Polyhydramnios

Objectives

• To define polyhydramnios and describe the etiologies of polyhydramnios.
• To describe the peripartum complications associated with polyhydramnios.
• To describe the appropriate evaluation and management of a pregnancy complicated by polyhydramnios.

Amniotic Fluid Volume

• Regulation of AFV is complex and incompletely understood
• Fetal urine production
• Secretion of fetal lung fluid
• Fetal swallowing
• Movement between fetal blood and the placenta (Intramembranous Pathway)
• Movement across the surface of the amnion and chorion (Transmembranous Pathway)

Polyhydramnios

• Refers to an excessive amount of amniotic fluid
• Also known as “Hydramnios”
• Overall incidence ranges 0.2-2%
• Clinically, the diagnosis is made by ultrasound
• Several generally accepted definitions in the literature

Definitions of Polyhydramnios

| Amniotic Fluid Volume (AFV) > 2000ml |
| Amniotic Fluid Volume > 95th% for Gestational Age |
| Amniotic Fluid Volume > 97th% for Gestational Age |
| Amniotic Fluid Index (AFI) ≥ 24cm |
| Amniotic Fluid Index (AFI) ≥ 25cm |
| Single Deepest Pocket ≥ 8cm |
| A Subjectively Increased Amniotic Fluid Volume |

Polyhydramnios

<table>
<thead>
<tr>
<th>Severity Grading</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
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<tbody>
<tr>
<td>AFI</td>
<td>25-30 cm</td>
<td>30.1-35 cm</td>
<td>&gt; 35 cm</td>
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<tr>
<td>SDP</td>
<td>≥8 cm</td>
<td>≥12 cm</td>
<td>≥16 cm</td>
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Clinical Relevance

• Relation to adverse pregnancy outcomes, including perinatal mortality
• Association with pregnancy complications
  – Fetal anomalies, Diabetes
• Delivery complications
  – Increased c-section rate, malpresentation, macrosomia, fetal distress in labor
• Neonatal complications
  – Lower APGAR scores, increased rate of NICU admission

Mechanisms of Polyhydramnios

• Reduced Elimination
  – Esophageal atresia, tracheo-esophageal fistula, duodenal atresia
• Reduced Swallowing
  – Neurological impairment (e.g. anencephaly)
  – Neuromuscular disorders (e.g. Myotonic Dystrophy)
  – Fetal hypoxia (ovine model)
• Increased Production
  – Abnormal renal function, fetal brain injury, diabetes

Mechanisms of Polyhydramnios

• Exposed fetal cerebral and spinal tissues (e.g. spina bifida)
• Multiple Gestation (e.g. TTTS)
• Other conditions:
  – Isoimmunization (e.g. Hydrops)
  – Infection (e.g. CMV, toxoplasmosis, parvovirus)
  – Fetomaternal hemorrhage
• Idiopathic

Causes of Polyhydramnios

• Idiopathic (50-60%)
• Congenital anomalies / Genetic disorders (8-45%)
• Maternal Diabetes (5-26%)
• Multiple Gestation (8-10%)
• Fetal anemia (1-11%)
• Other (e.g. congenital viral infection, hydrops, etc.)

Idiopathic Polyhydramnios

• No identifiable cause
• Accounts for >50% of the cases
• May be related to aquaporins within the membranes
• Associated with pregnancy complications
• Increased risk for adverse pregnancy outcome
• Increased risk of perinatal mortality
• Increased risk of infant morbidity and mortality within the first year after birth

Idiopathic Polyhydramnios

• Panting, Kemp et al. 1999
  – 151 pregnancies with no identifiable cause of hydramnios (AFI > 24cm) compared to 302 pregnancies with normal AFV on ultrasound
• Associated with increased risk of:
  – malpresentation at the time of delivery
  – Infant birth-weight >4000g
  – Primary cesarean section
• No association with perinatal death
  – No perinatal deaths in either group
Idiopathic Polyhydramnios

- Maymon et al. 1998
  - 1,211 pregnancies with idiopathic hydramnios
  - AFI > 25cm or SDP > 8cm or a subjectively increased AFV
  - Adjusted for maternal diabetes and congenital anomalies and compared to 59,941 pregnancies with a normal AFV
  - Found a 5-fold increased risk of perinatal mortality
- A review of the literature by Magann, et al. 2007 found an overall increased risk of perinatal mortality of 2-5 fold

Genetic Implications

- Congenital fetal anomaly risk in the setting of polyhydramnios ranges 8-45%
- Common congenital anomalies include:
  - CNS anomalies
  - Cardiac anomalies
  - GI anomalies
  - Thoracic anomalies
  - Craniofacial anomalies
  - Skeletal anomalies
  - Renal anomalies

Genetic Implications

- Fetal aneuploidy:
  - Incidence varies but appears low overall (< 1%)
    - In a study by Biggio et al. 1999 of 370 patients with hydramnios, the incidence was only 0.3%
  - In the setting of idiopathic hydramnios the incidence of aneuploidy ranges 3.2-13.3%
  - Fetuses with an anomaly identified on ultrasound have approximately a 10% risk of aneuploidy
  - Those fetuses without sonographic evidence of an anomaly have only a 1% risk of aneuploidy
  - Trisomy 21, 18, and 13 are the most common

Fetal Anomaly Risk and Severity of Polyhydramnios

- Risk of major fetal anomaly increases with increasing severity of hydramnios
- Risk of fetal anomaly in the setting of a normal targeted ultrasound:
  - 1% with Mild Polyhydramnios
  - 2% with Moderate Polyhydramnios
  - 11% with Severe Polyhydramnios
- No significant difference in risk of fetal aneuploidy
- Ability to detect anomalies on ultrasound is not different

Polyhydramnios and Diabetes

- Incidence ranges 5-26%
- Both pre-gestational and gestational diabetes
- Generally related to poor glycemic control
- Mechanism is not entirely understood
- Does not appear to be associated with an increased risk of adverse pregnancy outcome or perinatal mortality (Idris, et al. 2010)
- Incidence of major fetal anomalies is similar

Peripartum Complications

- Increased risk of: hypertensive disorders related to pregnancy, UTI, premature delivery, PROM, c-section, IUFD, neonatal death
- Abnormal FHR patterns influencing delivery, APGAR scores <7 at 5 minutes, increased neonatal birth weight, and NICU admissions
- If diagnosed at term during the labor process, there was no increased risk to deliver a compromised infant
Perinatal Mortality

- Biggio et al. 1999 evaluated 370 cases of polyhydramnios (including those with congenital anomalies and diabetes)
  - Found a increased risk of perinatal mortality (49/1000) compared to 36,426 controls (14/1000)
  - If excluded those with anomalies the risk remained over twice that of the controls (3.7% vs. 1.4%)
  - There were 71 cases of diabetes and no deaths occurred in this group

Perinatal Mortality

- Polyhydramnios has been shown to be an independent risk factor for perinatal mortality at term (>37wks) and preterm
- Mechanism for fetal loss is unknown
  - May be related to increased intraamniotic pressure (decreased fetal pH and pO2 and decreased MCA PI)

Polyhydramnios, Cervical Length and Preterm Labor

- Frequency of PTL ranges approximately 11-29%
- No significant difference seen in the rate of PTL and increasing severity of hydramnios
- It is usually the underlying cause of the hydramnios which influences the preterm labor and delivery
- The prematurity rate for idiopathic hydramnios appears to be similar to that of the general population (~12%)
- There is a gradual shortening of the cervical length; however, it is not related to the severity of the hydramnios

Polyhydramnios and IUGR

- IUGR is seen in 3-4% of cases of hydramnios
- Highly concerning for major fetal anomalies and/or chromosomal abnormalities
- In a study by Sickler, et al. 1997 of 39 fetuses with polyhydramnios and IUGR, the mortality was 59% in this group
- Considered an “ominous combination”

Evaluation of Polyhydramnios

- Targeted ultrasound evaluation
  - Structural anomalies
  - Fetal hydrops
- Screen for maternal diabetes
- Consider amniocentesis
  - Fetal karyotype
  - Genetic testing
  - Viral titers

Treatment of Polyhydramnios

- May resolve spontaneously
  - 50% chance of resolution if idiopathic and asymptomatic
- Direct fetal therapy if indicated
  - Intrauterine fetal blood transfusion
  - Intrauterine treatment with medication to correct fetal arrhythmias
  - Laser ablation for TTTS
- Decompression amniocentesis
- Medication treatment (e.g. Indomethacin)
Treatment of Polyhydramnios

- Indomethacin
  - Typically used at gestational ages < 32 weeks
  - Regimen: 25mg every 6 hours for up to 48 hours
  - If prolonged use (>48 hrs) will need fetal echocardiogram
  - Risks: ductal constriction, neonatal bowel perforation, NEC
  - Shown to be effective in several studies

Antenatal Management

- Antenatal testing
  - Recommended by ACOG
  - No randomized studies to support the type of testing or the frequency of testing
  - Weekly fetal testing (e.g. NST) starting at 32-34 weeks gestational age
- Serial ultrasounds every 3-4 weeks to monitor fetal growth and amniotic fluid volume
- Delivery ≥ 39 weeks gestation
  - Unless dictated by abnormal fetal testing or other pregnancy complications

Summary

- The regulation of AFV is complex, highly regulated, and a disturbance in this process can lead to polyhydramnios
- Fetal structural anomalies, as well as various fetal and maternal conditions can all lead the development of polyhydramnios
- There are several generally accepted definitions of polyhydramnios (commonly AFI >24cm and SDP ≥8cm)
- The clinical relevance is significant given the association with adverse pregnancy outcome and increased risk of perinatal mortality

Summary

- When polyhydramnios is identified, a targeted ultrasound should be obtained
- Genetic amniocentesis should be considered
- Treatment of symptomatic polyhydramnios may be accomplished with either serial amnioreductions and/or medication such as indomethacin
- A practical approach to antenatal management includes serial ultrasounds, at least weekly fetal testing, and delivery ≥ 39 weeks gestational age unless dictated by abnormal fetal testing or other pregnancy complications
References

• Available upon request
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