DRUG ABUSE, PREGNANCY COMPLICATIONS AND ULTRASOUND FINDINGS

Dr. Bashiri A.
Obstetrics and Gynecology Department
Soroka University Medical Center
Ben-Gurion University of the Negev
Faculty of health Sciences
Beer-Sheva
• In 2005, in the USA - 3.9% of pregnant women, age 15-44, reported illicit drug in the past month.

• In 2002, 363,000 women were admitted to substance abuse programs, 4% of whom were pregnant at the time of admission.

• Heroin was identified as the primary substance of abuse in 15% of these women.

SAMHSA. Results from the 2005 National Survey.
Drugs

- Heroin.
- Cocaine.
- Marijuana
- LSD.
- Methadone.
Structural Malformation and Amniotic Band

Fetal Stroke

PTD, PPROM

Placenta abruption

IUGR

STD
Teratogenic effect

- CNS disruptions.
- Limb reduction defects.
- Intestinal atresia and perforation with meconium peritonitis.
- Urogenital anomalies.
- Craniofacial defects.
- Cardiovascular abnormalities.
- Ocular defects.
Mechanism

- Transient rise in maternal blood pressure.
- Placental vasoconstriction.
- Interruption of blood flow to the fetus.
Sonography in cocaine and heroin
CNS Acquired Anomalies

- Cerebral infarction, hemorrhage.
- Porencephaly, hydrocephalus.
- Hydranencephaly.
Fetal Stroke

- Between 28 weeks of gestation and 28 days of life.
- 1:4000 live births.
- Associated with postnatal epilepsy, mental retardation and cerebral palsy.
- Caused by antenatal ischemic, thrombotic or hemorrhagic injury.
- The most common maternal conditions—alloimmune thrombocytopenia and trauma.
- 50%—unknown cause.

Ozduman et al. Fetal Stroke 2004;30: 151-162
• MRI- optimal for diagnosis- prenatal imaging revealed hemorrhage lesions in over 90% of studies.
• Porencephaly-13%.
• 78%-resulted in either death or adverse neurodevelopmental outcome at ages 3 months to 6 years.

Ozduman et al. Fetal Stroke 2004;30: 151-162
Figure 2. Postnatal magnetic resonance imaging of intraventricular hemorrhage (Case 52). Coronal fluid-attenuated inversion recovery image (fast spin echo inversion recovery: TR 16,002/TE/133/TI 2200/4-mm slice/20-cm field of view/256 × 192 matrix) reveals hyperintense hematoma (arrow) within the frontal horn plus ventriculomegaly.
Prenatal cocaine exposure and cranial sonographic findings in preterm infants

• Associated with subependymal hemorrhage and the formation of cysts that are detectable at neonates born at term.

• 122 premature infants, retrospective study.

• 8 out of 18 (44%) infants exposed to cocaine prenatally- compared with 8 out of 99(8%), p<0.01.

FIGURE 1. Sagittal (A) and coronal (B) sonograms show subependymal cyst in the left caudothalamic groove of a premature infant born at 32 weeks of gestation and exposed to cocaine in utero. Hemorrhage was not observed in this infant.
Fig. 1 – Transvaginal axial scan of the cerebellum and cisterna magna at 23.3 weeks shows a hypoechoic lesion of the left cerebellar hemisphere with hyperechoic borders (black arrow).
Congenital CNS malformations

- Microcephaly.
- Midline abnormalities (such as agensis of the corpus callosum).
- Septooptic dysplasia.
- Schizencephaly.
- Encephalocele and teratoma.
Septooptic dysplasia
Intestinal Atresia
Amniotic Band

- Early amniotic rupture leads to the formation of pathological amniotic strands, which can then induce various fetal abnormalities.

- Includes:
  - intrauterine amputations, syndactyly, fetal disruption, fetal compression deformities and constriction rings associated with disruption of the amniotic membranes.

Daly et al. Ultrasound Obstet Gynecol 1996;8:123-125
Amniotic bands can constrict fingers, limbs, and other body parts.

Chorion (outer membrane)

Amnion (inner membrane) torn or ruptured
• Associated with congenital annular constriction bands—clubfeet, lymphedema, pseudo-arthrosis and nail deformities.

• Extremity involvement is very common.

• Distal extremities were most often affected and usually involved the longer central fingers and median two toes.

Daly et al. Ultrasound Obstet Gynecol 1996;8:123-125
• Diagnosis by prenatal ultrasound demonstrating fetal deformities in non-embryological distributions, with or without visualization of amniotic sheets or bands within the amniotic fluid.

• The degree of deformity depends on the severity of the band formation and the gestational age at which this occurs.

Daly et al. Ultrasound Obstet Gynecol 1996;8:123-125
Daly et al 1996. Ultrasound Obstet Gynecol;8:123-125

Figure 3  Anteroposterior postnatal radiograph of the immensely swollen right hand with evident constriction of the right wrist
Don’t forget

- Multisubstance abuse is common
- Cocaine. Heroin, cigarettes, alcohol.
- Congenital infections.
The Preterm Parturition Syndrome

- Uterine overdistension
- Cervical Disease
- Abnormal Allograft Reaction
- Allergic phenomena
- Infection
- Endocrine Disorder

Romero et al, BJOG 2006;113 3:17-42.
Non Inflammatory Group

Maternal and fetal vascular lesions.
Maternal Lesions

• Failure of physiological transformation of the myometrial segment of the spiral arteries.
• Atherosis.
• Thrombosis of the spiral arteries. (a form of decidual vasculopathy).
• A combination of these lesions.

Romero et al, BJOG 2006;113 3:17-42.
Fetal Lesions

- A decrease in the number of arterioles in the villi.
- Fetal arterial thrombosis.

Romero et al, BJOG 2006;113 3:17-42.
Placental Abruption

- Premature separation of the placenta.
- 1% of births.
- Important cause of vaginal bleeding in the second half of pregnancy.
- Associated with significant perinatal mortality.

Oyelesy et al, Obstet Gynecol 2006;108:1005-16
<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Evidence</th>
<th>RR or OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal age and parity</td>
<td>+</td>
<td>1.1–3.7</td>
</tr>
<tr>
<td>Cigarette smoking</td>
<td>++</td>
<td>1.4–2.5</td>
</tr>
<tr>
<td>Cocaine and drug use</td>
<td>+++</td>
<td>5.0–10.0</td>
</tr>
<tr>
<td>Multiple gestations</td>
<td>++</td>
<td>1.5–3.0</td>
</tr>
<tr>
<td>Chronic hypertension</td>
<td>++</td>
<td>1.8–5.1</td>
</tr>
<tr>
<td>Mild and severe preeclampsia</td>
<td>++</td>
<td>0.4–4.5</td>
</tr>
<tr>
<td>Chronic hypertension with preeclampsia</td>
<td>+++</td>
<td>7.8</td>
</tr>
<tr>
<td>Premature rupture of membranes</td>
<td>++</td>
<td>1.8–5.1</td>
</tr>
<tr>
<td>Oligohydramnios</td>
<td>+</td>
<td>2.5–10.0</td>
</tr>
<tr>
<td>Chorioamnionitis</td>
<td>++</td>
<td>2.0–2.5</td>
</tr>
<tr>
<td>Dietary or nutritional deficiency</td>
<td>+/-</td>
<td>0.9–2.0</td>
</tr>
<tr>
<td>Male fetus</td>
<td>+/-</td>
<td>0.9–1.3</td>
</tr>
</tbody>
</table>

Placental Abruptio

A hematoma may be seen in:
1. Marginal location.
2. Retroplacental location.
3. Preplacental location.

Oyelesy et al, Obstet Gynecol 2006;108:1005-16
Fig. 4. Diagram showing the different sites at which ultrasonographic evidence of abruption may be observed. Subchorionic hematomas are thought to rise from marginal abruptions. “Preplacental hemorrhage” describes both subamniotic hematoma and massive subchorial thrombosis.


Large, retroplacental abruption
Large, extensive ultrasonographic preplacental collection
Thickened placenta with heterogenous appearance
Impact of Maternal substance use during pregnancy on childhood outcome

- Lower motor skills at 1 month.
- Poor performance on the soft sign examination.
- Behavioral problems.
- Special education services in school.
- Financial burden.

Shankaran et al. Seminars in Fetal & Neonatal Medicine 2007;12:143-150
Methadone

- Opioid agonist, pharmacologic properties similar to morphine, less sedative, does not cause euphoria.
- Methadone (M) hydrochloride is a synthetic opioid, mu agonist, with slow onset of action and a half-life of approximately 24 hours when taken orally.
- M maintenance programs were established at the 1960’s as a treatment for heroin dependence.

M is used for detoxification, treatment and maintenance of heroin users.

When substituted for heroin, it prevents opiate withdrawal symptoms, and blocks heroin craving for 24-36 hours.

Reduces the use of illicit opioids, criminal behavior and the spread of viral diseases and thus decreasing the morbidity and mortality in the heroin abusers.

Perinatal care of women maintained on methadone

- Antepartum teaching
- Maternal analgesia in labor
- Evaluation of fetal-well being in labor
- Neonatal care
- Postpartum care
- Breast feeding

Summary

- IUGR.
- STD
- Malformation.
- Amniotic Band.
- Stroke.
- Preterm delivery.
- Abruption.
- Childhood outcome.
- Methadone and pregnancy.
Thank you!