Polyhydramnios

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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) $\geq$ 24cm
Amniotic Fluid Index (AFI) > 25cm
Single Deepest Pocket $\geq$ 8cm
A Subjectively Increased Amniotic Fluid Volume

Polyhydramnios

Severity Grading	Mild	Moderate	Severe
AFI	25-30 cm	30.1-35 cm	> 35 cm
SDP	$\geq$8 cm	$\geq$12 cm	$\geq$16 cm

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, tracheal-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 $\geq$ 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

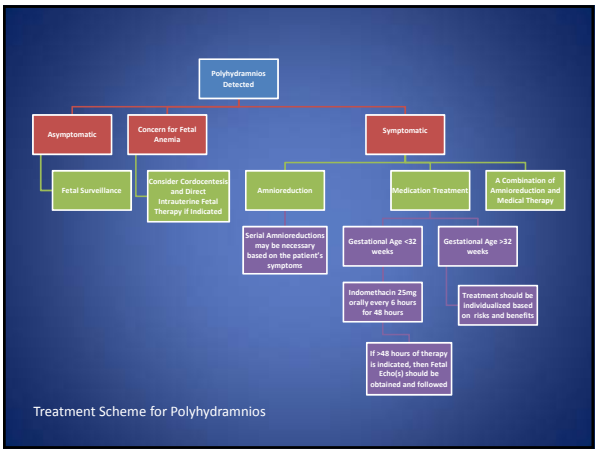
- Targeted ultrasound evaluation
  - Structural anomalies
  - Fetal hydrops
- Screen for maternal diabetes
- Consider amniocentesis
  - Fetal karyotype
  - Genetic testing
  - Viral titers

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

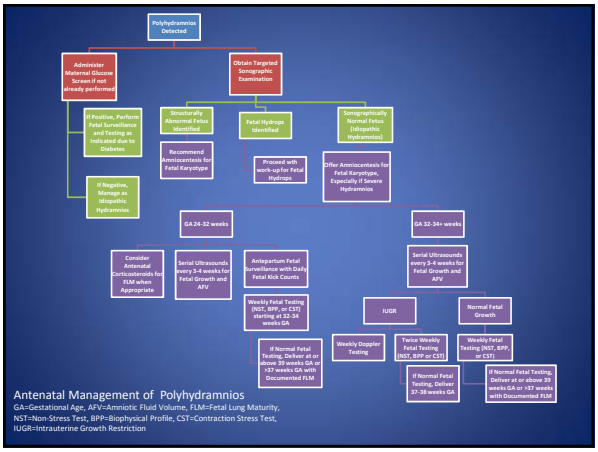
- Indomethacin
  - Typically used at gestational ages < 32 weeks
  - Regimen: 25mg every 6 hours for up to 48 hours
  - If prolonged use (>48 hrs) will need fetal echocardiogram
  - Risks: ductal constriction, neonatal bowel perforation, NEC
  - Shown to be effective in several studies



Treatment Scheme for Polyhydramnios

Antenatal Management

- Antenatal testing
  - Recommended by ACOG
    - ACOG Practice Bulletin: "Antepartum Fetal Surveillance"
  - 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



Antenatal Management of Polyhydramnios
GA=Gestational Age, AFV=Amniotic Fluid Volume, FLM=Fetal Lung Maturity, NST=Non-Stress Test, BPP=Biophysical Profile, CST=Contraction Stress Test, IUGR=Intrauterine Growth Restriction

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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