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# Retrospective cohort study of pregnancy terminations before the 24th week of pregnancy

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**Ethics Committee Approval**
TC. İzmir Governorship İzmir Provincial Health Directorate, S.B.Ü. Tepecik Training and Research Hospital Clinical Research Ethics Committee, Decision No: 2020 / 13-40, 16/11/2020.
All procedures in this study involving human participants were performed in accordance with the 1964 Helsinki Declaration and its later amendments.

**Conflict of Interest**
No conflict of interest was declared by the authors.

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## Abstract

**Background/Aim:** Termination, which indicates ending the pregnancy process, should be performed in fetal anomalies incompatible with life or maternal-life threatening pregnancies. Pregnancy termination involves a challenging process for both the clinician and the patients. Identifying the pathology indicating termination and sharing this decision with the family should include certain strategies. In this study, the indications for termination decision were examined. We think that these indications may help the clinician make a termination decision.

**Methods**: In this retrospective cohort study, the indications, and termination procedures performed on 707 pregnant women in the Perinatology clinic of Izmir Tepecik Training and Research Hospital between November 2016 and November 2020 were analyzed retrospectively.

**Results**: The total number of patients who underwent termination was 707. Their ages varied between 14 and 45 years (median 29.6). The median number of pregnancies among all patients was 2.5 (range: 1-12). The minimum and maximum gestational weeks of termination were 10 and 24 weeks, respectively (median 17.4). Termination indications were divided into groups: a) Congenital malformations (without karyotype diagnosis) (n=400, 56.5%) b) Congenital malformation with diagnosed karyotype anomalies (n=27, 3.8%) c) Only karyotype anomalies (n=146, 20.6%) d) Other fetal / obstetric disorders (anhydramnios, Preterm Premature Rupture of Membranes (PPROM), teratoma, Twin-to-twin transfusion syndrome (TTTS), drug use (n=115, 16.2%) e) Maternal causes (n=19, 2.6%). In addition, each group was divided into three groups according to the weeks of termination as 11-14 weeks, 15-22 weeks, and 23-24 weeks. The total number of patients for these groups were 170, 503 and 34, respectively. Patients without fetuses with karyotype anomalies and who were terminated due to congenital malformations were grouped according to the origin of the malformation: a) Central nervous system anomalies (57.2%) b) Multiple anomalies (18.7%) c) Hydrops fetalis (8%) d) Urinary system anomalies (6.5%) e) Skeletal system anomalies (5.7%) f) Cardiac anomalies (1.7%) g) Conjoined twins (1%) h) Congenital pulmonary airway obstruction (0.5%) i) Congenital diaphragmatic hernia (0.2%).

**Conclusion**: The continuation of abnormal pregnancies brings many problems. Termination of pregnancies that are incompatible with life or involving serious anomalies is necessary in most cases. In daily practice, making the decision of termination and sharing it with the family should include an important algorithm.

**Keywords:** Termination of pregnancy, Congenital malformations, Fetal indications

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## Introduction

Pregnancy terminations in Turkey can be grouped into three categories in general. The first group of terminations can be performed until the 10th gestational week per the family's request. According to the 13th article of the "regulation on the execution of population planning services" published in 1983, the termination process was approved by law until the 10th week, with the consent of the mother and father [1]. Termination in pregnancies over the 10th week is limited with certain indications. While pregnancies that endanger maternal life make the second group, pregnancies involving fetal genetic anomalies or malformations make the third group.

It is important to base the termination decision on concrete evidence and provide options to the family accordingly. During fetal evaluation, diagnosis should be made using all current evaluation parameters. In cases where ultrasound and diagnosis are not clear, using magnetic resonance is important for the diagnosis of fetal malformation [2-4]. In addition, obtaining a fetal karyotype sample (chorionic villus biopsy, amniocentesis, cordocentesis) to detect genetic problems will help the clinician in terms of definitive diagnosis. Maternal problems should be evaluated and those that may prevent the continuation of pregnancy should be revealed with a multidisciplinary approach. Regardless of the indication, in our perinatology clinic, termination is performed to pregnancies below 24 weeks only.

In this study, we retrospectively analyzed the patients who decided to terminate due to fetal/maternal problems under 24 weeks of gestation and analyzed the indications for termination.

## Materials and methods

A total of 707 patients who decided to terminate between November 2016 and November 2020 were retrospectively analyzed. Terminations under 10 weeks of gestation performed per the wishes of the family were not included in this study. Pregnancies with serious fetal congenital malformations incompatible with life and those with serious maternal disease which threaten maternal life were included in the study. Anomalies were determined with ultrasound and fetal magnetic resonance.

Data were obtained from the digital archive of İzmir Tepecik Training and Research Hospital and patient files. The demographic and obstetric characteristics of the patients are shown in Table 1, Figure 1, and Figure 2.

Table 1: Demographic and obstetric characteristics of the patients

| | Median | Minimum | Maximum |
|---|---|---|---|
| Age | 29.6 | 14 | 45 |
| Gravida | 2.5 | 1 | 12 |
| Parity | 1.08 | 0 | 1 |
| Gestational week | 17.4 | 10 | 24 |

All patients underwent routine pregnancy examinations (blood tests, maternal blood pressure measurements and systemic examinations during pregnancy). Prenatal screening tests were performed to all patients. In addition, chorionic villus sampling, amniocentesis or cordocentesis procedures were performed for prenatal diagnosis in necessary cases.

In the council where the termination decision is made, there are experts from all relevant branches (perinatology, neurosurgery, radiology, neurology, pediatric cardiovascular surgery, pediatric cardiology, pharmacology, pediatric nephrology, and neonatology). According to the characteristics of the patient, a termination decision was made by obtaining expert opinion from the required branch.

Figure 1: Age range of patients

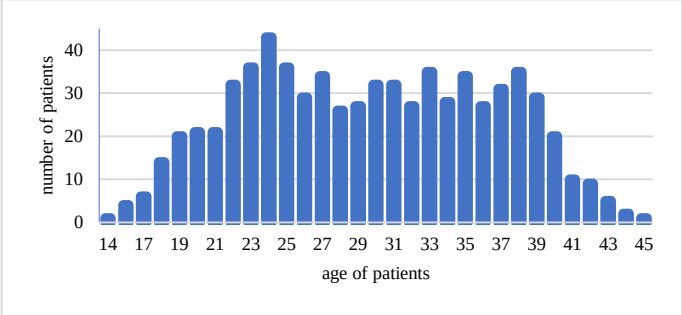
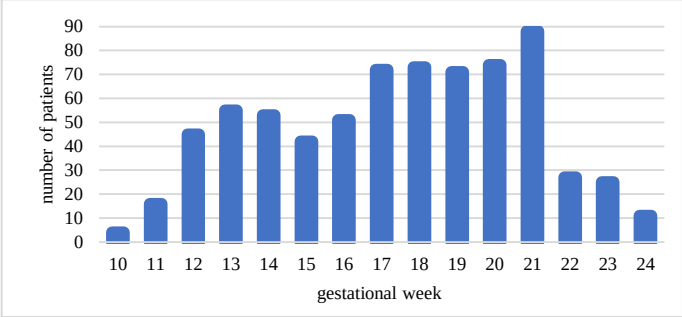



Figure 2: Distribution of the gestational weeks of the patients




The patients were divided into five subgroups: a) Congenital malformations (without karyotype diagnosis) b) Congenital malformations and diagnosis of karyotype anomalies) c) Only karyotype anomalies d) Other fetal / obstetric disorders e) Maternal causes.

Pregnancies with congenital malformations were examined in two separate groups. The first group comprised pregnancies with congenital malformations who did not undergo invasive karyotyping (patients who did not consent to invasive sampling or did not need karyotyping due to the presence of multiple major anomalies). The second group included pregnancies with congenital malformations who were diagnosed with karyotype disorders. The third group included pregnancies deemed risky during prenatal screening, later found to have karyotype anomalies as revealed by invasive karyotype sampling. Anhydramnios, premature rupture of membranes (PPROM), teratoma, twin to twin transfusion syndrome (TTTS) and iatrogenic drug use were categorized as a separate group. The last group included patients with terminated pregnancies due to maternal reasons.

The five groups were also divided into categories according to the week of gestation in which termination took place. Those performed between the 11th and 14th weeks constituted the first group, those performed between the 15th and 22nd weeks were included in the second group, and finally, the ones performed between the 23rd and 24th weeks constituted the third group.

This study was approved by Izmir Tepecik Training and Research Hospital Ethics Committee (2020/13-40, 11/16/2020).

**Statistical analysis**

A total of 707 patients were included in the study. The minimum, maximum and median values of the ages of the patients, the number of previous pregnancies, and the weeks of

gestation at termination were analyzed. The results were classified according to the patients' ages and weeks of gestation. Termination indications were also classified and those in the same group were indicated in the table together with their percentages.

## Results

The ages of 707 patients included in our study ranged from 14 to 45 years (mean: 29.6 years). The ages at termination were similar between the patients. Median gravida and parity values of the patients who underwent termination were 2.5 and 1.08, respectively. The gestational weeks of the patients ranged from 10 to 24 weeks (mean 17.4). We found that the most common week of termination was between the $20^{th}$-$21^{st}$ weeks (86 patients).

Fifty-six percent of the patients (n=400) were recommended termination due to congenital malformations without karyotype diagnosis (Table 2). While 14.4% of these patients (n=102) were between the $11^{th}$ and $14^{th}$ gestational weeks, 38.6% (273 patients) were between the $15^{th}$ and $22^{nd}$ gestational weeks and 3.5% were between the $23^{rd}$ and $24^{th}$ gestational weeks. We categorized the patients in this group according to the origin of their congenital malformation. Anomalies related to the central nervous system were the most common (57.2%), followed by multiple anomalies (18.7%), hydrops fetalis (8%), urinary system anomalies (6.5%), skeletal dysplasia (5.7%), cardiac anomalies (1.7%), conjoined twins (1%), congenital pulmonary airway obstruction (0.5%) and congenital diaphragmatic hernia (0.2%) (Table 3).

Table 2: Termination indications

| Number of patients (%) | | Distribution of patients according to the week of termination | | |
|---|---|---|---|---|
| | total | $11^{th}$ -$14^{th}$ weeks | $15^{th}$-$22^{th}$ weeks | $23^{th}$-$24^{th}$ weeks |
| Congenital Malformations (without karyotype diagnosis) | 400 (56.5%) | 102 (14.4%) | 273 (38.6%) | 25 (3.5%) |
| Congenital Malformation + Karyotype Anomaly | 27 (3.8%) | 6 (0.8%) | 19 (2.6%) | 2 (0.2%) |
| Isolated Karyotype Anomaly | 146 (20.6%) | 31 (4.3%) | 109 (15.4%) | 6 (0.8%) |
| Other Fetal/Obstetric Disorders | 115 (16.2%) | 19 (2.6%) | 95 (13.4%) | 1 (0.1%) |
| Anhydramnios | 40 (5.6%) | 4 (0.5%) | 35 (4.9%) | 1 (0.1%) |
| PPROM | 54 (7.6%) | 3 (0.4%) | 51 (7.2%) | |
| Teratoma | 5 (0.7%) | 1 (0.1%) | 4 (0.5%) | |
| TTTS | 4 (0.5%) | | 4 (0.5%) | |
| Iatrogenic Drug Use | 12 (1.6%) | 11 (1.5%) | 1 (0.1%) | |
| Maternal Causes | 19 (2.6%) | 12 (1.7%) | 7 (0.9%) | |
| Total | 707 (100%) | 170 (24%) | 503 (71.1%) | 34 (4.8%) |

PPROM: Preterm Premature Rupture of Membranes, TTTS: Twin to Twin Syndrome

Table 3: Congenital malformations by systems

| Congenital Malformation | Number of Patients (percentage in group) | | | Total |
|---|---|---|---|---|
| | $11^{th}$ -$14^{th}$ weeks | $15^{th}$ -$22^{th}$ weeks | $23^{th}$-$24^{th}$ weeks | |
| Central Nervous System | 65 (16.2%) | 148 (37%) | 16 (4%) | 229 (57.2%) |
| Skeletal System | 4 (1%) | 19 (4.7%) | | 23 (5.7%) |
| Cardiac Abnormality | | 7 (1.7%) | | 7 (1.7%) |
| Hydrops Fetalis | 13 (3.2%) | 18 (4.5%) | 1(0.2%) | 32 (8%) |
| Urinary System | 5 (1.2%) | 21 (5.2%) | | 26 (6.5%) |
| Congenital Diaphragmatic Hernia | | 1 (0.2%) | | 1 (0.2%) |
| Congenital Pulmonary Airway Obstruction | | 2 (0.5%) | | 2 (0.5%) |
| Conjoined Twin | 3 (0.7%) | 1 (0.2%) | | 4 (1%) |
| Multiple anomaly | 12 (3%) | 56 (14%) | 8 (2%) | 75 (18.7%) |
| Total | 102 (25.5%) | 273 (68.25) | 25 (6.2%) | 400 (100%) |

The number of patients who carried fetuses with karyotype anomalies in addition to congenital malformations were 27 (3.8%). Six (0.8%) were between the $11^{th}$-$14^{th}$ gestational weeks, 19 patients (15.4%), between the $15^{th}$-$22^{nd}$ gestational weeks, and 2 (0.2%) were between the $23^{rd}$-$24^{th}$ weeks. The number of patients who underwent invasive karyotyping after positive prenatal screening tests and found to have abnormal results was 146 (20.6%). While the pregnancies of 31 of these patients were terminated between the $11^{th}$ and $14^{th}$ weeks, 109 (15.4%) were terminated between the $15^{th}$ and $22^{nd}$ weeks, and 6 (0.8%) were terminated between the $23^{rd}$ and $24^{th}$ weeks.

We included 115 patients (16.2%), except those carrying fetuses with congenital malformations and genetic problems, in the other fetal/obstetric disorders group. In this group, anhydramnios (5.6%), PPROM (7.6%), teratoma (0.7%), TTTS (0.5%) and iatrogenic drug use (2.6%) were the reasons for termination.

Patients who were recommended termination of pregnancy due to maternal reasons only were included in a separate group (n=19, 2.6%).

## Discussion

Making a pregnancy termination decision requires a serious algorithm. The patient should be evaluated with multidisciplinary approach and all auxiliary equipment that can be used in fetal diagnosis should be used when necessary. Although ultrasound findings provide a large amount of evidence, it is not sufficient in some cases to make a termination decision. Fetal magnetic resonance imaging, prenatal screening tests and invasive karyotype sampling methods should be used frequently [2-4].

Termination by family request is legal up to the $10^{th}$ gestational week in Turkey, according to 'the population planning services law' published in 1983 [1]. Termination after the designated period should depend on medical reasons. If the fetus is not alive, there is no week limitation for the termination decision [5, 6]. However, if the fetus is alive, it is legally considered an individual and has legal rights (Turkish Civil Code no: 4721/28 2001). After the $24^{th}$ week, it is not considered ethical to terminate the pregnancy without feticide (Maternal-Fetal and Perinatal Association of Turkey, Ankara Declaration, 2011) [7]. In Izmir Tepecik Training and Research Hospital, a termination decision made over the tenth week of gestation involves multidisciplinary approach and the decisions are thoroughly discussed with the family.

Congenital heart diseases, which are the most common anomalies in the literature, are not an indication for termination because some types of heart anomalies are compatible with life [8]. Central nervous system anomalies are the most common reason for termination of pregnancy [9-12]. We found that the most common cause of congenital malformations in terminated pregnancies in our center was central nervous system anomalies (57.2%). Other reasons for termination appear at different rates in different publications [13]. We found that multiple anomalies (18.7%) and urinary system anomalies (6.5%) were the second and third most frequent, respectively. We think that the

differences may be due to different geographical features or the diverse characteristics of the population admitted to the hospital.

The rate of patients with congenital malformations and concomitant chromosomal anomalies was lower in our study compared to others [10]. Invasive karyotype analysis is recommended for patients with multiple anomalies in our center. However, some patients we follow with multiple anomalies do not accept this procedure and they want termination without invasive karyotyping. For this reason, we think that we found a lower rate than that reported in the literature.

The number of patients who received invasive karyotyping and were diagnosed with chromosomal anomalies of the fetus after positive prenatal screening tests is 146 (20.6%). This rate was similar with the other publications in the literature [14, 15].

In the literature review conducted in terms of the upper limit of gestational week for termination, it is seen that different weeks are considered in different countries [11]. In Turkey and many other countries, because the limit of viability, 24$^{th}$ gestational week is accepted as the upper limit for termination without feticide [5]. After this week, feticide process should be added to pregnancy terminations. Also, after the 24$^{th}$ gestational week, the termination procedure should be implemented cautiously [16, 17].

**Limitations**

The retrospective nature of this cohort study limited us in terms of generalizing the results. Studies involving more patients are needed to evaluate the causes of termination. In future studies where each country or ethnic origin is examined much more broadly, it can be determined whether there are differences in pregnancy termination indications between the communities.

**Conclusion**

Pregnancy termination involves difficulties for both the family and the clinician. Due to different legal regulations in different countries, it is not possible to clearly standardize the termination indications. Thorough knowledge of the legal and medical requirements will ensure that more accurate decisions are made when making a termination decision as a physician. Since there is a wide spectrum of diseases that may cause pregnancy termination, the most accurate information and recommendations should be provided to the patient by following up-to-date diagnosis and treatment protocols.

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