-15]. In order to achieve realistic expectations of a routine ultrasound examination, pregnant women should get the information prior to the scan from the physician and other available sources such as educational hand outs, posters, etc.

Conclusion
Organization of prenatal ultrasound scans at the primary health care – determination of the level and number of examinations, standardization of examination, education and training of medical professionals and patients would result in higher and equal quality of health care in general and reduced costs of health system.

References
Sažetak

Odgovarajući nivo prenatalnog ultrazvučnog pregleda je preduslov za adekvatno definisanje populacije sa visokim rizikom, odnosne populacije kod koje su potrebna dodatna ispitivanja. Basnički, standardizovan akušerski ultrazvučni pregled u II trimestru, uz odgovarajući izveštaj daje mogućnost ne samo za dijagnostiku anomalija ploda, nego i za procenu stanja trudnoće u celini. Mogući pravci strateške organizacije bazičnih ultrazvučnih pregleda treba da se razvijaju ka standardizaciji pregleda, sa utvrđivanju normi broja i nivoa, te edukaciji lekara i pacijenata. Radi standardizacije pregleda, na nacionalnom nivou trebna je uniformna lista provere, tako da se, bez obzira gde se vrši i ko vrši pregled, on uvek radi prema istom planu, nivou i sa istim sadržajem. U radu je prikazan plan standardizacije ultrazvučnog pregleda i izveštaja u II trimestru trudnoće.

Ključne reči: Prenatalna ultrasonografija; Trudnoća, drugi trimestar; Preporuke; Prenatalna dijagnoza; Prenatalna zaštita

Rad je primljen 12. IV 2011.
Prihvaćen za štampu 18. IV 2011.