

Twin-To-Twin Transfusion Syndrome

Twin-to-Twin Transfusion Syndrome (TTTS) is a rare placental disease that can occur at any time during pregnancy involving identical twins. TTTS occurs when there is an unequal distribution of placental blood vessels between fetuses, which leads to a disproportionate supply of blood delivered. This unequal allocation of blood leads to developmental problems in both fetuses that can range in severity depending on the type, direction, and number of interconnected blood vessels.

TTTS only affects identical twin pregnancies during which the fetuses share a placenta during development. The placenta acts as an interface between the mother and twins during pregnancy, and is the organ that is responsible for supplying the developing fetuses with blood. Twins afflicted by TTTS have a higher mortality rate than twins without TTTS, especially if the syndrome occurs twenty-six weeks or earlier in pregnancy.

In describing TTTS, one of the developing fetuses is considered a donor twin and the other a recipient twin. TTTS occurs when the placenta has fewer blood vessels that connect it to the donor twin than connect it to the recipient twin. The blood that would normally go to the donor twin is then diverted to the recipient twin, causing a reduction in blood volume in the donor twin. This excess of blood in the recipient twin can strain the recipient twin's heart and may ultimately lead to heart failure.

Blood volume in the fetus is related to urinary output, a process that is essential for producing amniotic fluid. Thus the decreased blood flow to the donor twin results in an inconsistent supply of amniotic fluid, a condition known as oligohydramnios. Oligohydramnios can result in slower development and growth of the donor fetus. The recipient twin produces a surplus of amniotic fluid due to the increase in blood volume, a condition known as polyhydramnios, which research has linked to preterm labor.

Obstetricians may suspect TTTS in identical twin pregnancies when the uterus measures larger than it should during prenatal testing. Ultrasound can detect the condition as a comparative difference in the amniotic fluid level or the size of each fetus. Other tests include fetal echocardiogram to detect heart problems, a Doppler flow to assess the blood flow, and Magnetic Resonance Imaging (MRI) to determine if there is any neurological damage in each fetus.

If TTTS occurs late in pregnancy it may not require any treatment, but in early occurrences treatment is essential to the survival of both fetuses. Serial amniocentesis or regular removal of amniotic fluid from the recipient twin can temporarily restore balance in the amniotic fluid volumes of both twins, but it is usually only recommended for mild cases of TTTS. Another treatment, septostomy, uses a needle to create a hole in the membrane dividing the two fetuses. The hole allows the amniotic fluid to be more equally distributed between the two fetuses; however, this treatment has been associated with cord entanglement and is therefore rarely used.

Serial amniocentesis and septostomy only treat TTTS through adjustment of amniotic fluid but do not address the central issue, that the fetuses share the same placenta and some of the same blood vessels. A type of fetal surgery called laser photocoagulation uses a fetoscope and laser to close the placental blood vessels that fetuses share so each fetus receives blood independent of the other twin. The treatment usually requires an epidural or local anesthesia. In extreme cases umbilical cord ligation may be performed, in which the cord of one of the twins is tied in a knot in order to stop the recipient twin's heart and halting blood flow between twins. The procedure is only used in severe cases where one twin is so close to death that no other treatment is possible. Termination of the pregnancy may also be advised in severe cases of TTTS.

Little is known about the cause of Twin-to-Twin Transfusion Syndrome, but it is thought to be a random developmental abnormality of the placenta that is unrelated to genetics or environment. Many relate the disease to how the fetuses are positioned on the placenta, with a greater chance of occurrence if one twin obtains greater access to the placenta. Also, variations in blood vessel development may lead to unbalanced blood exchange. Further studies regarding TTTS are aimed at determining the causes and creating improved ways of treating the condition. As most cases require treatment, research in these areas is crucial to the survival of twins with TTTS.

Sources

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