Intrauterine Fetal Death

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Although many of the risks of pregnancy and childbirth have been alleviated or minimized during the past century, intrauterine fetal demise (IUFD) remains a significant obstetric problem. IUFD can occur without warning during an uncomplicated pregnancy, or it may be associated with specific medical conditions and social behaviors. This chapter discusses the definition, epidemiology, etiology, prevention, and management of IUFD, with special emphasis on anesthetic management.

Definition

The study of IUFD has been hampered by two factors: a lack of consensus with respect to the definition of this event and the fact that there is no organized mechanism for its reporting. In the early 1950s, the World Health Organization (WHO) defined fetal death as “death occurring prior to the complete expulsion or extraction from the mother of a product of conception, irrespective of duration of pregnancy; the death is indicated by the fact that after such separation, the fetus does not breathe or show any evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definitive movement of voluntary muscles.”

This definition was adopted to show a distinction between spontaneous abortion and stillbirth and to allow collection of statistics based on a consistent standard. However, many issues worldwide continue to preclude our ability to reach consensus on definition. For example, in the United States, the National Center for Health Statistics has adopted the WHO definition. In most other nations, registration of a fetal death is required only if it occurs after the 20th week of gestation.

Another factor affecting the definition of IUFD has been the advancement of neonatal medicine and obstetric care, which continually affects the minimal gestational age at which fetal viability can occur. For many years, viability was considered to be possible only with birth after 28 weeks gestation. It is now possible, in some circumstances, for infants weighing as low as 500 g, coinciding with 24 weeks gestation, to survive with a reasonable prognosis and quality of life.

Overall, the incidence of IUFD in the United States is 6 to 7 per 1000 births; however, inconsistencies in both the definition of fetal death and in its reporting make it difficult to accurately estimate the true incidence of this condition. Poor documentation of IUFD also affects statistics regarding the causal factors. Indeed, as recently as June 2000, WHO demonstrated that up to 27% of stillbirths are reported without an attributable cause.

Epidemiology

During the period between 1981 and 1991, there were a total of 62 million pregnancies in the United States; of these, 62.5% resulted in live births, 21.9% in legal abortions, 13.8% in spontaneous abortions, 1.3% in ectopic pregnancies, and 0.5% in fetal deaths. Since 1950, there has been a progressive decline in the crude fetal death rate in the United States, from 18.4 to 6.8 per 1000 total births in 1997. Race can be an important factor in the incidence of fetal death. For instance, fetal death rate is lower for whites (Caucasian patients) as compared to all other racial groups, perhaps due to differences in gestational weight distribution. Other factors that have been linked to unexplained fetal death include older maternal age, low socioeconomic status, poor prenatal care (fewer than four antenatal visits), prepregnancy weight greater than 68 kg, primiparity and multiparity (>3), and large-for-gestational-age fetus.

A woman’s social behavior and habits can also affect pregnancy outcome and affect the incidence of IUFD. For instance, smoking is associated with a higher incidence of fetal death, and the effects of smoking are more pronounced during pregnancy of older compared to younger women. The risk of fetal mortality is 77% greater when alcohol is consumed during pregnancy than when no alcohol is consumed. Illicit drug abuse, particularly of crack/cocaine, can have many negative effects on a pregnancy and can also result in IUFD.
Diagnosis

As stated, IUFD is diagnosed when a fetus has no cardiac activity, umbilical cord pulsation, or definitive movement of voluntary muscles. Suspicion of fetal death is confirmed by either radiographic or biochemical tests that identify degenerative changes in the fetus resulting from intrauterine death.

A common symptom associated with IUFD is a report that the mother no longer “feels pregnant.” Fetal movements may be absent or decreased, and there may be a loss of breast discomfort and nausea. Clinical signs indicative of IUFD may be a lack of interval examination fundal height growth, inability to auscultate fetal heart tones, maternal weight loss, or vaginal bleeding. The presence of any of these signs indicates the need for further evaluation of the fetus by ultrasound to identify the presence or absence of fetal heart activity.

If fetal heart tones cannot be auscultated, cardiac movement, as determined by real-time ultrasonography, is the clearest, most direct sign of fetal life. If sonography indicates that an IUFD has occurred, the cause of death may be subsequently identified by pathologic examination of the fetus and placenta.

Other sonographic signs associated with IUFD are dependent on the gestational age and the time interval since the fetal death. In addition to the absence of cardiac motion, other key diagnostic signs suggestive of fetal death are the absence of fetal limb or trunk movements and the absence of umbilical cord pulsations. In modern practice, fetal movement, particularly cardiac activity, can be visualized from as early as 8 weeks gestation by transabdominal sonography, but the resolution may be affected by maternal body habitus. In contrast, transvaginal ultrasound has become the preferred modality for confirming fetal cardiac activity for two reasons. First, the resolution is not dependent on body habitus, because the examination is performed with an endovaginal probe; second, this technique allows for the use a higher-frequency transducer (6.5 MHz) capable of determining fetal cardiac activity by the sixth week of gestation. The presence of an intrauterine gestational sac with a fetal pole and the absence of cardiac activity by ultrasound indicate fetal nonviability. In very early pregnancy, an empty gestational sac without a fetal pole may represent an error in dating the pregnancy rather than indicating an embryonic demise or blighted ovum. In such a case, the patient is usually rescanned in 7 to 14 days, at which time the presence of a normal pregnancy can be distinguished from a blighted ovum or embryonic demise. Fetal movements are a less reliable sign of fetal life, as they may be passive, caused by maternal movement, great vessel pulsations, or uterine positioning, or active, originating from the fetus itself.

After the death of a fetus, secondary signs related to degenerative changes may be observed by ultrasound. Twelve hours after IUFD, the intracranial anatomy becomes obscure due to degeneration of neural tissue. Within 72 hours, the calvaria collapses, and the cranial bones overlap. The fetal outline is also said to become “fluffy” due to the absorption of amniotic fluid by the skin, resulting in edema.

After fetal death, amniotic fluid volume decreases because of both a lack of production by the fetus and absorption of the remaining fluid by the mother. As a result, severe oligohydramnios is an associated finding in many cases of IUFD. However, skeletal deformities, skin edema, and severe oligohydramnios may be also observed in a living fetus with specific congenital abnormalities. For this reason alone, it must be emphasized that the only definitive sign of fetal death is the absence of cardiac motion.

Etiology

Chromosomal Causes

Chromosomal abnormalities are the single most common cause of pregnancy loss. Up to 50% of first trimester losses and 5% to 10% of midpregnancy stillbirths are related to chromosomal abnormalities. Chromosomal abnormalities vary with both maternal and gestational age. For instance, the most common abnormality associated with first trimester pregnancy loss is Turner’s syndrome (45X), which is usually linked to young maternal age. Trisomy is the most frequent chromosomal abnormality found in fetal deaths at a more advanced gestational age. For the most part, fetuses with autosomal trisomies rarely survive until term; however, trisomies 13, 18, and 21 may be compatible with life. A genetic analysis of fetal tissue is essential because diagnosis of a chromosomal abnormality may have major implications in counseling the family for future pregnancies.

Fetal Malformations

Approximately one in four stillborn infants has a congenital malformation, and half of these are related to a genetic problem. Many of the malformations associated with stillbirth are also commonly seen in spontaneously aborted fetuses. It is often difficult to determine the exact frequency of a specific malformation. For instance, some malformations may be underreported because degenerative changes in the dead fetus preclude accurate identification. Alternatively, rates of some malformations have been reported to be higher in stillborn fetuses because the condition is generally more severe and easier to identify.

In order of decreasing frequency, the most common chromosomal congenital malformations associated with stillbirth are cardiac defects, urogenital anomalies, polydactyly/syndactyly/oligodactyly, omphalocele/gastrochisis, hydrocephalus, cleft lip/palate, microphthalmia/anophthalmia, intestinal atresia, and midline brain defects. Nonchromosomal congenital defects linked with stillbirth include neural tube defects, anomalies in infants born to diabetic mothers, amniotic band syndrome, Potter’s syndrome, gastrointestinal conditions including gastrochisis, omphalocele, and dwarfism.