Polyhydramnios

Polyhydramnios refers to an excess volume of amniotic fluid surrounding a fetus in utero. Polyhydramnios can be caused by gastrointestinal atresia, anencephaly, maternal diabetes, multiple gestation pregnancies, and hydrops fetalis. Diagnosis of this condition depends on ultrasound imaging and calculation of an amniotic fluid index (AFI) greater than 25 cm. Management of polyhydramnios includes conducting weekly nonstress tests, a biophysical profile, amnioreduction, and indomethacin.



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Pathophysiology

Increased Amniotic Fluid

Up-arrow Onion Fluid

Polyhydramnios is diagnosed using ultrasound to obtain measurements of amniotic fluid volume. If the single deepest fluid pocket seen on sonogram is greater than 8 cm, or if the amniotic fluid index (AFI) is greater than 25 cm, then a diagnosis of polyhydramnios is made. Normally this fluid is swallowed by the infant and then recycled by the fetal kidneys to produce more urine. After ~20 weeks gestation, the amniotic fluid mostly consists of fetal urine. Inability to reabsorb this fluid or overproduction of urine can cause increased amniotic fluid around the fetus.

Causes

Duodenal Atresia (or Gastrointestinal Atresias)

Dodo Atresia-tree

Atresia is the abnormal absence of an orifice or lumen in the body. Since the gastrointestinal tract is one long lumen, atresia can occur at any point and potentially cause issues. Gastrointestinal atresia, particularly of the esophagus or the duodenum, can cause decreased absorption of swallowed amniotic fluid, and therefore a build up of amniotic fluid around the fetus.

Maternal Diabetes

Mother with Dyed-bead-pancreas

Poorly managed gestational diabetes is associated with fetal polyhydramnios and macrosomia. Although the exact mechanism is not well understood, it is theorized to be due to fetal hyperglycemia, and the resultant polyuria producing an excessive amount of amniotic fluid.

Multiple Gestations

Twins

Multiple gestations may result in a phenomenon known as twin-to-twin transfusion syndrome. Depending on placental vessel configuration, one twin (the recipient) may receive a greater amount of blood than the other (the donor), and therefore produce a greater amount of urine. Polyhydramnios occurs around the recipient twin, while oligohydramnios occurs around the donor twin who receives the lower amount of blood.

Anencephaly

Baby-without-brain

Neuromuscular disorders, such as anencephaly and Werdnig-Hoffmann disease, can interfere with the ability of the fetus to swallow amniotic fluid. Anencephaly is a type of neural tube defect that results in absence of the cerebral cortex; the fetus will thus lack the cognitive ability to swallow and fluid accumulates. Werdnig-Hoffmann disease is the most common and severe type of skeletal muscular atrophy. Muscular atrophy causes an inability to swallow due to neuromuscular weakness and polyhydramnios occurs as a result.

Hydrops Fetalis

Eye-drop Fetus

Fetal anemia from various causes, including hemolytic anemia due to Rh incompatibility, may lead to fetal heart failure. With ongoing heart failure, fluid begins to accumulate within the fetus in a condition known as hydrops fetalis. This condition is identified when there are two or more abnormal fluid collections within fetal soft tissues and serous cavities; examples include ascites, pleural effusion, and skin edema. As fluid continues to accumulate,

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polyhydramnios may occur.

Diagnosis

Ultrasound

Ultrasound-machine

Amniotic fluid level is measured using ultrasound, and polyhydramnios is diagnosed if the single deepest pocket seen on sonogram is greater than 8 cm, or if the amniotic fluid index (AFI) is greater than 25 cm.

Amniotic Fluid Index (AFI) > 25 cm

Onion Fluid Greater-than (25) Quarter

Amniotic fluid level is measured using ultrasound, and polyhydramnios is diagnosed if the single deepest pocket seen on sonogram is greater than 8 cm, or if the amniotic fluid index (AFI) is greater than 25 cm. The AFI approximates total amniotic fluid volume by dividing the uterus into four quadrants, taking measurements of the deepest pocket in each quadrant, and then adding the four measurements together.

Treatment

Weekly Nonstress Test (NST) and Biophysical Profile (BPP)

Weekly Newspaper with Nun-stressed

After a diagnosis of polyhydramnios is made, if it is mild to moderate, NST and BPP are performed every one to two weeks until 37 weeks gestation, and then weekly until delivery. Both of these tests evaluate fetal well being with measurements of fetal movement and heart rate. The BPP includes an assessment of amniotic fluid index (AFI) so that the level of amniotic fluid can be measured and monitored.

Amnioreduction

Onion-suction

Normalizing the amniotic fluid levels in polyhydramnios can reduce maternal discomfort, improve maternal complications such as dyspnea, and decrease risk for premature rupture of membranes (PROM). Amnioreduction involves inserting a needle through the abdominal wall, into the uterus and draining amniotic fluid. It is similar to paracentesis in patients with ascites.

Indomethacin

Indigo-moth-man

Indomethacin is classified as a non-steroidal anti-inflammatory drug (NSAID) and may reduce fetal urine production, thereby decreasing amniotic fluid volume. For polyhydramnios occurring in pregnancies less than 32 weeks of gestation, it can be used in conjunction with amnioreduction to treat polyhydramnios. However after 32 weeks of gestational age, the risk of constriction of the ductus arteriosus increases and its use is greatly cautioned.

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