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Amniocentesis results and retrospective analysis performed in the university clinic

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Abstract

Objective: The aim of this study is to evaluate retrospectively the indications, karyotype results and complications of amniocentesis that we performed in our clinic.

Methods: Between January 2011 and January 2013 at the Department of Obstetrics and Gynecology Clinic of Kahramanmaraş Sütçü İmam University, 561 patients were analyzed retrospectively who applied amniocentesis procedure for high risk in double (1/300 and above) and triple test (1/270 and above), increased nuchal translucency (≥2.5 mm), history of child with Down syndrome, history of baby anomalies, abnormal ultrasound findings (cystic hygroma, choroid plexus cyst, diaphragmatic hernia etc.).

Results: Amniocentesis was performed in 561 patients in our clinic during 2011 and 2012. The most common indication was a high risk at triple test with 65.5%. As a result of amniocentesis, it was found that 34 patients (6.06%) had abnormal karyotypes. Abnormal karyotype was found in 18 of 368 patients (4.89%) with high risk at triple test, in one of 32 patients (3.1%) with advanced maternal age, in 4 of 63 patients (6.34%) with high risk at double test, in 9 of 80 patients (11.25%) with abnormal ultrasound findings, and 2 of 5 patients (40%) with hydrops fetalis.

Conclusion: Although it may lead to serious complications including fetal loss, amniocentesis is the most commonly and easily performed, and reliable invasive test for prenatal diagnosis of genetic disease.

Key words: Amniocentesis,indications, chromosomal abnormalities.

Üniversite kliniğinde uygulanan amniyosentez sonuçları ve retrospektif analizi

Amaç: Çalışmanın amacı kliniğimizde yapılmış olan amniyosentezlerin endikasyonlarını, komplikasyonlarını ve karyotip sonuçlarını retrospektif olarak değerlendirmektir.

Yöntem: Ocak 2011 ile Ocak 2013 tarihleri arasında Kahramanmaraş Sütçü İmam Üniversitesi Kadın Hastalıkları ve Doğum kliniğinde; ikili testte yüksek risk (1/300 ve üzerinde), üçlü testte yüksek risk (1/270 ve üzerinde), artmış ense kalınlığı, Down sendromlu bebek öyküsü, anomalili bebek öyküsü ve anormal ultrasonografi bulguları (kistik higroma, koroid pleksus kisti, diyafragma hernisi vb.) olması nedeniyle amniyosentez uygulanan 561 hasta retrospektif olarak incelendi.

Bulgular: Kliniğimizde yapılan 561 amniyosentezde en sık saptanan endikasyon %65.5 ile üçlü testte yüksek risk olan hastalardı. Amniyosentez sonuçlarında 34 (%6.06) hastada anormal karyotip saptandı. Üçlü test riski yüksek olan 368 hastanın 18'inde (%4.89), ileri anne yaşı nedeniyle amniyosentez yapılan grupta 32 hastadan 1'inde (%3.1), ikili testte yüksek riske sahip olan 63 hastadan 4 tanesinde (%6.34), anormal ultrasonografi bulguları saptanan 80 hastanın 9'unda (%11.25) ve hidrops fetalis saptanan 5 hastanın 2'sinde (%40) anormal karyotip saptandı.

Sonuç: Amniyosentez; fetal kayıp gibi ciddi komplikasyonları olmasına rağmen, prenatal tanıda ve genetik hastalıkların tanısında oldukça sık ve kolay uygulanabilen güvenilir bir invaziv yöntemdir.

Anahtar sözcükler: Amniosentez, endikasyon, kromozom anomalisi.

Introduction

Nowadays, it has become possible to diagnose many fetal chromosomal abnormalities with the help of common use of screening tests for prenatal diagnosis such as first trimester screening tests (nuchal translucency, free beta-hCG, PAPP-A) and second trimester screening tests (triple and quadruple screening tests) as a result of the rapid developments observed in biochem-

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ical and cytogenetic methods and in ultrasonography technology.[1] One of the main objectives of today's modern maternal and fetal medical science comprises the diagnosis of genetic abnormalities in prenatal period and the necessary measures taken in accordance with the types of pathologies.[2] For this purpose, amniocentesis is a common diagnosis method. Amniocentesis for genetic purposes was blindly administered through vaginal route in the past; transabdominal route started to be used in 1960s. It started to be applied under the guidance of static ultrasonography (USG) in 1980s.[3]

Classical amniocentesis is generally applied between 16-20 weeks of gestation. In this period, the transition ratio of living cells to non-living cells in amniotic fluid is higher than the ratio in late pregnancy weeks (>20th week of gestation).[4] Multicenter studies carried out so far have shown the reliability of amniocentesis for mother and fetus.[5-7]

Amniocentesis procedure has various indications such as over 35 years of maternal age, habitual abortus, history of abortus or delivery where chromosome pathologies were observed, abnormal karyotype in couples, history of infant delivery with multiple major malformation whose karyotype determination was not performed beforehand, high risk in triple test, high risk in NT test conducted in 11-14th weeks, findings which make the physicians think of the possibility of aneuploid in ultrasound analysis and anxiety.[8]

Even though amniocentesis is a reliable diagnosis method, it causes certain complications. These complications are inversely proportional to the experience of the person who applies the method.[9] Amniotic fluid leak, vaginal bleeding, uterine contractions, chorioamnionitis, sampling failure, fetal loss and possible fetal injuries are among the complications of amniocentesis. Fetal loss rate in amniocentesis is 0.5% or less.[10] In our study, we would like to share the indications and results of the amniocentesis cases which were applied to high risk pregnants during 2011 and 2012 in our clinic.

Method

We retrospectively analyzed 561 cases with some indications such as high risk in triple test (>1/270), high risk in double test (>1/300), NT thickness (≥2.5 mm), history of children with Down syndrome, history of abnormal baby, abnormality in ultrasonography (cystic hygroma, omphalocele, diaphragmatic hernia, etc.) and to which amniocentesis was applied from January 2011 to January 2013 in the Department of Obstetrics and Gynecology, Kahramanmaraş Sütçü İmam University. The families were informed about the amniocentesis procedure, the role of this method in diagnosis and also its complications before the application. Written informed consent forms were filled by the families who accepted the process.

After that, the materials which would be used in amniocentesis were prepared to be sterile and were placed on a sterile cover. Ultrasonography was administered to all patients before the amniocentesis and their placenta localizations were determined. Amniocentesis was performed by using free-hand technique together with Aloka 4000 Prosound model 3.5 MHz transabdominal probe with colored Doppler ultrasonography through amniotic pocket that is far from placenta and which does not contain the fetal parts and where the cord is not situated after the abdomen was cleaned with providone-iodine. 1-2 ml amniotic fluid which was taken in the first place was discarded in order to prevent maternal contamination. Then 15-20 ml amniotic fluid was taken from all of the patients. If the fluid was light colored and clean, it was put into an empty tube; if it was bloody or blurry, it was placed into a tube with media and the tubes were sent to the laboratory as it would be delivered within 24 hours. After the application, anti-D immune globulin was administered to the patients having Rh incompatibility. The patients took a rest in bed for 30 minutes subsequent to the application and they were asked to come to hospital for the controls for the following week and following month.

The cases were retrospectively analyzed in terms of amniocentesis indications and results.

Results

Amniocentesis was applied to 561 patients in our clinic in 2011 and 2012. The mean age of the patients was 31.5 (range: 17-48) years. The indications and rates of amniocentesis application to the patients were shown in the **Table 1.** The patients who had high risk in triple test constituted the most frequent indication with a rate of 65.5% within the patient groups.

Abnormal karyotype was detected in the results of the amniocentesis applied to total 34 (6.06%) patients. Abnormal karyotype rate was 4.89% in the patient group with high risk in triple test, 11.25% in the

Table 1. Indications and rates of amniocentesis.

Indication	n	(%)
High risk at triple test	368	65.59
High risk at double test	63	11.22
Abnormal ultrasound findings	80	14.26
History of child with Down syndrome and baby anomalies	7	1.24
Advanced maternal age	32	5.70
Hydrops fetalis	5	0.89
Severe IUGR, prenatal infection	3	0.53
Elective	3	0.53
Total	561	100

IUGR: intrauterine growth restriction

patients with abnormalities founded in ultrasonography, 6.34% in those with high risk in double test, 40% in those with hydrops fetalis and 3.1% in the patients to whom amniocentesis was administered because of age risk (**Table 2**).

Gestational week, maternal age, amniocentesis indication and karyotype results of the 34 patients who had abnormal karyotype are presented in **Table 3.** Trisomy 21 (Down syndrome) became the most commonly seen abnormal karyotype with a rate of 47% in this patient group. Trisomy 18 was 8.8% while Turner syndrome was 5.8%. Palliester-Killian syndrome was found in a patient whereas 47,XXX (triple X syndrome - trisomy X) was seen in another.

Discussion

Amniocentesis is the most commonly used and very reliable prenatal diagnosis method. Today, amniocentesis process is advised for the families with high risks detected in the fetal screening tests conducted in first and second trimesters in order to alleviate their anxiety. As it is known, the conditions such as advanced maternal age, parental balanced translocation, history of children with chromosomal abnormality, detection of fetal abnormality in USG, high risk in double-triple tests are the indications of amniocentesis.[11] Sjogren et al. specified that advanced maternal age was the most common reason for application with a case rate of 57% in the amniocentesis they applied.[12] Also, the advanced maternal age is known to be most common reason of intervention in various amniocentesis series published in our country.[13] On the other hand, Tongsong et al. stated that the percentage of indication in the amniocentesis they carried out was 86.3% for advanced maternal age, 5% chromosomal abnormality in the former child, 3.1% for chromosomal abnormality in spouse and family and 0.6% for ultrasonographic pathology.[14] In this study, we found that high risk in triple test (65.5%) was the most common amniocentesis indication. Of the patients taken part in our study, the maternal age of 228 (40.6%) was over 35 years. When the interventional treatment is applied for the purpose of prenatal diagnosis to the pregnant who is over 35 years, 25-40% of the cases with Down syndrome can be diagnosed.[15] Singh et al. determined the percentage of sensitivity of triple screening test, carried out in the second trimester, for Down syndrome in the cases of advanced maternal age as 92.3% with 0.8% margin of error.[16] Yuce et al. stated that chromosomal abnormality rate was 3.7% in the amniocentesis which they applied because of high risk in triple test in their own series while Wenstrom et al. gave this rate as 2.9% in the series of 516 cases. Bal et al. specified this rate as 3.9%.[12,17-20]

The probability of chromosomal abnormality in amniocentesis highly increases in the existence of fetal abnormality. Chromosomal abnormality rate in the amniocentesis applied after the determination of fetal

Table 2. Results of amniocentesis and indications for patients with abnormal karyotypes.

Indication	Abnormal karyotype	n	(%)
Advanced maternal age	1	32	3.1
High risk at triple test	18	368	4.89
High risk at double test	4	63	6.34
Abnormal ultrasound findings	9	80	11.25
Hydrops fetalis	2	5	40
Total	34	561	6.06

Table 3. Gestational week, maternal age, amniocentesis indication and karyotyping results of patients who were found to have abnormal karyotypes.

No	Gestational week (week+day)	Maternal age	Indication	Abnormal karyotype
1	17+6	18	High risk at triple test	46, inv (9)(p11q13)
2	18+4	31	High risk at triple test	46, t (5:9)(q13:q24)
3	17+6	32	High risk at triple test	Trisomy 21
4	20+3	40	High risk at triple test	Trisomy 21
5	17+0	35	Cystic hygroma	Trisomy 21
6	18+6	26	Hydrops, cystic hygroma	46, inv(9)(p11q13)
7	16+5	38	Cystic hygroma	Trisomy 21
8	17+0	39	High risk at triple test	Trisomy 21
9	20+0	23	High risk at triple test	Trisomy 21
10	18+6	28	High risk at triple test, pleural effusion	Trisomy 21
11	17+3	21	High risk at triple test	Trisomy 21
12	16+4	29	High risk at double test	Trisomy 18
13	17+2	43	High risk at double test	47,XXX
14	18+0	35	Bilateral pes equinavarus	Trisomy 18
15	17+4	38	High risk at triple test	Trisomy 21
16	15+0	43	Non-immune hydrops fetalis	Trisomy 21
17	18+5	44	High risk at triple test	Trisomy 21
18	16+6	38	High risk at triple test	Trisomy 21
19	19+6	31	Ventricular septal defect, choroid plexus cyst	Trisomy 18
20	16+6	28	High risk at triple test	46,+15
21	16+2	17	Cystic hygroma	45, X, Turner
22	16+4	21	High risk at triple test	46,13pss
23	17+3	42	High risk at double test	Trisomy 21
24	18+3	27	High risk at triple test	47,+mar
25	19+5	33	High risk at triple test	Trisomy 21
26	21+6	39	High risk at triple test	47,+mar
27	18+4	37	Advanced maternal age	46,21cenh+
28	22+4	36	Diaphragmatic hernia, ventriculomegaly	47,+i(12)(P10)
29	17+4	36	High risk at triple test	46,inv(9)(p11q13)
30	22+0	38	Complete atrioventricular defect	Trisomy 21
31	18+0	25	High risk at triple test	46,inv(9)(p11q13)
32	18+4	35	High risk at double test	46,inv(12)(p11 2q15)
33	15+4	34	Hydrops fetalis	45, X, Turner
34	20+3	41	High risk at triple test	Trisomy 21

abnormality in ultrasonography ranges between 4% and 27%.[21-23] Rizzo et al. found out the rate of chromosomal abnormality as 16.8% in the fetuses having abnormality observed in USG[19] whereas this rate was 27.1% in the study of Dallaire et al.[20] In our study, amniocentesis was applied to 80 mothers (14.3%) in consequence of abnormality findings specified in USG analysis. It was found that 9 (11.25%) of those patients had chromosomal abnormality.

It has been stated in certain studies that frequency of complication related to the operation increases when transplacental amniocentesis is applied.[24] Some

reports indicate that the rate of complication, which may occur subsequent to amniocentesis, increases because of making needle insertion more than once.[25] The rate of fetal loss related to amniocentesis ranges between 0.05% and 1% in the hands of experienced physicians. According to Eddleman et al., the fetal loss rate was 0.15% in the series of 1605 cases.[23] Armstrong et al. gave this rate as 0.2% in the series of 28,163 cases.[26] In the series carried out in our country, fetal loss rate in amniocentesis ranges between 0.6% and 3.3%.[27,28] In a study conducted in our country, Sener et al. expressed that amnionitis leak may be observed in a rate of 0.1% while this leakage rate may be 1-2% for amniotic fluid subsequent to amniocentesis.[29] Possible complications on mothers may be seen less often in amniocentesis. These complications are perforation in visceral organs, amniotic fluid embolization and Rh sensitization.[30] Rh isoimmunisation risk rate has been determined as 1.4-3.4% subsequent to amniocentesis in certain studies.[31] In normal pregnancies, immunization rate is 1.1-2.2%; such increase of risk was not observed in some studies.[32] Non-reproduction rate in the culture is found as 0.6-1% subsequent to amniocentesis carried out between 15-20th weeks in the literature.[33] We found this rate as 2.1% in our study.

Conclusion

As a result, although it might lead to serious complications including fetal loss, amniocentesis is the most commonly and easily performed, and reliable invasive test for prenatal diagnosis of genetic disease. Genetic amniocentesis has a high success rate when performed by experienced physician in 15-20 weeks of gestation. It should be offered to patients when the patient has a correct indication.

Conflicts of Interest: No conflicts declared.

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