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The Course of Pregnancy and Delivery After Genetic Amniocentesis

Przebieg ciąży i porodu po amniopunkcji genetycznej

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Abstract

Background. Amniocentesis allows sampling the amniotic fluid to perform fetal karyotyping, tests for monogenic disorders, metabolic errors, and assessing AFP and ACHE levels.
Objectives. Comparison of the pregnancy course and delivery as well as the condition of the newborns in patients who did and did not undergo amniocentesis during pregnancy.
Material and Methods. The authors analyzed the indications for amniocentesis, results of ultrasound examinations performed at the time of the procedure, and medical records concerning the pregnancies after the procedure of all of the 721 patients who underwent amniocentesis at the Department of Obstetrics in 1996–2003. The control group consisted of 101 pregnancies in women above 35 years of age in whom amniocentesis was not performed.
Results. Mean duration of pregnancy in patients after amniocentesis was 37.6 ± 2.4 weeks. Fetal loss occurred in 6 pregnancies (0.8%) after amniocentesis and in 3 (1.9%) in control group. The mean weight of a newborn in the study group was 3424.4 ± 621 g, and in the control group 3432.2 ± 597 g. The frequency of congenital malformations and neonatal morbidity in the first weeks of life was higher in the study group. In the first 3 weeks after amniocentesis, lower-abdominal pain (7.2%), spotting (0.3%), bleeding (1.5%), and leakage of amniotic fluid (2.4%) were observed. In the control group, lower-abdominal pain occurred in 2 cases (2.6%), and spotting in 2.6%, while leakage of amniotic fluid and bleeding did not occur.
Conclusions. Conducted analysis confirmed that fetal loss rate after amniocentesis is no higher than 1%, whereas the population risk of spontaneous abortion in women over 35 is 1.5–6.1%. The mean duration of pregnancy was significantly shorter in patients who had amniocenteses than in the control group. Cesarean section was performed more often in patients who had had amniocenteses. Lower-abdominal pain, spotting, bleeding, and leakage of amniotic fluid could be observed after amniocentesis and appeared more frequently than in the control group. Congenital malformations and early morbidity in neonates were more often observed in the group that underwent amniocentesis (**Adv Clin Exp Med 2006, 15, 481–484**).

Key words: amniocentesis, fetal loss, complications.

Streszczenie

Wprowadzenie. Do diagnostyki prenatalnej należą inwazyjne i nieinwazyjne metody.
Cel pracy. Ocena przebiegu ciąży i porodu u pacjentek po amniopunkcji genetycznej.
Materiał i metody. Zanalizowano wskazania, wyniki USG wykonanych w czasie amniopunkcji oraz historie obserwacji bezpośrednio po zabiegu u ciężarnych, u których wykonano amniopunkcję w Klinice Położnictwa w latach 1996–2002. Kontrolną grupą były ciężarne po 35. r.ż., które nie zdecydowały się na wykonanie amniopunkcji.
Wyniki. U 6 pacjentek (0,8%) nastąpiło poronienie po amniopunkcji, a w grupie kontrolnej u 3 ciężarnych (1,9%). W grupie pacjentek po amniopunkcji poród następował w 37,6 ± 2,4 tygodnia ciąży, a w grupie kontrolnej w 39,1 ± ± 2,3, co różni się istotne statystycznie. W grupie badanej w 223 przypadkach (66,6%) odbył się poród fizjologiczny, w 108 (32,2%) – cięcie cesarskie, poród kleszczowy – w 4 przypadkach (1,2%), a w grupie kontrolnej – w 59 przypadkach (76,62%) poród fizjologiczny, w 17 (22,1%) – cięcie cesarskie, w jednym – kleszczowy (1,3%). W grupie badanej średnia masa dziecka wynosiła 3424,4 ± 621 g, a w grupie kontrolnej 3432,2 ± 597 g. U pacjentek po amniopunkcji stwierdzono wadę wrodzoną dziecka w 18 przypadkach (5,4%), w tym jednorazowo stopę końsko-szpotawą u dziecka pacjentki po amniopunkcji późnej, a w grupie kontrolnej u jednego dziecka (1,2%).

Wnioski. Badania potwierdziły, że ryzyko poronienia po amniopunkcji nie przekracza 1%, podczas gdy ryzyko populacyjne poronienia samoistnego u kobiet powyżej 35. r.ż. wynosi 1,5–6,1%. Czas trwania ciąży w grupie badanej jest statystycznie krótszy niż w grupie kontrolnej. U pacjentek po amniopunkcji częściej występowały dolegliwości (bóle podbrzusza, plamienie, krwawienie, odpływanie płynu owodniowego) do trzech tygodni po wykonanym zabiegu niż u pacjentek z grupy kontrolnej w tym samym czasie. Dzieci pacjentek po amniopunkcji częściej rodziły się z wadą wrodzoną i chorowały w pierwszych tygodniach życia (m.in. na zapalenie płuc) niż dzieci pacjentek z grupy kontrolnej (**Adv Clin Exp Med 2006, 15, 3, 481–484**).

Słowa kluczowe: amniopunkcja, poronienie, powikłania.

There is a wide range of invasive and noninvasive procedures for the prenatal diagnosis of fetal disorders. Invasive methods are offered to high-risk patients to obtain fetal cells and/or amniotic fluid for genetic and biochemical tests. Invasive prenatal diagnosis continues to be the gold standard for pregnancies at increased risk of chromosomal aneuploidy or other genetic disease [1, 2]. Amniocentesis is a method of obtaining a sample of the amniotic fluid and is done transabdominally under the guidance of ultrasound. As the amniotic fluid contains cells from the embryo, mostly shed from the skin, cell cultures enable karyotyping and the prenatal diagnosis of chromosomal abnormalities. Monogenic diseases can be diagnosed using FISH as well. Metabolic disorders and malformations such as neural tube defects can also be diagnosed prenatally after biochemical study of the fluid or cell cultures [3]. The procedure is performed transabdominally between the 12th and 20th week of gestation. The most serious complication is miscarriage, but this happens in only 0.3–1% of cases.

The aim of the study was to compare the courses of pregnancy, and delivery and the condition of the newborns in patients who did or did not undergo amniocentesis during their pregnancies.

Material and Methods

The authors analyzed indications for amniocentesis, the results of ultrasound examinations performed at the time of the procedure, and the medical records concerning the pregnancies after the procedure of all of the 721 patients who underwent amniocentesis at the Department of Obstetrics of the Medical University of Gdańsk between 1996–2002. In addition, 611 questionnaires on the course of the pregnancy, and delivery and the newborn's condition were sent to the patients who had had amniocentesis and who gave birth until Dec. 2002. The authors obtained answers in 335 cases (55%). The control group consisted of 101 pregnancies in women above 35 years of age in whom amniocentesis was not performed. The t-Student and χ^2 tests were used for statistical analysis, with a significance level of $p = 0.05$.

Results

Amniocentesis was performed due to advanced maternal age in 553 cases (76.7%), congenital malformations in previous pregnancies in 80 cases (11.1%), fetal malformation in current pregnancy in 39 cases (5.4%), psychological reasons in 15 cases (2.1%), abnormal results of the triple marker test in 11 cases (1.5%) cases, serious obstetric history in 9 cases (1.3%), inherited diseases in the family in 8 cases (1.1%), and maternal balanced translocation in 6 cases (0.8%). Transplacental amniocentesis was performed in 219 patients (32.6%) and nontransplacental puncture in 445 (66.3%). Clear fluid was obtained in 660 cases (98.4%). In 667 cases (99.4%), one needle insertion was performed. Complications during amniocentesis and immediately after the procedure were observed in 1 case (0.1%) only. There were 412 (57.1%) early and 293 (40.6%) late amniocenteses performed. Patients who had early amniocentesis more frequently reported lower-abdominal pain (8.4% *vs.* 5.2%), spotting (0.5% *vs.* 0%), bleeding (1.6% *vs.* 1.5%), and leakage of amniotic fluid (3.7% *vs.* 1.5%). Morbidity in newborns was also higher in patients who had an early amniocentesis than those who had a late one (22.6% *vs.* 14.1%).

Fetal loss occurred in 6 pregnancies (0.8%) after amniocentesis (from the 13th to 22nd week of gestation) and in the control group in 3 pregnancies (1.9%) (from 13th to 15th week). In four (0.6%) women the pregnancy was terminated after amniocentesis was performed. The mean duration of pregnancy in patients who had amniocentesis was 37.6 ± 2.4 weeks (range: 25–43 weeks), significantly shorter than in the control group (39.1 ± 2.3, range: 30–42 weeks). In patients, who had an amniocentesis, spontaneous vaginal delivery took place in 223 cases (66.6%), cesarean section was performed in 108 (32.2%), and forceps delivery in 4 (1.2%), and in the control group spontaneous vaginal delivery occurred in 59 cases (76.62%), cesarean section in 17 (22.1%), and forceps delivery in 1 case (1.3%). The mean weight of the newborns in the study group was 3424.4 ± 621 g (range: 340–4950 g), and in the control group 3432.2 ± 597 g (range: 1440–4955). The frequency of congenital malformations and neonatal mor-

bidity in the first week of life was higher in the study group than in controls (5.4% and 16.6% *vs.* 1.2% and 7.8%, respectively).

In the first three weeks after amniocentesis, lower-abdominal pain (24 patients, 7.2%), spotting (1, 0.3%), bleeding (5, 1.5%), and leakage of amniotic fluid (8, 2.4%) were observed. In the control group between the 12th and 16th weeks of gestation, lower-abdominal pain occurred in 2 cases (2.6%), and spotting in 2 (2.6%), while leakage of amniotic fluid and bleeding did not occur.

Twenty-two women (6.6%) of the group who had amniocentesis and 10 patients (13%) of the control group were admitted to the hospital during pregnancy.

Discussion

Amniocentesis is carried out in the first or in the early second trimester of pregnancy to determine fetal karyotype, monogenic disorders, metabolic errors, and the levels of alpha-fetoprotein and acetylocholinesterase [3–7]. Alpha-fetoprotein is a protein whose increased level in the amniotic fluid indicates neural tube defects (e.g. spina bifida), open abdominal wall defects (e.g. gastroschisis), clef lip, fetal death, and some other abnormalities. A high level of acetylocholinesterase has a very similar meaning. The most common indications for karyotyping in the first or second trimester are advanced maternal age (over 35 years), inherited metabolic or monogenic diseases (e.g. Duchenne's muscular dystrophy), chromosomal aberrations, neural tube defects or open abdominal wall defects in previous pregnancies, and a positive screening test [2, 4, 5].

The procedure is performed transabdominally between the 15th and the 17th (12th and 20th) week of gestation. About 15 ml of amniotic fluid is necessary to make all the tests. Complications after the procedure are very seldom and occur in 0.5–1% of cases. Miscarriage is the most serious one, but it happens only in 0.3–0.8% of cases [1, 8–10]. There is minimal risk to the mother. The risk of amnionitis is less than 0.1% for all procedures [10]. Immediate complications of amniocentesis occurred in approximately 2% of procedures: vaginal bleeding in 0.2–2% of procedures, amniotic fluid leakage in 1–2%, and abdominal pain in 0.4–1%. Amniocentesis does not affect the preterm birth rate or the stillbirth or perinatal mortality rates [6, 10].

Amniocentesis is the most frequently performed invasive prenatal diagnostic procedure in authors' department as it is safer than chorionic villous sampling, which is performed only in selected cases [2]. Amniocentesis has traditionally been performed for prenatal genetic diagnosis at around the 15th to 16th gestational week [2, 7, 9, 11]. Discussion about adverse events of early and late amniocentesis continues [2, 4, 8, 12]. The authors have determined that the most convenient time for the procedure is the 14th week of pregnancy: late enough to lower the complication rate and early enough to decide about the further management of the pregnancy.

Amniocentesis has been performed for prenatal diagnosis for the last 40 years. However, very few randomized controlled trials have evaluated the risks of the procedure, or assessed the optimal technique. Such studies are difficult, as they require a very large number of patients. Amniocentesis is a highly accurate and safe procedure that does not significantly increase the risk of fetal loss or injury.

The analysis confirmed that the fetal loss rate after amniocenteses is no higher than 1%, whereas the population risk of spontaneous abortion in women over 35 is 1.5–6.1%. The mean duration of pregnancy was significantly shorter in patients who had amniocenteses than in the control group. Cesarean section was performed more often in patients who had had amniocenteses. Lower-abdominal pain, spotting, bleeding, and leakage of amniotic fluid could be observed after amniocenteses and appeared more frequently than in control group. Congenital malformations and early morbidity in neonates were more often observed in the group that underwent amniocentesis.

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