Patient Information Sheet
Single Umbilical Artery

You have recently learned that your baby has a single umbilical artery (sometimes referred to as a two vessel umbilical cord). We expect that you may have questions about what this could mean for your developing baby. Hopefully, this information will address some of your concerns; however, we encourage you to speak to your genetic counselor or healthcare provider for more information. It is important to remember that anyone can have a baby with a birth defect. Birth defects occur in 2-5% of all births and are rarely caused by something that the parents did or did not do before or during pregnancy. Currently, there are no tests available to detect all health problems.

What is a single umbilical artery?

To understand how a single umbilical artery occurs, we must first review the normal development of the umbilical cord and the blood vessels inside. Cord development occurs between the 13^{th} and 38^{th} days after conception. The cord provides a connection between the developing baby and the mother. Typically, there is one umbilical vein and two arteries within the cord. The vein is longer than the arteries, and is responsible for taking oxygen-rich blood from the mother to the baby. Then, the arteries return oxygen-poor blood and other waste materials from the baby to the mother. A baby with a single umbilical artery has one vein and one artery, as opposed to two arteries. To diagnose a single umbilical artery prenatally, a very thorough ultrasound evaluation is needed. It is not always easy to see these umbilical blood vessels, especially if the baby is still very small.

What causes a single umbilical artery?

There are several theories as to why some babies only have a single umbilical artery. It is most widely believed that all babies begin with two such arteries. For some babies, however, one of the arteries stops developing. There may be many reasons why this second artery's development is stopped.

How many babies are found with a single umbilical artery?

Between 0.5%-2.0% of babies examined by ultrasound have a single umbilical artery.

What problems could be associated with a single umbilical artery for my baby?

Most babies with a single umbilical artery are born healthy, and without any additional medical complications. However, babies with a single umbilical artery do have a higher risk to have other abnormalities on ultrasound. Other types of problems could occur in any of the major organ systems, but most commonly affect the heart, kidneys, intestines, or spine. If your baby has been found to have another abnormality on ultrasound evaluation, your health care provider will address these issues and prognosis for the baby would depend on what findings are present.

Babies with a single umbilical artery who also have other ultrasound abnormalities are at higher risk for chromosome abnormalities. In order to understand a possible chromosomal cause or genetic syndrome cause, it is helpful to know a little about chromosomes. Chromosomes are packages of genetic information that carry the instructions (genes) necessary for our growth and development. Typically, there are 23 pairs of chromosomes in each cell of our bodies. One copy of each pair is from our mother and one copy of each pair is from our father. It is important to have the correct amount of genetic material to have typical development. Having an extra or missing whole chromosome, or piece of a chromosome, may cause birth defects. Changes in one or more genes can also result in a particular set of characteristics (also called a syndrome). Both chromosome abnormalities and genetic syndromes can produce birth defects and physical changes such as a single umbilical artery.

Babies with a single umbilical artery may have a higher risk for complications later in pregnancy, including: growth restriction, preterm delivery, low birth weight, and problems with the growth of the placenta. These associations are controversial. To monitor your baby's growth, your health care provider may recommend follow up testing during your pregnancy, such as a third trimester ultrasound to monitor the baby's growth.

What further testing may be offered and what will it tell me?

Depending on your current gestational age, a number of additional tests may be offered to you. If the single umbilical artery is found during a routine ultrasound, a more detailed ultrasound will usually be performed to look carefully at the baby's anatomy. Your health care provider may also recommend additional ultrasounds for you later in pregnancy to assess the baby's growth in the third trimester.

There are two additional types of prenatal tests: screening tests and diagnostic tests. Screening tests can modify your risk for a chromosome abnormality such as Down syndrome and involve no risk of complications to your pregnancy. A screening test will not

determine if your baby has Down syndrome, but it may help you decide whether or not you would like to pursue a diagnostic test. Diagnostic tests can evaluate the number and structure of your baby's chromosomes. They are 99% accurate in detecting extra or missing chromosomes. Unfortunately, all diagnostic tests have a risk of complications including the potential for pregnancy loss.

Screening Tests

Non-invasive prenatal testing, or NIPT, is a screening test for certain chromosome conditions. During pregnancy, some of your baby's chromosome material is in your blood, along with your own chromosomes. NIPT is a blood test that measures the amount of chromosome material in your blood to determine if your baby could have an extra chromosome, such as in Down syndrome where there is an extra 21st chromosome. This test also screens for two other more severe chromosome conditions, trisomy 13 and trisomy 18, and may screen for some less severe conditions that are caused by different numbers of the X or Y chromosome. NIPT is a highly accurate screen; however, it is not a diagnostic test. The detection rate for these chromosome conditions is typically between 90-99%.

Other screening blood tests (often called a triple, quad, penta, or first trimester screen) may also be offered. Your genetic counselor or health care provider can discuss these various screening options in more detail.

Diagnostic Tests

Depending on your gestational age, an amniocentesis procedure may be offered. The amniocentesis is a diagnostic test in which a small sample of amniotic fluid is obtained to examine the baby's chromosomes. Because the procedure is considered an invasive procedure, there is a risk, likely less than 1%, for complications that can lead to miscarriage.

If you choose to pursue amniocentesis, you may be offered an additional test called a chromosome microarray (CMA.) It is used to identify small missing or extra pieces of the baby's chromosomes that may be associated with genetic conditions. CMA cannot detect all genetic conditions and may detect variations in the chromosomes that have uncertain clinical significance. Parental blood samples may help to clarify the meaning of a variation, but effects of these changes may not be known until after the baby is born. CMA may also detect information such as non-paternity and close relationships between parents.

The risks, benefits and limitations of screening and diagnostic testing options should be discussed with you by your genetic counselor or other healthcare provider. Follow-up counseling and referrals for support can be made if a chromosome condition is detected prenatally. As with all situations in which prenatal testing is discussed, it is your decision whether or not this test is done.

What do I do now?

This information is only intended as an introduction to some of the terms and tests that you have already heard or will be hearing about from your genetic counselor or other healthcare provider. We hope that this information sheet will be helpful as you begin to understand more about single umbilical artery. We understand that any time something of concern is found through prenatal screening and testing, parents are going to be worried. Please don't hesitate to contact your genetic counselor with any questions or concerns you have. We are here to help you and your baby.

The decision to have one or more of these tests or to do no additional testing is a difficult and personal one. There is no one right decision. Some people will decide to have no further testing because they do not feel they need to know if their baby will have any of these conditions before delivery. Other people feel that they want more information as soon as possible. After gathering all of the information you need about single umbilical artery, you should make the decision that is right for you and your family. Please keep in mind that not all babies with single umbilical artery will have the complications described in this information sheet. Though it is never possible to predict the long-term prognosis for a child with even isolated single umbilical artery, many babies will be born without significant medical complications.