

Chapter 14

Abnormalities of the amniotic fluid volume

Amniotic fluid is produced by fetal urination but in the first 16 weeks of gestation additional sources include the placenta, amniotic membranes, umbilical cord and fetal skin. Removal of amniotic fluid is by fetal swallowing. Ultrasonographically, the diagnosis of polyhydramnios or oligohydramnios is made when there is excessive or virtual absence of echo-free spaces around the fetus.

OLIGOHYDRAMNIOS/ANHYDRAMNIOS

Oligohydramnios means reduced amniotic fluid and anhydramnios means absence of amniotic fluid.

Prevalence

Oligohydramnios in the second trimester is found in about 1 per 500 pregnancies.

Etiology

Oligohydramnios in the second trimester is usually the result of preterm premature rupture of the membranes, uteroplacental insufficiency and urinary tract malformations (bilateral renal agenesis, multicystic or polycystic kidneys, or urethral obstruction).

Diagnosis

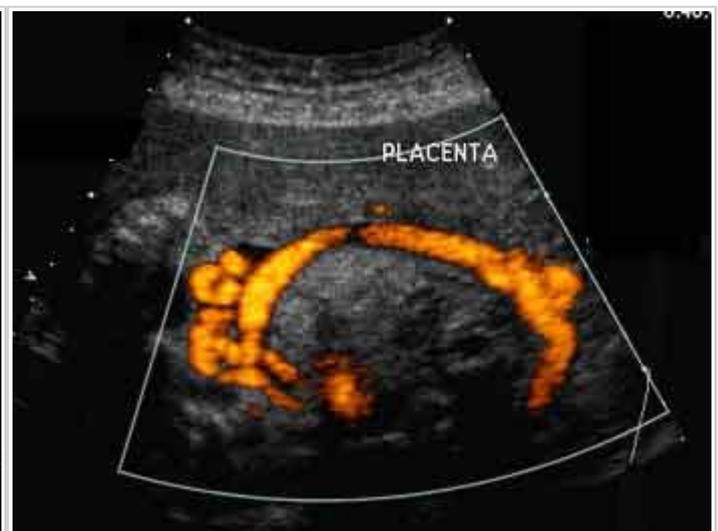
The diagnosis of oligohydramnios is usually made subjectively.

Quantitative criteria include:

- (a) the largest single pocket of amniotic fluid being 1 cm or less, or
- (b) amniotic fluid index (the sum of the vertical measurements of the largest pockets of amniotic fluid in the four quadrants of the uterus) of less than 5 cm.



Anecoic areas simulating pockets of amniotic fluid



Color Doppler energy at the umbilical cord

In the absence of the "acoustic window" normally provided by the amniotic fluid, and the "undesirable" postures often adopted by these fetuses, confident exclusion of fetal defects may be impossible. Nevertheless, the detection of a dilated bladder in urethral obstruction and enlarged echogenic or multicystic kidneys in renal disease should be relatively easy. The main difficulty is in the differential diagnosis of renal agenesis. In cases of preterm prelabour

rupture of the membranes, detailed questioning of the mother may reveal a history of chronic leakage of amniotic fluid. Furthermore, in uteroplacental insufficiency, Doppler blood flow studies will often demonstrate high impedance to flow in the placental circulation and redistribution in the fetal circulation. In the remaining cases, intra-amniotic instillation of normal saline may help improve ultrasonographic examination and lead to the diagnosis of fetal abnormalities like renal agenesis.

Prognosis

Bilateral renal agenesis, multicystic or polycystic kidneys are lethal abnormalities, usually in the neonatal period due to pulmonary hypoplasia. Preterm rupture of membranes at 20 weeks or earlier is associated with a poor prognosis; about 40% miscarry within five days of membrane rupture due to chorioamnionitis and in the remaining 60% of pregnancies more than 50% of neonates die due to pulmonary hypoplasia. Uteroplacental insufficiency resulting in oligohydramnios at 18-23 weeks is very severe and the most likely outcome is intrauterine death.

POLYHYDRAMNIOS

Polyhydramnios means increased or excessive amniotic fluid volume.

Prevalence

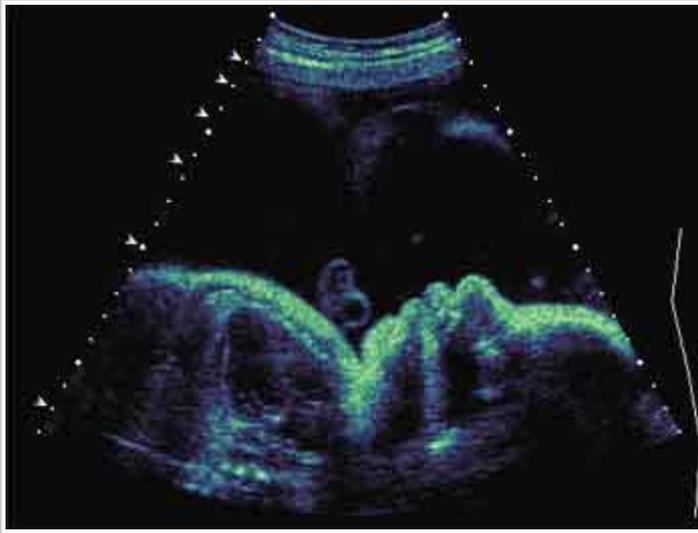
Polyhydramnios in the second trimester is found in about 1 per 200 pregnancies.

Etiology

There are essentially two major causes of polyhydramnios; reduced fetal swallowing or absorption of amniotic fluid and increased fetal urination. Reduced fetal swallowing may be due to craniospinal defects (such as anencephaly), facial tumours, gastrointestinal obstruction (such as esophageal atresia, duodenal atresia and small bowel obstruction), compressive pulmonary disorders (such as pleural effusions, diaphragmatic hernia or cystic adenomatoid malformation of the lungs), narrow thoracic cage (due to skeletal dysplasias), and fetal akinesia deformation sequence (due to neuromuscular impairment of fetal swallowing). Increased fetal urination is observed in maternal diabetes mellitus and maternal uremia (increased glucose and urea cause osmotic diuresis), hyperdynamic fetal circulation due to fetal anemia (due to red cell isoimmunization or congenital infection) or fetal and placental tumours or cutaneous arteriovenous malformations (such as sacrococcygeal teratoma, placental chorioangioma), or twin-to-twin transfusion syndrome.

Diagnosis

The diagnosis of polyhydramnios is usually made subjectively. Quantitatively, polyhydramnios is defined as an amniotic fluid index (the sum of the vertical measurements of the largest pockets of amniotic fluid in the four quadrants of the uterus) of 20 cm or more. Alternatively, the vertical measurement of the largest single pocket of amniotic fluid free of fetal parts is used to classify polyhydramnios into mild (8-11 cm), moderate (12-15 cm) and severe (16 cm or more). Although 80% of cases with mild polyhydramnios are considered to be idiopathic, in the majority of cases with moderate or severe polyhydramnios there are maternal or fetal disorders. In most cases polyhydramnios develops late in the second or in the third trimester of pregnancy. Acute polyhydramnios at 18-23 weeks is mainly seen in association with twin-to-twin transfusion syndrome. Testing for maternal diabetes, detailed sonographic examination for anomalies, and fetal karyotyping should constitute the cornerstones of the diagnostic protocol in the investigation of these cases.



Moderate polyhydramnios



Polyhydramnios - Diaphragmatic Hernia

Prenatal therapy

The aim is to reduce the risk of very premature delivery and the maternal discomfort that often accompanies severe polyhydramnios. Treatment will obviously depend on the diagnosis, and will include better glycemic control of maternal diabetes mellitus, antiarrhythmic medication for fetal hydrops due to dysrhythmias, thoracoamniotic shunting for fetal pulmonary cysts or pleural effusions. For the other cases, polyhydramnios may be treated by repeated amniocenteses every few days and drainage of large volumes of amniotic fluid. However, the procedure itself may precipitate premature labour. An alternative and effective method of treatment is maternal administration of indomethacin; however, this drug may cause fetal ductal constriction and close monitoring by serial fetal echocardiographic studies is necessary. In twin-to-twin transfusion syndrome, presenting with acute polyhydramnios at 18-23 weeks of gestation, endoscopic laser occlusion of placental anastomoses or serial amniodrainage may be carried out.

Prognosis

This depends on the cause of polyhydramnios.