Özgün Araştırma Original Article

Jinekoloji - Obstetrik ve Neonatoloji Tıp Dergisi
The Journal of Gynecology - Obstetrics and Neonatology

DOI: 10.38136/jgon.855436

The impact of counseling indications in the decision-making process regarding second trimester prenatal genetic testing of pregnant women

Gebe kadınların ikinci trimester prenatal genetik testine ilişkin karar verme sürecinde danışmanlık nedeninin etkisi

Filiz HALICI ÖZTÜRK [1] Orcid ID: 0000-0002-4494-5167
Seyit Ahmet EROL [1] Orcid ID: 0000-0002-2494-4896
Fatma Doğa ÖCAL [1] Orcid ID: 0000-0003-4727-7982
Kadriye YAKUT [1] Orcid ID: 0000-0003-3182-4312
Berhan BESİMOĞLU [1] Orcid ID: 0000-0003-0376-2513
Şule GÖNCÜ AYHAN [1] Orcid ID: 0000-0002-5770-7555
Dilek ŞAHİN [1] Orcid ID: 0000-0001-8567-9048

[1] Ankara Şehir Hastanesi, Kadın Doğum Hastanesi, Perinatoloji Kliniği, Ankara, Türkiye

[2] Elazığ Fethi Sekin Şehir Hastanesi, Kadın Doğum Kliniği, Elazığ, Türkye

ÖZ

Amaç: Doğum öncesi genetik tanı danışmanlığının nedenleri, fetal kromozomal anormallik riskini belirlemek için yeni ve karmaşık tarama protokollerinin klinik kullanıma girmesi nedeniyle yıllar içinde değişmiştir. Bu çalışmanın amacı, ikinci trimesterde genetik tanı danışmanlığı verilen hastaların invaziv testi yaptırma kararında danışmanlık nedeninin etkisini araştırmaktır.

Gereç ve Yöntemler: Bu çalışmada, Ankara Şehir Hastanesi perinatoloji kliniğinde bir yıllık sürede ikinci trimester prenatal tanı testi danışmanlığı alan hastaların kayıtları retrospektif olarak taranmıştır. Genetik testler için danışmanlık endikasyonları ve danışma sonrası invaziv test yaptırma ile ilgili hastaların tutumları değerlendirilmiştir.

Bulgular: Çalışmanın kapsadığı süre içerisinde, toplam 1338 hastaya ikinci trimesterde doğum öncesi genetik test danışmanlığı verildi ve bunların 297'sine (% 22,2) amniyosentez uygulandı. Hastaların en sık anormal ultrason bulguları (% 26,5) ve anöploidi soft belirteçleri nedeniyle (% 23,8) genetik test danışmalığı aldığı görüldü. En yüksek kabul oranı ilk trimesterde anormal tarama testi sonuçları nedeniyle danışmanlık alan hastalarda bulundu (% 44.1). Yüksek riskli gebeliklerin 211'ine (% 30,8) amniyosentez yapılırken, düşük riskli gebeliklerde amniyosentez olma oranı % 13,2 idi ve amniyosentez kabul oranları arasındaki fark anlamlıydı.

Sonuç: İkinci trimesterde prenatal genetik danışmanlık verilme nedeni ve risk düzeyi, hastanın testi yaptırma kararında etkili olabilir.

Anahtar kelimeler: Prenatal genetic danışmanlık, amniyosentez, tarama protokolleri, yüksek riskli gebelik, fetal anomali

ABSTRACT

Objective: The reasons for prenatal genetic test counseling were changed over the years due to the introducing new and complex screening protocols into clinical use to determine the risk of fetal chromosomal abnormalities. The aim of this study is to investigate the effects of changing new counseling reasons on the decisions about having invasive testing of patients who are given genetic diagnosis counseling in the second trimester.

Materials and Methods: This retrospective study, in one-year period, was conducted on patients who received consultancy on second trimester prenatal diagnostic testing in the fetal-maternal medicine department of Ankara City Hospital, Turkey. Counselling indications for genetic testing and patients' attitudes regarding invasive procedure after counseling were evaluated.

Results: During the study period, 1338 patients were given prenatal genetic test counseling in the second trimester, and amniocentesis was performed for 297 of them (22.2%). The most common indications for genetic testing were abnormal ultrasound scan results (26.5%) and aneuploidy soft markers (23.8%). The highest acceptance rate was found in patients who received counseling due to abnormal screening test results in the first trimester (44.1%). While 211 (30.8%) of high-risk pregnancies underwent amniocentesis, the rate of having amniocentesis in low-risk pregnancies was 13.2% and the difference between amniocentesis acceptance rates was significant

Conclusion: The differences in the risk criteria and risk level that require prenatal genetic diagnosis may affect the decision-making processes regarding the acceptance of genetic testing in patients who receive prenatal genetic counseling in the second trimester.

Keywords: Prenatal genetic counselling, amniocentesis, screening protocols, high-risk pregnancy, fetal anomaly

Sorumlu Yazar/ Corresponding Author:
Filiz Halıcı Öztürk
Ankara Şehir Hastanesi, Kadın Doğum Hastanesi, Perinatoloji Kliniği, Bilkent Blv. No:1, 06800, Ankara, Türkiye.
E-mail: : ozturkfh@gmail.com

Başvuru tarihi : 07.01.2021
Kabul tarihi : 14.12.2021

INTRODUCTION

Counselling for prenatal diagnosis of fetal chromosomal abnormalities is an important part of prenatal care. Information about the advantages and limitations of each screening protocol, the patient's risk level according to the screening results and what it means, the potential risks of invasive tests, the interpretation of genetic test results and how the test results can improve pregnancy management should be presented to all patients in prenatal counseling (1).

Although all pregnant women should be informed about genetic testing, the invasive procedures are not offered routinely. They should be recommended to patients who are defined as risky in terms of fetal chromosome anomalies (2). The definition of risky pregnant women for chromosomal anomalies evolved over the years. With integration of serum and ultrasound screening protocols in risk assessment, it has been observed that invasive tests have been reduced by half and used more rationally (3). Recently, with the development of cell free fetal DNA technology, risk assessment for fetal aneuploidy has become more sensitive and this decreased the invasive tests even more (4). However, due to the increasing number of prenatal risk criteria and the complexity of screening protocols, prenatal counseling can be difficult and confusing for both physicians and patients (1).

The most common prenatal genetic diagnosis test is amniocentesis, and it has been used for many years as effective and safe procedure, with a low fetal loss risk (0,1-0,3%), in detecting prenatal chromosomal anomalies (5). However, deciding to have amniocentesis is a difficult and stressful process for the patient and her family. They face a dilemma: the probability of the birth of a chromosomally abnormal baby if they refuse invasive testing, or the loss of a healthy baby if they accept it (6). Previous studies have found that the decision to accept or decline invasive testing may be affected by numerous factors: maternal age, gestational age, previous experiences of pregnancy, educational and occupational level, knowledge about risk factors, social pressure, cultural and religious values and patient's level of anxiety (3, 5, 7-9).

The aim of this study is to evaluate the decisions of patients who take prenatal counseling about second trimester genetic testing and to investigate how the decision to undergo amniocentesis varies according to indications for genetic test counseling.

MATERIALS AND METHODS

This retrospective study was conducted in Ankara City Hospital, Turkey between 1 September 2019- 31 August 2020. All patients consulted to the prenatal diagnosis department for second trimester genetic diagnosis between these dates were included in the study. Data regarding patient characteristics, screening test results, ultrasound results, referral indication for prenatal diagnosis test and the patient's decision for amniocentesis were obtained from the hospital patient database.

All patients who applied to our clinic or were referred for prenatal genetic diagnosis from another center were evaluated by a fetal-maternal medicine fellow assistant and detailed ultrasonography was performed for structural abnormalities and soft aneuploidy markers. According to the age, history of genetic disorders, first or second trimester serum screening results and ultrasound scan results, the patient was informed about the individual risk of having a chromosomal abnormal fetus. While a diagnostic test was presented as an opinion to all patients in consultancy, a diagnostic test was recommended for patients who were found to be at high risk for chromosomal anomalies. Amniocentesis was applied to patients with low-risk pregnancy for chromosomal anomalies upon their request after informing. The amniocentesis procedure was performed trans abdominally under continuous ultrasound guidance in accordance with the technique specified in the guidelines (10).

Pregnant women who had following criteria was defined as high-risk pregnancy for fetal chromosomal anomalies: abnormal first or second trimester serum screening test (trisomy 21 risk> 1/300, trisomy 13/18 risk >1/150 or positive non-invasive prenatal testing), family or obstetric history of genetic disorders, first trimester increased nuchal translucency (NT≥3mm), cystic hygroma, abnormal ultrasound scan.

Abnormal genetic sonogram defined as: a) Presence of fetal structural anomaly b) Solitary existence of either following soft markers; increased nuchal folding, mild ventriculomegaly c) Coexistence of other soft markers (hyperechogenic bowel, choroid plexus cyst, intracardiac echogenic focus, pelviectasis, shorten femur, shorten humerus, nasal bone hypoplasia, sandal gap, single umbilical artery (2).

Patient who counseled for advanced maternal age, serum screening markers (PAPP-A, β HCG, AFP) abnormalities, isolated presence of sort markers (except nuchal fold thickness, mild ventriculomegaly), moderate screening test risk (1/301-1/1000)

were defined as low-risk pregnancy for chromosomal abnormalities.

Statistical analyses were carried out with IBM SPSS Statistics for Windows, version 23 (IBM Corp., Armonk, N.Y., USA). For continuous variables, the mean and standard deviation were calculated. Categorical variables were presented as frequencies and percentages. The differences between the groups were compared by Student t-test for continuous variables and Fisher's exact test for categorical variables.

RESULTS

During the one-year period covered by the study, 297 of 1338 patients who were given counselling on prenatal genetic testing in second trimester decided to undergo amniocentesis (22,2%). Maternal age did not appear to be an important factor affecting the patients' decision-making. The mean of the maternal age is 32,5 and 32,94, respectively, in those who underwent and those who did not undergo amniocentesis and there is no significant difference (p=0,28). Whereas, a significant correlation arose between the gestational age and the decision about amniocentesis (p<0,001). The mean of the gestational week is 18,97 among the patients who accepted amniocentesis and 20,49 among who declined it (Table 1).

In the study group, the most common referral reasons were abnormal ultrasound scans results (26,5%) and aneuploidy soft markers (23,8%). The women counselled due to the advanced maternal age comprised 12,7% of the patients (Table 2).

According to the screening results, 686 patients in the study population (51,3%) had a high risk of having a chromosomally abnormal fetus. The referral reasons of the patients with high-risk pregnancy were abnormal screening test results (306 patients), abnormal ultrasound findings (354 patients) and family history of genetic disorders (27 patients). Among high-risk pregnancy, 211 patients (30,8%) underwent amniocentesis (Table 3). The highest acceptance rate was found in the patients who had abnormal screening test results in the first trimester (44,1%). The amniocentesis acceptance rates were 37%, 36,2% and 22,9% in women who had family history, abnormal second trimester screening test results and abnormal ultrasound scans results, respectively (Table 2).

The pregnant women with low risk to have a chromosomally affected fetus were given genetic test counseling due to advanced maternal age (170 patients), aneuploidy soft markers (318 patients), abnormal serum screening markers (138 patients) and maternal request (25 patients) (Table 2). Of 652 women with low-risk, 86 (13,2%) had amniocentesis. The difference between amniocentesis acceptance rates of high-risk and low-risk groups is significant (p<0,001) (Table 3).

Among the women whom the counseling reason was the advanced maternal age, the acceptance rate was 17,6%. The lowest amniocentesis acceptance rate (4,4%) was found in patients who were given genetic test counseling due to aneuploidy soft markers (Table 2).

Table 1. Comparison of the study groups according to maternal age and gestational age.

	Patients who underwent amniocentesis	**Patients who did not undergo amniocentesis**	***p* value**
	Mean ± SD	Mean ± SD	
Maternal age (year)	32,5 ± 6,135	32,94 ± 6,124	=0,28*
Gestational age (week)	18,97 ± 1,845	20,49 ± 3,973	<0,001*

Table 2: Distribution of the patients according to the amniocentesis decision and the indications.

	Patients who underwent amniocentesis		**Patients who did not undergo amniocentesis**		**Total**	**Percentage in total study group**
	N	**%**	**N**	**%**	**N**	**%**
Abnormal first trimester screening test	52	44,1%	66	55,9%	118	8,8%
Abnormal second trimester screening test	68	36,2%	120	63,8%	188	14,1%
Abnormal ultrasound scans	81	22,9%	273	77,1%	354	26,5%
Family history of genetic disorders	10	37%	17	63%	27	2%
Advanced maternal age	30	17,6%	140	82,4%	170	12,7%
Aneuploidy soft markers	14	4,4%	304	95,6%	318	23,8%
Abnormal serum screening markers	22	15,9%	116	84,1%	138	10,3%
Maternal anxiety	20	80%	5	20%	25	1,9%
Total	**297**	**22,2%**	**1041**	**77,8%**	**1338**	**100%**

Table 3: Comparison of the study groups according to the risk level.

	Patients who underwent amniocentesis		**Patients who did not undergo amniocentesis**		**Total**	***p* value**
	n	%	n	%		
High risk	211	30,8%	475	69,2%	686	<0,001
Low risk	86	13,2%	566	86,8%	652	
Total	297		1041		1338	

DISCUSSION

This study reveals that the indications for genetic test counselling and individual risk level have an impact on patient's decision-making about having amniocentesis. Since, maternal advanced age had been used as an adequate criterion to recommend prenatal testing for years, it was the most common indication for genetic testing in the majority of the studies in the literature with a high acceptance rate (80.8 - 86.7%) (11, 12). To more accurately determine the risk of chromosomal abnormalities and to reduce the need for invasive procedures, the screening protocols are being improved continently. With the use of serum and ultrasound screening protocols, it is found that advanced aged women less frequently received prenatal counseling for genetic testing and the utilization of diagnostic tests in these patients have decreased significantly (3, 13).

Sonographic risk criteria were the most common reason for counselling about amniocentesis in this study, but it was noteworthy that the rate of amniocentesis acceptance was low (22,9%) in these patients. Previous studies have shown that sonographic malformation or soft markers increase acceptance of invasive procedure. However, this effect is thought to be minimal, probably due to the confusion and anxiety experienced by families when a fetal anomaly is detected (5). In a study evaluating the effect of genetic sonogram on accepting diagnostic test in patients who were given counseling due to advanced age, it was observed that only 8% of the patients changed their initial decisions after ultrasound result (14). In another study, patients who were referred for genetic sonogram due to any risk factors were evaluated. It was seen that 10-15% of those who are undecided or who decline to have amniocentesis, decided to have amniocentesis when a sonographic structural abnormality or soft marker were detected (11).

In this study, it was observed that acceptance of the diagnostic test was related to the patient's risk level. Acceptability was higher in high-risk pregnant women, but it could still consider low given that two-thirds reject the recommended amniocentesis. The mean gestational week of the patients who did not accept invasive procedure was significantly higher than who accept it. Considering the fact that acceptance of amniocentesis decreased with increasing gestational age (15), it was thought that one of the reasons for the low acceptability, found in this study, might be advanced gestational age.

Amniocentesis acceptance was highest in patients with abnormal first or second trimester serum screening test. In previous studies, it has been shown that 37.2-70.5% of the patients who had a screening test and got a positive result accepted the invasive test (16, 17). Presenting a numerical risk to the patients is thought to be a factor that increases the uptake of diagnostic test. However, while all patients with positive screening test results are expected to accept the diagnostic test, as the natural target of screening protocols, it is seen that the acceptance of amniocentesis is still low in our study and in the literature. As in many countries, prenatal screening tests are offered to patients as a routine part of prenatal care in our country. The routine application of screening tests, unfortunately, prevents patients from thinking in detail while making their decision. It was shown that, for most women, accepting the screening tests is not a well-considered and conscious choice, it accepted because it perceived as a medical and maternal necessity and a routine part of prenatal care (18, 19). When prenatal screening was applied not as a routine of prenatal care but offered after detailed information about the limitations and advantages of screening, it was observed that the screening test acceptance rate was reduced by half (18). The pre-test consultancy regarding the necessity of the diagnostic test after the positive screening result, will enable the selection of patients who will not accept the diagnostic test regardless of the result, and thus the acceptance of prenatal genetic tests will increase.

Although it did not replace diagnostic testing, NIPT significantly reduced the use of invasive procedures. In this series, all pregnant women (2 patients) who referred due to positive NIPT result accepted genetic testing. However, because of its cost, NIPT was a very rare indication for prenatal test. Widespread use of NIPT will improve the rational use of prenatal diagnostic tests.

Although there is a significant difference in acceptance rates between high-risk patients and low-risk patients, this study showed that a considerable proportion of high-risk patients did not accept amniocentesis. On the other hand, it was found that a significant number of pregnant women with low risk for fetal chromosomal anomaly had invasive testing. In this respect, this study highlighted an important issue in prenatal counseling. Understanding of what factors affects the patient's decision to have or not have an invasive testing after presenting low risk or high risk in prenatal counseling is important. Before referring to a maternal-fetal medicine specialist for counseling on prenatal genetic testing, most patients seem to have a preliminary idea about whether to undergo amniocentesis as a result of the information provided by the healthcare provider who first

evaluated them. Previous studies have reported that the initial consultation received by patients is important for the acceptance of amniocentesis, and subsequent counseling has a limited impact on risk perception and final decision (11, 20).

CONCLUSION

The patient's decision to have a second trimester diagnostic testing may be affected by genetic counselling reason and the patient's risk level of having a fetus with a chromosomal abnormality. Therefore, accurate and sufficient prenatal counseling regarding the changing causes of genetic counseling is important for a more rational use of diagnostic tests. Appropriate counseling provided by not only maternal-fetal medicine specialists but also other obstetricians-gynecologists who providing information about the risk determination criteria and diagnostic procedures will enable the pregnant woman to make informed decisions about genetic tests.

REFERENCES

1. Knutzen D, Stoll K. Beyond the Brochure: Innovations in Clinical Counseling Practices for Prenatal Genetic Testing Options. J Perinat Neonatal Nurs. 2019;33(1):12-25.

2. Practice Bulletin No. 162: Prenatal Diagnostic Testing for Genetic Disorders. Obstet Gynecol. 2016;127(5):e108-22.

3. Benn PA, Egan JF, Fang M, Smith-Bindman R. Changes in the utilization of prenatal diagnosis. Obstet Gynecol. 2004;103(6):1255-60.

4. Larion S, Warsof SL, Romary L, Mlynarczyk M, Peleg D, Abuhamad AZ. Uptake of noninvasive prenatal testing at a large academic referral center. Am J Obstet Gynecol. 2014;211(6):651.e1-7.

5. Sadlecki P, Grabiec M, Walentowicz P, Walentowicz-Sadlecka M. Why do patients decline amniocentesis? Analysis of factors influencing the decision to refuse invasive prenatal testing. BMC Pregnancy Childbirth. 2018;18(1):174.

6. Marini T, Sullivan J, Naeem R. Decisions about amniocentesis by advanced maternal age patients following maternal serum screening may not always correlate clinically with screening results: need for improvement in informed consent process. Am J Med Genet. 2002;109(3):171-5.

7. Usta IM, Nassar AH, Abu-Musa AA, Hannoun A. Effect of religion on the attitude of primiparous women toward genetic testing. Prenat Diagn. 2010;30(3):241-6.

8. Lesser Y, Rabinowitz J. Elective amniocentesis in low-risk pregnancies: decision making in the era of information and uncertainty. Am J Public Health. 2001;91(4):639-41.

9. Halliday J, Lumley J, Watson L. Comparison of women who do and do not have amniocentesis or chorionic villus sampling. Lancet. 1995;345(8951):704-9.

10. Ghi T, Sotiriadis A, Calda P, Da Silva Costa F, Raine-Fenning N, Alfirevic Z, et al. ISUOG Practice Guidelines: invasive procedures for prenatal diagnosis. Ultrasound Obstet Gynecol. 2016;48(2):256-68.

11. Willruth A, Vieten J, Berg C, Gembruch U, Geipel A. Decision making and attitudes towards invasive prenatal diagnosis in the early second trimester. Ultraschall Med. 2010;31(5):515-9.

12. Grinshpun-Cohen J, Miron-Shatz T, Ries-Levavi L, Pras E. Factors that affect the decision to undergo amniocentesis in women with normal Down syndrome screening results: it is all about the age. Health Expect. 2015;18(6):2306-17.

13. Wray AM, Ghidini A, Alvis C, Hodor J, Landy HJ, Poggi SH. The impact of first-trimester screening on AMA patients' uptake of invasive testing. Prenat Diagn. 2005;25(5):350-3.

14. Vergani P, Locatelli A, Biffi A, Ciriello E, Zagarella A, Pezzullo JC, et al. Factors affecting the decision regarding amniocentesis in women at genetic risk because of age 35 years or older. Prenat Diagn. 2002;22(9):769-74.

15. Ilgin-Ruhi H, Yürür-Kutlay N, Tükün A, Bökesoy I. The role of genetic counseling on decisions of pregnant women aged 35 years or over regarding amniocentesis in Turkey. Eur J Med Genet. 2005;48(1):13-9.

16. Kuppermann M, Learman LA, Gates E, Gregorich SE, Nease RF, Jr., Lewis J, et al. Beyond race or ethnicity and socioeconomic status: predictors of prenatal testing for Down syndrome. Obstet Gynecol. 2006;107(5):1087-97.

17. Liamputtong P, Halliday JL, Warren R, Watson F, Bell RJ. Why do women decline prenatal screening and diagnosis? Australian women's perspective. Women Health. 2003;37(2):89-108.

18. van den Berg M, Timmermans DR, Kleinveld JH, Garcia E, van Vugt JM, van der Wal G. Accepting or declining the offer of prenatal screening for congenital defects: test uptake and women's reasons. Prenat Diagn. 2005;25(1):84-90.

19. Green JM, Hewison J, Bekker HL, Bryant LD, Cuckle HS. Psychosocial aspects of genetic screening of pregnant women and newborns: a systematic review. Health Technol Assess. 2004;8(33):iii, ix-x, 1-109.

20. Elimian A, Demsky M, Figueroa R, Ogburn P, Spitzer AR, Quirk JG. The influence of genetic counselors on the acceptance of mid-trimester amniocentesis. J Matern Fetal Neonatal Med. 2005;17(3):219-21.