Amniocentesis Results in 7 Years Period in Our Clinic

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Abstract

Objective: Retrospective evaluation of genetic amniocenteses performed in our clinic between 1998-2005.

Methods: Retrospective assessment of the records of amniocentesis in Perinatology Department.

Results: Most frequent indications were high risk at triple test (38.4%), maternal age over 35 (32.0%), and fetal abnormality at ultrasonography (7.3%) in a total of 894 cases. Normal chromosomal constitution observed in 854 (95.5%) cases, chromosomal aberration in 21 (2.3%) cases, and culture failure in 19 (2.1%) cases. Most frequent chromosomal abnormality detected was Trisomy 21. Karyotype aberration rate was higher in the babies of the mothers with poor obstetrics history (6.6%), fetal abnormality detected in current ultrasonographic examination (6.2%), and previous chromosomally abnormal infant (3.2%). The fetal loss rate was 1/127.

Conclusion: Amniocentesis is a frequently performed second trimester procedure. Patients should be followed-up for maternal and fetal complications.

Keywords: Amniocentesis, prenatal diagnosis, genetic screening.

Kliniğimizde 7 yıllık amniosentez sonuçları

Amaç: Kliniğimizde 1998-2005 yılları arasına yapılmış olan genetik amniosentez olgularının retrospektif değerlendirilmesi.

Yöntem: Perinatoloji Bilim Dalı amniosentez kayıtlarının retrospektif olarak taranması.

Bulgular: Kayıtlarına ulaşılan 894 olguda en sık endikasyonlar; üçlü testte yüksek risk (%38.4), maternal yaşın 35'in üzerinde olması (%32.0), ultrasonografide fetal anomali (%7.3) görülmesidir. Sekizyüz ellidört (% 95.5) olguda normal kromozomal yapı, 21 (%2.3) olguda kromozomal anomali, 19 (%2.1) olguda kültür başarısızlığı tesbit edildi. En sık Trizomi 21 olgusu saptandı. En yüksek karyotip anomalisi oranı kötü obstetrik öyküsü olan (%6.6), ultrasonografide fetal anomali saptanmış olan (%6.2) ve kromozomal anomalili çocuk doğurma öyküsü olan (%3.2) gebelerde görüldü. Fetal kayıp hızı 1/127 olarak hesaplandı.

Sonuç: Amniosentez ikinci trimesterde sık uygulanan bir test olup girişim sonrasında maternal ve fetal komplikasyonlar açısından yakın izlem gereklidir.

Anahtar Sözcükler: Amniosentez, prenatal tanı, genetik tarama.

Introduction

Amniocentesis is a method of getting amniotic fluid from uterus during gestation. Amniocentesis which is known as the oldest prenatal diagnoses method was first begun to use in polyhydroamnios cases as medical treatments in 1881 and today it is still used increasingly.[1] Steele and Breg accomplished cell culture and karyotyping in amniotic fluid in 1966; by this way, a wider application area emerged for prenatal diagnosis of genetic disorders.[2] In particular, frequent utilization of bilateral and triple screening test, experienced gained during ultrasonographic examination in terms of the determination of chromosomal anomalies and additionally increase of maternal age over time ca-

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used an augmentation in cases which were applied amniocentesis for prenatal diagnosis purpose.

Most of amniocenteses are for prenatal genetic diagnosis purposes. Also, spectrophotometric examination of amniotic fluid in Rh iso-immunization for determining fetal situation provides bilirubin to be indirectly measured which appears fetal hemolysis. Moreover, it is possible find intra-amniotic infection without any clinical indicator and to determine effective agent by amniocentesis. It is possible to find lecithin/sphingomyelin rate in amniotic fluid for the determination of fetal lung maturation, to measure phosphatidyl glycerol level, to perform shake or tap test and to determine the quantity of lamellar bodies. Amniocentesis is also used for fetal medical treatment purposes such as decompression in polyhydroamnios, amnioinfusion in oligohydroamnios and reduction in multigestations.[3]

Amniocentesis for genetic diagnosis is applied frequently in between 16th and 18th gestational weeks. Even though early amniocentesis was being used for a while, it is not popular today due to high complication rates.

While it is a safer diagnosis method in experienced hands, it has fetal loss risk between approximately 1/100 – 1/200. Failure rate in culture is 1% in second trimester in developed laboratories.[4]

Results of amniocentesis attempts applied for genetic diagnosis purposes in our clinic in between January 1998 and November 2005 and complications related to process were evaluated retrospectively in this study.

Methods

In this study, information of 894 cases who had full records and who were applied amniocentesis for genetic diagnosis purposes in our clinic in between January 1998 and November 2005 was evaluated.

Pregnants and their husbands were informed about the amniocentesis process and their probable complications. Permission forms were read and signed by pregnants and their husbands for amniocentesis process. Cases were evaluated before the process in terms of Rh incompatibility.

Cases were accepted both from outside and from our own polyclinic for amniocentesis. It was found that indications might change over time. Our amniocentesis indications were maternal age over 35, high risk in triple test (1/300 and higher), maternal anxiety, fetal anomaly existence in ultrasonography, bad obstetric history, delivery history with chromosomal anomaly and delivery history with fetal anomaly.

Viability and fetal biometry of the fetus were determined by ultrasonography before amniocentesis. All amniocentesis processes were performed in the transabdominal way and in between 16th and 20th gestational weeks by 2 different operators (TS and HMT). Fetal quantity and posture, amniotic fluid quantity and placenta localization were examined. Determination was performed in terms of fetal anomaly. Toshiba Sonolayer SSA-250A ultrasonography device was used for amniocentesis process. By choosing needle entrance spot for amniocentesis process, the area was cleaned by povidone-iodine. Local anesthesia was not applied. The process was performed by free hand technique accompanied by the ultrasonography. Twenty-two gauge (22G) spinal needle was entered to area which was far from the body of fetus and which had plenty of amniotic fluid and which had not placenta if possible. After throwing first 1 ml of amniotic fluid in order to reduce maternal cell contamination risk, 1 ml sample for each gestational week was taken. The material was immediately sent to genetic laboratory. 250 microgram Anti-D Immunoglobulin G was applied within 72 hours to pregnants who was not sensitized and having Rh incompatibility. Patients were warned against complications that might occur after the process and were discharged.

Results

Records of 894 cases who were applied amniocentesis for genetic diagnosis purposes in our clinic in between January 1998 and November 2005 were studied. As to amniocentesis indications of pregnants which were applied amniocentesis, it was found that 343 (38.4%) cases had high risk at triple test, 286 (32%) cases had maternal age ≥35, 65 (7.3%) cases had fetal anomaly in ultrasonography, 61 (6.8%) had bad obstetric history, 49 (5.4%)

Table 1. Amniocentesis indications in pregnants who were applied amniocentesis.

Indication	n	(%)
High risk at triple test	343	38.4
Maternal age 35	286	32.0
Fetal anomaly in ultrasonography	65	7.3
Bad obstetric history	61	6.8
High risk at combined test	49	5.4
Maternal anxiety	44	4.9
Delivery history with chromosomal anomaly	31	3.5
Delivery history with fetal anomaly	15	1.7
Total	894	100

cases had high risk at combined test (NT+PAPPA+ FreeBHCG), 44 (4.9%) cases had maternal anxiety, 31 (3.5%) cases had delivery history with chromosomal anomaly, 15 (1.7%) cases had delivery history with fetal anomaly (Table 1).

Chromosomal anomaly was found in 21 (2.3%) of 894 cases who were applied amniocentesis in our clinic. When we evaluated the results as to the indications; fetus with chromosomal anomaly was found in 7 (2.4%) of 286 cases who were applied amniocentesis due to maternal age ≥35, in 5 (1.5%) of 343 cases who were applied amniocentesis due to high risk at triple test, in 4 (6.2%) of 65 cases who were applied amniocentesis due to due to pathological ultrasonography, in 4 (6.6%) of 61 cases who were applied amniocentesis due to family history with chromosomal anomaly and in 1 (3.2%) of 31 cases who were applied amniocentesis due to delivery history due to chromosomal anomaly (Table 2).

When we evaluated general results of 894 cases, we found that 854 (95.5%) cases had normal chromosomal structure, 21 (2.3%) cases had chromosomal anomaly and 19 (2.1%) cases had culture failure (Table 3).

As shown in Table 3, chromosomal anomaly was found in 21 of 894 cases who were applied amniocentesis. 10 cases among them have Classical Down Syndrome and 3 cases have Trisomy 18. Termination was applied in accordance with the decisions of families after informing them about established chromosomal anomalies and prognoses (Table 4).

After amniocentesis process, 7 (0.78%) cases applied to clinic due to amniotic fluid infiltration and fetal loss occurred during their medical treatment (Table 5).

Discussion

Amniocentesis which is a prenatal diagnosis method frequently used was applied to 894 patients for 7 years in our clinic. When the distribution of indications is evaluated, high risk at triple test is in the first row and maternal age ≥35 is in the second row. There are very different rates within studies which evaluates amniocentesis indications in literature. For instance, advanced maternal age was the most frequent indication with the rate of 86.3% in a study.[5] Similarly, Marthin et al found indication distributions as 77.2% advanced maternal age, 15.6% maternal anxiety, 2.2% delivery history with chromosomal anomaly, 2.1% pathological ultrasonography diagnosis and 0.7% family history with chromosomal anomaly.[6] Amniocentesis for pathological ultrasonography diagnosis was in the third row in our clinic. This can be explained that our clinic is a referred center and that patients are referred to our center when any anomaly is found during ultrasonographic determinations.

When amniocentesis results are determined as to the indications, chromosomal anomaly was found in 2.3% of cases who were applied amniocentesis. Yayla et al found this rate as 3.6%, Basaran et al found as 4.5% and Cengizoglu et al found as 4.5%.[7]

When rate of fetus existence with chromosomal anomaly is evaluated as to indications, family history with chromosomal anomaly was 6.6%, pathological ultrasonography diagnosis was 6.2%, delivery history with chromosomal anomaly was 3.2% and advanced maternal age was 2.4%. It is also seen by our data that detailed ultrasonographic screening is important especially in second trimester. There was no specific ultrasonographic anomaly diagnosis in our series, they showed a general distribution. 6.2% chromosomal anomaly was found after amniocentesis due to ultrasonographic pathology and this rate changes between 8.1% and 27.1% in the literature.[7] As to results of the triple screening test, 1.5% of cases had karyotype anomaly in amniocentesis performed as to the 1/300 limit value. This result means that there was 1 karyotype anomaly within each 69 amniocentesis cases and this so low predictive value should be a start point for Triple test to be examined in other centers.

Table 2. Amniocentesis results as to the indications.

Amniocentesis indication amniocentesis (n)	Patient applied amniocentesis (n)	Fetus with chromosomal anomaly (n)	Percentage of fetus indication with chromosomal anomaly (%)
High risk at triple test	343	5	1,5
Maternal age 35	286	7	2,4
Fetal anomaly in ultrasonography	65	4	6,2
Bad obstetric history	61	4	6,6
High risk at combined test	49	0	0
Maternal anxiety	44	0	0
Delivery history with chromosomal anomaly	31	1	3,2
Delivery history with fetal anomaly	15	0	0
Total	894	21	2,3

Cell culture failure is 2.1% in our amniocentesis cases. Nicolaides et al stated that cell culture failure decreased as gestational age increased and found the failure as 0% in 13th week while it was 5.26% before 10th week.[8]

Major maternal risks of amniocentesis are injuries of epigastric veins, perforations of innards, intraabdominal infection, intraabdominal bleeding, amniotic fluid emboly and Rh sensitization. Reported fetal risks of amniocentesis are fetal bruises, fetal loss (abortus-stillbirth-neonatal death), amniotic fluid infiltration, respiratory distress syndrome, orthopedic congenital anomalies, fetal injuries, porencephalic cyst, hemothorax, pneumothorax, patellar tendon injury, subclavian artery perforation, amniotic band syndrome and arm gangrene. There was no complication other than 7 fetal loss cases in our series. No fetal injury was found. Gestational loss risk related to amniocentesis process is approximately 0.2% - 2.1% in wider series. Spontaneous gestational loss was 2.1% in randomized 14 studies and gestational loss without amniocentesis was 1.3% at the same gestational weeks (RR: 1.02-2.52).[9] Fetal loss rate is 1/127 (0.78%) in our clinic and it is among the average loss rate 1/000-1/200 given in the literature.

Table 3. Amniocentesis results, general distribution.

Results	n	%
46,Normal*	261	30.1
46,XX	303	33.9
46,XY	282	31.5
Chromosomal anomaly	21	2.3
Culture failure	19	2.1
Total	894	100.0

* The sexuality has not been reported in genetic reports for last 3 years.

Only and the most important reason of fetal loss in our series is amniotic fluid infiltration. Amniotic fluid infiltration is seen 4 times more after amniocentesis.[10] The infiltration stops within 48 hours in most of cases.[11] Longer infiltration raises the fetal loss risk. As the conservative observation is enough, amniopatch application technique or endoscopic methods may be used in cases with longer infiltration by maternal blood.[12,13]

If bloody fluid is obtained in amniocentesis, it is reported that spontaneous abortus quantity increased 5 times.[14] Dark colored amniotic fluid was aspired which was thought as compatible with old bleeding in our 2 cases who were resulted by abortus. There were 10 cases of that their bloody amniotic fluids were aspired and transplacental transfer was performed in all of them and active bleeding was observed related to vascular penetration on chorionic surface. No amniotic fluid infiltration and fetal loss was observed in 49 cases that we performed transplacental transfer.

Feto-maternal bleeding rate after amniocentesis was observed as 7%.[15] Thus, Anti-D Ig G application immediately should be applied to pregnants who have risk in terms of Rh incompatibility. This application is especially important for transplacental transfer. Though there are publications claiming that transplacental transfer increases abortus risk, there are also publications reporting that the risk does not increase and even incidence rate of amniotic fluid infiltration decreases.[10,14-17] We did not observe any amniotic fluid infiltration and loss in cases we performed transplacental transfer. Thus, it is supported in our series that transplacental amniocentesis is a safer technique.

Table 4. Cases found chromosomal anomaly after amniocentesis (n=21).

No	Chromosomal Anomaly	Interpretation	Age	Gestational Age	Amniocentesis Indication	Gestational Week	Prognosis
1	47,XY,+20/ 46,XX (%i)	Mosaic Trisomy 20	39	17	Maternal age ≥35	20	Termination
2	47,XY,+21	Classical Down Syndrome	43	19	Maternal age ≥35	22	Termination
3	47,XY,+21	Classical Down Syndrome	37	20	Maternal age ≥35	23	Termination
4	47,XX,+21	Classical Down Syndrome	31	18	High risk at triple test	22	Termination
5	47,XY,+18	Trisomy 18	27	18	Patolojik usg diagnosis	22	Termination
6	46,XY,del(12). (q21.32q22)/ 46,XY (%13/%87)	Mosaic chromosomal deletion	37	18	Maternal age ≥35	22	Termination
7	47,XX,+mar/ 46,XX (% 10 / % 90)	Mozaik marker chromosome	36	17	Maternal age ≥35	21	Termination
8	47,XX,+mar/ 46,XX (% 3,3 / % 96,7)	Mozaik marker chromosome	26	16	Delivery history with chromosomal anomaly	39	Phenotype normal
9	47,XXX	Trisomy X	24	16	Family history with chromosomal anomaly	19	Termination
10	47,XX,+21	Classical Down Syndrome	38	18	Family history with chromosomal anomaly	21	Termination
11	47,XX,+21	Classical Down Syndrome	37	19	Maternal age ≥35	22	Termination
12	47,XX,+21	Classical Down Syndrome	20	20	Pathological usg diagnosis	23	Termination
13	47,XY,+18	Trisomy 18	29	18	Üçlü testte yüksek risk	21	Termination
14	46,XX,t(8;19) (p22; p13)	Balanced translocation	30	16	Kromozomal anomalili aile öyküsü	39	Phenotype normal
15	46,XY,t(1;3) (q25;q13)	Balanced translocation	36	18	Üçlü testte yüksek risk	38	Phenotype normal
16	47,XX,+21	Classical Down Syndrome	19	20	Patolojik usg bulgusu	23	Termination
17	47,XY,+21	Classical Down Syndrome	30	19	Patolojik usg bulgusu	22	Termination
18	47,XY,+21	Classical Down Syndrome	27	18	High risk at triple test	21	Termination
19	46,XX,t(3;17) (p23; p13.3)	Balanced translocation	26	16	Family history with chromosomal anomaly	38	Phenotype normal
20	47,XY,+21	Classical Down Syndrome	29	19	High risk at triple test	22	Termination
21	47,XY,+18	Trisomy 18	39	17	Maternal age ≥35	20	Termination

Membrane tenting is dispersion of amnio-chorionic membranes from uterine wall during needle entry. Needle edge is seen within amniotic sac in ultrasonography but it can not obtain amniotic fluid. Rotating the needle edge around itself or changing its angle is appropriate. Alternatively, amniocentesis may be postponed for 1-2 weeks or transplacental entry may be preferred. We solved the problem in 3 cases by applying the needle on a different angle with same session.

Table 5. Complications seen after amniocentesis

Complications	n
Complications occurred during the process	
Membrane decomposition	3
Multiple needle entry (max. 2)	5
Bleeding within amniotic fluid	10
Complications of mothers	
Infection	-
Organ and vein injury	-
Fetal complications	
Amniotic fluid infiltration	7
Fetal loss or abortus	3
Abortus	4
Total loss	7

Needle entry quantity is the other important problem. Too many needle entry more than once increases spontaneous abortus risk.14 Attempt should not be continued after two attempts. A second attempt was required in 5 cases within our series. The application was repeated in three of these cases due to membrane tenting and in two cases due to obesity. No complication was observed in these cases.

Conclusion

Consequently, becoming prevalent of prenatal scanning tests and ultrasonographic screening of many pregnants in second trimester increased invasive attempts for medical treatments. Before amniocentesis which is the most frequent invasive attempt during second trimester, families should

be informed enough and observations should be performed after attempts in order to decrease complications.

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