Termination of Pregnancy for Fetal Anomalies Up to 24 Weeks of Gestation: A Comprehensive Clinical, Diagnostic, Ethical, and Legal Analysis

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Abstract—Termination of pregnancy (TOP) for fetal anomalies up to 24 weeks of gestation represents one of the most complex clinical, legal, and ethical domains in modern maternal-fetal medicine. Advances in prenatal screening—including cell-free DNA (cfDNA) testing, high-resolution ultrasonography, non-invasive imaging (fetal MRI), and chromosomal microarray analysis (CMA)—have drastically shifted the detection of major structural and genetic abnormalities into earlier gestational windows. However, a significant proportion of severe structural anomalies, particularly complex central nervous system (CNS) malformations and structural cardiac defects, are definitively diagnosed during the mid-trimester target scan between 18 and 22 weeks of gestation. This review provides a comprehensive analysis of second-trimester termination of pregnancy up to 24 weeks. It examines diagnostic modalities, major structural and chromosomal indications, clinical protocols (comparative efficacy of surgical dilation and evacuation [D&E] versus medical induction with mifepristone and misoprostol), feticide procedures, ethical paradigms surrounding fetal viability, and variable legal frameworks worldwide. Furthermore, it addresses post-procedural pathology, bereavement care, and genetic counseling for subsequent pregnancies.

Keywords: Second-Trimester Abortion, Fetal Anomalies, Prenatal Diagnosis, Dilation and Evacuation, Mifepristone, Misoprostol, Maternal-Fetal Medicine, Bioethics.

1. Introduction

Congenital anomalies account for approximately 20–25% of perinatal mortality globally and represent a leading cause of long-term infant morbidity and childhood disability. Over the past four decades, the field of prenatal diagnosis has undergone a profound technological revolution. What was once limited to basic clinical palpation and late-gestation radiologic evaluation has evolved into a highly precise clinical science capable of identifying microgram-level genetic deletions and subtle anatomical aberrations as early as the first and early second trimesters.

Despite these advances, the second trimester—specifically the window spanning 13 to 24 weeks of gestation—remains the critical diagnostic interval for the majority of structural fetal anomalies. The routine mid-trimester anomaly scan, recommended universally between 18 and 22 weeks of gestation by bodies such as the International Society of Ultrasound in Obstetrics and Gynecology (ISUOG) and the American College of Obstetricians and Gynecologists (ACOG), serves as the primary mechanism for detecting structural defects.

When a severe or lethal fetal anomaly is diagnosed, expectant parents face profound psychological distress and time-sensitive clinical decisions. The decision to terminate a pregnancy following the confirmation of a severe fetal defect is governed by a delicate balance of patient autonomy, medical ethics, clinical safety, and regional statutory frameworks. The 24-week gestational threshold holds particular significance globally. Historically anchored to the traditional landmark of potential extrauterine fetal viability, 24 weeks represents a critical legal boundary in many international jurisdictions.

2. Prenatal Diagnostic Modalities

Accurate diagnosis and prognosis estimation are prerequisites before any discussion of pregnancy termination for fetal anomalies. Modern prenatal care utilizes a tiered approach combining screening tools with invasive confirmatory diagnostic procedures.

2.1. cfDNA and Serum Screening

Cell-free DNA screening from maternal plasma has transformed early aneuploidy detection. With sensitivity and specificity exceeding 99% for Trisomy 21 (Down syndrome), cfDNA provides early risk stratification starting at 10 weeks of gestation. However, cfDNA remains a screening tool; positive results must be confirmed via invasive diagnostic testing prior to irreversible clinical actions such as pregnancy termination. Second-trimester maternal serum screening (the “quadruple screen”) provides risk scores for

Trisomy 21, Trisomy 18, and open neural tube defects (ONTDs).

2.2. High-Resolution Ultrasonography

Ultrasound remains the primary imaging modality for structural assessment. ISUOG guidelines stipulate a systematic examination during the 18–22 week anomaly scan utilizing specific anatomical planes:

- **Neurosonographic Plane:** Evaluation of the transventricular, transthalamic, and transcerebellar planes to measure posterior fossa width, nuchal fold, and lateral ventricle width.
- **Cardiovascular Plane:** Examination of the four-chamber view, LVOT, RVOT, and three-vessel trachea (3VT) view.
- **Abdominal and Musculoskeletal Planes:** Verification of stomach position, renal pelves, bladder filling, bowel echogenicity, and four-limb bone lengths.

2.3. Fetal Magnetic Resonance Imaging (MRI)

Fetal MRI serves as an indispensable adjunct to high-resolution ultrasonography, particularly between 18 and 24 weeks. Superior soft-tissue contrast and immunity to maternal obesity or oligohydramnios make fetal MRI highly valuable in evaluating complex CNS malformations and Congenital Diaphragmatic Hernia (CDH).

2.4. Invasive Diagnostics (Amniocentesis & CMA)

Amniocentesis is the gold standard for second-trimester diagnosis, typically performed from 15 weeks onward. It allows for Chromosomal Microarray Analysis (CMA), which replaces traditional G-banded karyotyping as the first-line test for structural anomalies, detecting submicroscopic copy number variations that standard karyotyping misses in up to 6–10% of structurally abnormal fetuses.

3. Spectrum of Fetal Anomalies

Fetal anomalies leading to second-trimester termination are broadly divided into lethal anomalies, severe non-lethal anomalies associated with profound physical/intellectual disability, and conditions causing progressive intra-uterine decline.

3.1. CNS Malformations

CNS anomalies represent a common indication for termination due to their impact on long-term neurological function.

- **Anencephaly:** Lethal neural tube defect characterized by the absence of the major portion of the brain and skull.
- **Severe Open Spina Bifida:** Associated with Arnold-Chiari II malformation, severe hydrocephalus, and lower-limb paralysis.
- **Alobar Holoprosencephaly:** Failure of the prosencephalon to divide into bilateral cerebral hemispheres.

3.2. Chromosomal Aberrations

Severe aneuploidies such as Trisomy 13 (Patau Syndrome) and Trisomy 18 (Edwards Syndrome) are characterized by multi-organ structural defects. Median survival is measured in days to weeks post-birth, prompting most parents to request early termination.

3.3. Cardiovascular and Renal Defects

Major congenital heart diseases (CHDs) like Hypoplastic Left Heart Syndrome (HLHS) frequently lead to requests for termination due to the burden of multi-stage palliative cardiac surgeries. Similarly, conditions like Bilateral Renal Agenesis (Classic Potter Sequence) result in severe pulmonary hypoplasia, rendering the condition uniformly lethal at birth.

4. Clinical Management of Termination

Termination of pregnancy between 13 and 24 weeks can be safely accomplished through either Surgical Abortion (Dilation and Evacuation - D&E) or Medical Abortion (Induction of Labor).

4.1. Medical Termination Regimens

The gold-standard medical regimen is the combination of Mifepristone followed by Misoprostol.

- **Mifepristone:** 200 mg orally administered 24 to 48 hours prior to misoprostol initiation. It sensitizes the myometrium to prostaglandin activity.
- **Misoprostol:** Initiated 24–48 hours post-mifepristone. Loading dose of 400 micrograms followed by repeated doses every 3 to 4 hours until expulsion occurs.

Over 90–95% of patients achieve complete expulsion within 24 hours.

4.2. Surgical Termination (D&E)

D&E is the standard surgical approach for second-trimester termination in many developed nations due to its speed and predictability. It involves meticulous cervical preparation with osmotic dilators (Dilapan-S or Laminaria) 12 to 24 hours prior to surgery, followed by surgical evacuation of the uterus using suction and specialized forceps under ultrasound guidance.

4.3. Intrauterine Feticide

In pregnancies progressing past 20–22 weeks, to prevent live birth during termination, intra-uterine feticide is routinely offered. This is typically achieved via ultrasound-guided intracardiac injection of Potassium Chloride (KCl), resulting in immediate diastolic arrest, or intra-amniotic Digoxin.

5. Ethical and Legal Frameworks

The ethical environment surrounding termination for fetal anomalies involves balancing fundamental bioethical principles: Maternal Autonomy against the Fetus's increasing moral status with gestational age. The concept of fetal viability is classically defined around 22 to 24 weeks, yet viability is dependent on organ maturation and the absence of lethal anatomical structural defects. A fetus with bilateral renal agenesis is non-viable regardless of gestational age. Legally, frameworks vary wildly, from the UK's Ground E (no gestational limit for severe anomalies) to heavily restricted frameworks in post-Dobbs US states and highly regulated medical board reviews in the EU.

6. Psychosocial Implications and Pathology

The psychological impact of terminating a desired pregnancy is profound. Early involvement of specialized perinatal bereavement counselors is essential. Post-mortem autopsy remains the definitive standard for confirming prenatal diagnostic findings, identifying un-suspected dysmorphic syndromes, and clarifying recurrence risks for future pregnancies, forming the basis for subsequent genetic counseling.

7. Conclusion

Termination of pregnancy for fetal anomalies up to 24 weeks of gestation requires a balance of advanced diagnostic technologies, safe clinical methods, empathetic bereavement care, and clear ethical guidelines. Maternal-fetal medicine specialists play a vital role in delivering evidence-based care and guiding families through these devastating diagnoses.

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