ORIGINAL ARTICLE

Mid-trimester Abortions: Experience at a Tertiary Care Center

Anil Kumar Singh[1], Atul Seth[2], Bojja Divya[3]

Received on: 15 March 2023; *Accepted on:* 10 April 2023; *Published on:* 09 May 2023

Abstract

Background: The literature on indications and their evaluation in mid-trimester abortions in the South Asian population is scarce. This retrospective study aims to identify the causes behind these abortions.

Materials and methods: The data of 55 women who had aborted in the labor room of a tertiary care center in Delhi between January 1, 2022 and March 3, 2023 were studied. The data included age, blood group, gestation, parity, indication, method of termination, biometry of abortus, placental weight, cord length, and complications.

Results: The analysis of these 55 women showed the commonest cause of abortion as missed abortion/intrauterine fetal demise (IUFD) (ten women, 18.2%) followed by inevitable abortion (seven women, 12.7%), preterm premature rupture of membranes (PPROM in six women, 10.9%), and voluntary termination of pregnancy (five women, 9.1%). The other causes included congenital birth defects, genetic abnormalities, and severe maternal diseases. Invasive prenatal testing in a few fetuses who had congenital anomalies revealed additional genetic abnormalities.

Conclusion: It highlights the need for a detailed evaluation of all pregnancies with reliable prenatal tests for aneuploidy screening, good first-trimester scan, detailed target scan for fetal anomalies at about 20 weeks, and evaluating maternal disorders properly.

Keywords: Abortion, Abortus, Chromosomal abnormalities, Fetus, Mid-trimester.

Journal of Obstetric and Gynaecological Practices POGS (2023): 10.5005/jogyp-11012-0004

Introduction

Abortion is the spontaneous or induced termination of pregnancy before fetal viability. Induced abortion is termination with surgery or medication in a live fetus that has not reached viability. The second trimester extends from the end of the first trimester until the gestational age reaches 28 weeks. The National Center for Health Statistics and the World Health Organization define abortion as the loss or termination of a pregnancy with a fetus aged younger than 20 weeks gestation or weighing <500 gm. Most miscarriages occur before 12 weeks, and it has been estimated that only 2–3% of pregnancies end spontaneously in the second trimester.[1]

Chromosomal abnormalities, such as trisomies, are a major cause of almost all forms of pregnancy loss.[2] Congenital birth defects are those that are often inherited but may also be caused by an infection during pregnancy or exposure to certain teratogenic (defect-causing) medications, chemicals, or toxins.[3]

Most of the literature on mid-trimester abortions has given prime importance to the method of abortion and induction abortion interval time with various methods. There is scarce literature on the indication of abortion and its evaluation to rule out genetic causes in the South Asian population. The aim of this retrospective analysis was to describe the causes of second-trimester abortions at this tertiary care center.

Materials and Methods

In this retrospective analysis, we studied the women who aborted in the labor room of a tertiary care center in Delhi between January 1, 2022 and March 3, 2023. The data were collected by the authors. The women with first-trimester miscarriages were excluded. The patients who aborted between 12 and 28 weeks were included.

The total number of patients who underwent termination was 55. The data of the women who aborted included age, blood group, gestation, parity, indication, method of termination, biometry of abortus, placental weight, cord length, and complications.

The medical termination of pregnancy (MTP) was done with a medical method that included either misoprostol alone or mifepristone followed by misoprostol. In the combined method, tablet mifepristone 200 mg was given orally 48 hours prior to misoprostol administration. Mifepristone prior to misoprostol was not given in cases where the patients had dilated cervix and were likely to expel the products of conception soon. The patients were counseled about the requirement of variable doses of misoprostol required for the successful completion of abortion. Women with a history of cesarean delivery and myomectomy were additionally counseled for risk of scar dehiscence and uterine rupture.

Prophylactic antibiotics were not given routinely. Analgesia was provided with intravenous paracetamol 1 gm infusion and sodium diclofenac 100 mg suppository.

All women were also explained adequately about the use of contraception in the post-abortal period. Patients should also be provided with education regarding contraception after a miscarriage including the use of an intrauterine device or hormonal

[1–3]Department of Obstetrics and Gynaecology, Army Hospital Research and Referral, New Delhi, India

Corresponding Author: Atul Seth, Army Hospital Research and Referral, New Delhi, India, Phone: +91 7791908624, e-mail: docatulseth@yahoo.com

How to cite this article: Singh AK, Seth A, Divya B. Mid-trimester Abortions: Experience at a Tertiary Care Center. J Obstet Gynaecol Pract POGS 2023;1(1):9–14.

Source of support: Nil

Conflict of interest: None

Table 1: Baseline Patient characteristics

Characteristics	*Number (n)*	*%*
Age (years)		
24 or less	8	14.5
25–29	19	34.5
30–34	16	29.0
35–39	10	18.1
40 or more	2	3.6
Gestation		
12 w–15 w 6 d	11	20.0
16 w–19 w 6 d	12	21.8
20 w–23 w 6 d	27	49.0
24 w–27 w 6 d	5	9.1
Prior pregnancies		
1	14	25.4
2–4	38	69.0
5 or more	3	5.5
Blood group		
A+	15	27.2
B+	16	29.0
AB+	2	3.6
O+	19	34.5
A–	1	1.8
B–	2	3.2
Type of pregnancy		
Singleton	48	87.2
Twins	6	10.9
Triplets	1	1.8

d, days; *n*, number; w, weeks

contraception as both have been deemed safe for use immediately following an early pregnancy loss.[4]

Results

The total number of patients who were included in this study was 55. The age of the women ranged from 22 to 42 years. Eight women (14.5%) were 24 years of age or younger as shown in Table 1. The commonest age group was of 25–29 years in which 19 women (34.5%) were there. Sixteen women (29%) had an age between 30 and 34 years, ten women (18.1%) were aged 35–39 years, and two women (3.6%) were of 40 years or more.

Fourteen (25.4%) were primigravida and in thirty-eight women (69.1%), it was second to fourth conception. In 3 women (5.5%), it was fifth conception or beyond.

The gestational age of women was between 13 and 27 weeks. On the day of the abortion, 11 women (20%) had a gestational age between 12 weeks and <16 weeks, 12 women (21.8%) had gestation between 16 and <20 weeks, 27 women (49.1%) had gestation between 20 and <24 weeks, and 5 women (9.1%) had gestation between 24 and <28 weeks.

The commonest blood group in this retrospective study of abortions was O positive. Nineteen women (34.5%) were O positive, sixteen (29.1%) were B positive, fifteen (27.2%) were A positive, and two women (3.6%) were AB positive.

Forty-eight women (87.2%) had singleton conception and in six women (10.9%) it was a twin conception. One lady (1.8%) had triplets.

Two patients who were admitted for abortion at this center during this period were excluded from the study as they had a uterine rupture. The first patient had two previous cesarean deliveries. She was given five doses of tablet misoprostol at an interval of 6 hours each. She started complaining of increased abdominal pain and giddiness. On ultrasound, the fetus was found lying partially out of the uterine cavity. Foley catheter placement prior to surgery showed hematuria. She underwent an emergency laparotomy where the fetus was seen lying in the abdominal cavity and the placenta was seen partially out through scar rupture. The bladder was found injured. There was about 800 ml of fluid in the abdominal cavity containing blood, liquor, and maternal urine. The fetus, placenta, and fluid were removed. The site of uterine rupture and bladder rupture was repaired. She was transfused 4 units of packed red blood cells (RBC) in the postop period. She was given antibiotics for 7 days. The Foley catheter was kept *in situ* for 14 days. Thereafter, the patient had an uneventful recovery. The second woman had one prior cesarean delivery. Uterine rupture was suspected in view onset of upper abdominal pain and tachycardia (pulse rate: 110/min). Ultrasound showed an empty fundus of the uterus with the fetus lying partially in the abdomen and free fluid in the abdominal cavity. She was taken up for emergency laparotomy where the fetus and placenta with intact sac was lying partially out of the uterus. The products of conception were removed and the ruptured site was repaired. She was transfused 2 units of packed RBC to correct the blood loss. Surgical evacuation is preferred in women who present with hemorrhage, hemodynamic instability, or signs of infection because these conditions require urgent treatment.[5]

The analysis of these 55 women showed the commonest cause of abortion as missed abortion/intrauterine fetal femise (IUFD) (10 women, 18.2%) as mentioned in Table 2. The other common causes included inevitable abortion (seven women, 12.7%), preterm premature rupture of membranes (PPROM in six women, 10.9%), and voluntary termination of pregnancy (five women, 9.1%). All abortions were carried out as per the MTP Act 1971 of India and its further amendment in 2021. In all cases, PCPNDT rules were strictly complied with.

Two patients were advised MTP in view of severe maternal disease with the likelihood of further aggravation during pregnancy.

The remaining 25 women were advised invasive testing in form of chorionic villus sampling (CVS) or amniocentesis if they had previously affected pregnancies with significant fetal physical/mental abnormalities in which some pathogenic or likely pathogenic mutation was identified or in present pregnancy they had major abnormalities in the fetus or multiple soft markers in fetus on ultrasound or increased risk of aneuploidy in prenatal screening. Twenty-four women had opted for further evaluation with invasive testing. One patient with trisomy risk 1:45 on the first trimester combined screening and large anterior wall fibroid (11 cm × 10 cm × 8 cm) who was at 14 weeks and 6 days gestation opted for termination of pregnancy in spite of adequate counseling about the need for invasive testing.

About 24% of pregnancy losses in the second trimester are caused by chromosomal abnormalities, and about 12% of late second-trimester losses are attributed to this cause.[6]

Table 2: Indications of abortions

Indications	*Number*	*%*
PPROM	6	10.9
MTP	5	9.1
Missed abortion	10	18.2
Inevitable abortion	7	12.7
CNS		
Bilateral severe ventriculomegaly	1	1.8
Cerebellar hypoplasia	1	1.8
Agenesis of corpus callosum with microcephaly	1	1.8
ONTD	1	1.8
Other spinal deformity	1	1.8
Binder facies	1	1.8
Cystic hygroma	1	1.8
Congenital heart disease		
Ebstein's anomaly with cardiomegaly	1	1.8
Complex congenital heart disease	1	1.8
Kidneys		
Multicystic dysplastic kidneys	2	3.6
Bilateral severe hydroureteronephrosis and right renal cyst	1	1.8
Fetal arthrogryposis	1	1.8
Trisomy 21	1	1.8
Increased risk for trisomy 21	1	1.8
DMD	1	1.8
SMA	1	1.8
Thalassemia major	2	3.6
Hemophilia A	1	1.8
Sickle cell anemia with duodenal atresia	1	1.8
Farber disease	2	3.6
Other genetic diseases		
Duplication of long arm of chromosome 7 with bilateral CTEV	1	1.8
Mutation in GORAB gene	1	1.8
Maternal disease		
RHD with severe MS, severe MR and pulmonary artery hypertension	1	1.8
Post ASD closure with bilateral MCA territory infarct	1	1.8

Among the congenital birth defects, five fetuses had central nervous system (CNS) and spinal deformity, one had binder facies, one had cystic hygroma, two had congenital heart disease, three had severely affected kidneys, and one had arthrogryposis.

The chromosomal microarray (CMA) of a fetus with cerebellar hypoplasia showed pathogenic deletion of 171 genes (size ~ 33 MB) on chromosome 5. Chromosomal microarray report of the fetus with open neural tube defect (ONTD) in the lumbosacral region with compression of posterior fossa (Arnold Chiari Malformation Type II) was normal. Whole-exome sequencing (WES) for the fetus with a severely deformed spine did not identify any pathogenic or likely pathogenic variant. The CMA of the fetus with bilateral

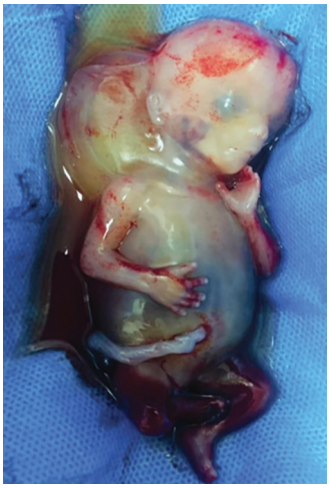

Fig. 1: Cystic hygroma in abortus. Chorionic villus sample revealed Turner syndrome

severe ventriculomegaly was normal. Whole-exome sequencing, karyotype, and qualitative polymerase chain reaction (PCR) for toxoplasma, rubella, cytomegalovirus, heroes (TORCH) infection were negative in the fetus with agenesis of the corpus callosum and microcephaly.

The fetus with features of binder facies on target scan for anomalies did not show any clinically significant deletion/duplication or other chromosomal abnormality on the microarray.

Quantitative fluorescent polymerase chain reaction (QFPCR) and CMA on a CVS sample of the fetus with cystic hygroma revealed Turner syndrome in the fetus as shown in Figure 1.

The CMA of the fetus with complex congenital heart disease (hypoplastic right ventricle, tricuspid atresia, and double outlet right ventricle) was normal. The karyotype of the fetus with Ebstein's anomaly and cardiomegaly was normal.

Whole-exome sequencing of the fetus with bilateral dysplastic kidneys showed a pathogenic homozygous variant in c.1993delG in exon 21 of the PKHD1 gene. Whole-exome sequencing of placental biopsy of the fetus with bilateral dysplastic kidneys with anhydramnios did not show any pathogenic or likely pathogenic variant. Whole-exome sequencing on the amniotic fluid of the fetus with bilateral severe hydroureteronephrosis and right renal cyst of about 5 cm × 4.5 cm on ultrasound did not identify any pathogenic or likely pathogenic variant.

The woman with the first child having arthrogryposis and WES showing a pathogenic variant in the ECEL1 gene for distal arthrogryposis type 5D was found again in this pregnancy with the fetus having features of arthrogryposis. The couple opted for amniocentesis and termination of pregnancy. The image of the abortus is seen in Figure 2.

The woman with trisomy 21 risk 1:7 on a quadruple test done elsewhere was also found to have echogenic bowel on ultrasound. Amniocentesis done at this center showed trisomy 21 on QFPCR and CMA samples.

Another woman with Duchenne muscular dystrophy (DMD) in the first child had undergone amniocentesis in this pregnancy elsewhere which revealed DMD in this fetus as well. The couple came to this center for the second opinion and opted for termination of pregnancy here after detailed counseling.

The woman with the first child with spinal muscular atrophy (SMA) and in this pregnancy fetus having echogenic intracardiac

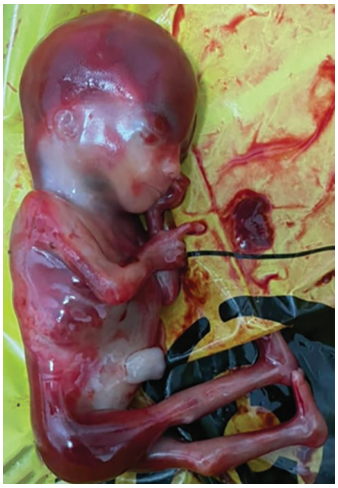

Fig. 2: Arthrogryposis in abortus

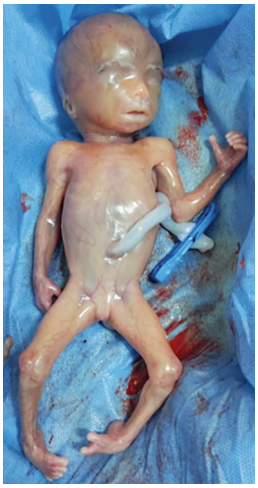

Fig. 3: Bilateral CTEV in abortus. Microarray on amniocentesis showed partial trisomy 7q

focus, single choroid plexus cyst and mild left pelviectasis underwent amniocentesis. Fetal karyotype was normal; however, multiplex PCR assay (MLPA) showed SMN1 exon 7,8 homozygous deletion suggestive of the fetus affected with SMA.

The woman with a family history of hemophilia A had undergone CVS sampling elsewhere which showed hemophilia A in the fetus. She came with the report to this center. After adequate counseling, the couple opted for abortion.

The woman with a previous child with thalassemia major underwent CVS during this pregnancy. Hemoglobin subunit beta (HBB) gene sequencing showed a pathogenic compound heterozygous variant suggesting an affected fetus.

The woman with the previous child with sickle cell anemia underwent CVS sampling. The HBB gene sequencing showed sickle cell minor. Karyotype was normal. In an anomaly scan later on the fetus was found to have duodenal atresia after which the couple opted for termination of pregnancy.

A 25-year-old woman whose first child had died due to Farber disease underwent CVS in the second pregnancy in which the Sanger sequence showed a variant in the ASAH1 gene. The patient aborted in January 2022. In the third pregnancy, she underwent amniocentesis. Sanger sequence showed the same variant as in the index child and second fetus. The couple opted for termination of pregnancy and she aborted again in September 2022.

Another woman with the first child with facial dysmorphism, ventricular septal defect, and the global developmental delay had the fetus with features of bilateral congenital talipes equinovarus (CTEV) on ultrasound. The CMA on amniotic fluid sample showed a pathogenic gain of 121 genes (~11 MB) on the long arm of chromosome 7 consistent with partial trisomy 7q or 7q duplication. The abortus is shown in Figure 3.

A woman with the first child affected with global developmental delay and homozygous mutation in the golgin, RAB6 interacting (GORAB) gene had done the triple marker test for aneuploidy screening elsewhere which showed trisomy 21 risk 1:220. The couple was counseled for amniocentesis. The fetal karyotype was normal. Sanger sequencing showed homozygous variant status in the GORAB gene same as in the first child. The couple opted for abortion.

There were 48 singletons, 6 twins, and 1 triplet conception. The total number of fetuses was 63. In 60 abortuses, gender was identified, but in three abortuses the same could not be identified mostly because of under-developed genitalia. There were 42 male and 18 female abortuses.

As is evident from Table 3, there was a wide variation in the weight and length of abortuses. The variation could be due to growth restricted versus hydropic and fresh versus macerated. The higher weight reading could also be due to measuring the weight of the abortus with a long length of the umbilical cord, placental tissues, or clots. The length of the abortus also showed variations which could be due to measuring crown-rump length in some and head-to-toe length in others.

The measurements of head circumference, thoracic circumference, and abdominal circumference were more consistent with gestational age. Small variations could be because of fresh versus macerated abortuses.

The weight of the placenta and the length of the umbilical cord also varied widely.

The requirement of the blood transfusion was more common in patients who took longer time to expel the placenta after delivery of the abortus.

Discussion

The risk of early pregnancy loss decreases with increasing gestational age and is relatively low after 15-week gestation in a genetically normal fetus.[7]

Termination of the second-trimester pregnancy with medical method includes the administration of drugs like mifepristone and misoprostol. Mifepristone intake during pregnancy causes softening of the cervix and increased contractility of the uterus and sensitivity to prostaglandin. Misoprostol is a synthetic prostaglandin E1 analog that is effective not only in preventing gastric ulcers but also in inducing cervical effacement and uterine contractions. The effectiveness of misoprostol alone for the second-trimester pregnancy is 80–90%.[8]

Termination of pregnancy up to 20 weeks was carried out in women where the continuance of the pregnancy would involve a risk to the life of the pregnant woman or grave injury to her physical or mental health. Five women who underwent voluntary termination of pregnancy were all with gestation less than 20 weeks. Two of the above five women underwent MTP because of severe maternal disease. One patient had rheumatic heart disease

Table 3: Biometry of abortus, placenta, and umbilical cord

Gestation	*n*	*Gender*	*Weight of abortus (gm)*	*Length (cm)*	*Head circumference (cm)*	*Thoracic circumference (cm)*	*Abdominal circumference (cm)*	*Placental weight (gm)*	*Cord length (cm)*
13 w–13 w 6 d	3	M: 2 F: 1	50–80	10	5–10	5–9	6–9	60	
14 w–14 w 6 d	3	M: 2 F: 1	70–450	16	8–10	7–9	7–9	60–130	12
15 w–15 w 6 d	7	M: 7	75–120	8–17	6–9	5–8	5–8	80–100	14–30
16 w–16 w 6 d	1	M: 1	100	9	6	6	7		
17 w–17 w 6 d	5	M: 3 F: 1 U: 1	120–175	15–20	11–17	10.2–18	10–13	60–180	14–16
18 w–18 w 6 d	5	M: 4 F: 1	115–300	12–22	12–16	10–16	10–16	35–260	20–32
19 w–19 w 6 d	2	M: 2	165–350	21–23	13	12–13	11–12	150	10–24
20 w–20 w 6 d	10	M: 5 F: 4 U: 1	255–639	12–40	12–21	12–18	12–21	80–250	12–28
21 w–21 w 6 d	6	M: 4 F: 2	257–630	24–30	14–28	15–22	12–20	205–400	7–35
22 w–22 w 6 d	6	M: 3 F: 3	420–590	25–40	14–23	16–21	14–18	180–288	14–20
23 w–23 w 6 d	10	M: 6 F: 3 U: 1	180–740	18–30	11–23	13–29	11–21	185–320	14–42
24 w–24 w 6 d	2	M: 2	680–750	28	16–25	18–20	18–20	205	14–15
26 w–26 w 6 d	1	M: 1	515	29	21	18	18	160	18
27 w–27 w 6 d	2	F: 2	920–1000	34–35	26	21–25	20–24	280–300	28

d, days; F, female; M, male; *n*, number; U, unidentified gender; w, weeks

with severe mitral valve stenosis, severe mitral valve regurgitation, and pulmonary arterial hypertension. This patient was planned by a cardiologist for mitral valve replacement 3 months after the abortion. The second patient was post-ASD closure with bilateral MCA territory infarct.

Termination of pregnancy up to 24 weeks was done only when there was a substantial risk that if the child was born, it would suffer from a serious physical or mental abnormality. Termination of pregnancy beyond 24 weeks was done only in patients with intrauterine fetal demise.

Lack of availability of timely and safe abortion facilities can result in various complications like a continuation of the fetus with birth defects, incomplete abortion, severe hemorrhage, and sepsis.

The limitations of this analysis included a smaller sample size of cases and the retrospective nature of the study. The causes of missed abortion and inevitable abortion could not be analyzed due to a lack of data. The features of chorioamnionitis in PPROM patients could not be evaluated. The maternal causes of second-trimester miscarriages like leiomyomas, uterine anomalies, thrombophilias, and medical disorders could not be analyzed. Further prospective randomized studies involving higher patient numbers over a greater length of time are required to confirm our findings.

Nevertheless, this analysis could identify many likely common causes of the second-trimester abortion like missed abortion/IUFD, PPROM, inevitable abortion, and MTP. It also identified common fetal structural and genetic anomalies like ONTDs, agenesis of the corpus callosum, cystic hygroma, congenital heart diseases, dysplastic kidneys, duodenal atresia, arthrogryposis, and trisomy 21. The couple with a family history or affected children with diseases like DMD, SMA, thalassemia, or hemophilia should be evaluated for genetic causes, which may recur in subsequent pregnancies. All women at the first visit should also be physically examined to rule out maternal disorders like rheumatic heart disease. Chronic diseases in the mother can also increase the risk of pregnancy loss.[9] If the loss is a stillbirth, a pathologic examination of the fetus and placenta is advocated; chromosomal analysis should also be performed, if possible.[10]

Conclusion

The second-trimester abortion is less common than the first trimester. However, it gives more opportunities to us to evaluate with ultrasound and invasive testing to detect genetic causes. It emphasizes the need for a detailed evaluation of all pregnancies with reliable prenatal tests for aneuploidy screening, good first-trimester scan, detailed target scan for fetal anomalies at about 20 weeks, and evaluating maternal disorders properly.

References

1. McNamee KM, Dawood F, Farquharson RG. Mid-trimester pregnancy loss. Obstet Gynecol Clinics North America 2014;41(1):87–102. DOI: 10.1016/j.ogc.2013.10.007.

2. Edlow AG, Srinivas SK, Elovitz MA. Second-trimester loss and subsequent pregnancy outcomes: What is the real risk? Am J Obstet Gynecol 2007;197(6):581.e1–6. DOI: 10.1016/j.ajog.2007.09.016.
3. World Health Organization. Congenital anomalies. https://www.who.int/health-topics/congenital-anomalies#tab=tab_1.
4. Curtis KM, Tepper NK, Jatlaoui TC, et al. US medical eligibility criteria for contraceptive use, 2016. MMWR Recomm Rep 2016;65(3):1–103. DOI: 10.15585/mmwr.rr6503a1.
5. The American College of Obstetricians and Gynecologists Practice Bulletin no. 150. Early pregnancy loss. Obstet Gynecol 2015;125(5): 1258–1267. DOI: 10.1097/01.AOG.0000465191.27155.25.
6. Warburton D, Kline J, Stein Z, et al. Cytogenetic abnormalities in spontaneous abortions of recognized conceptions. In: Porter IH, Hatcher NH, Willey AM, eds. Perinatal Genetics: Diagnosis and Treatment. Orlando, Fla.: Academic Press, 1986: pp. 23–40.
7. Wyatt PR, Owolabi T, Meier C, et al. Age-specific risk of fetal loss observed in a second trimester serum screening population. Am J Obstet Gynecol 2005;192(1):240–246. DOI: 10.1016/j.ajog.2004.06.099.
8. Ho PC, Blumenthal PD, Gemzell-Danielsson K, et al. Misoprostol for the termination of pregnancy with a liver fetus at 13 to 26 weeks. Int J Gynecol Obstet 2007;99:S178e81. DOI: 10.1016/j.ijgo.2007.09.007.
9. Eunice Kennedy Shriver National Institute of Child Health and Human Development. What Are the Causes of and Risks for Pregnancy Loss (Before 20 Weeks of Pregnancy)? https://www.nichd.nih.gov/health/topics/pregnancyloss/conditioninfo/causes. Accessed date: 17 April 2023.
10. Incerpi MH, Miller DA, Samadi R, et al. Still-birth evaluation: What tests are needed? Am J Obstet Gynecol 1998;178:1121–1125. DOI: 10.1016/s0002-9378(98)70311-4.