CHSS Data Center
CONGENITAL HEART SURGEONS' SOCIETY

Summary of the Pulmonary Conduit (PC) Analysis

Dear Family,

We wish to thank you for your continuing participation in the Congenital Heart Surgeons Society (CHSS) study that collects information about children with pulmonary conduits (valved tubes connecting the right side of the heart to the lungs). The study began in 2002 and is still continuing.

The purpose of this letter is to give families a short summary of the recent results that we presented at the American Association of Thoracic Surgery meeting in Philadelphia on May 1, 2006. The results will be published in the Journal of Thoracic and Cardiovascular Surgery by the end of this year.

Pulmonary Conduit Background

In order to fix some heart birth defects, a tube with a valve in it needs to be placed in order to connect the heart to the lungs. This tube is called a pulmonary conduit. These valved tubes are not living or growing tissue and therefore they do not last forever. In children who are less than age two years, the valved tubes do not tend to last very long and need to be replaced. The valved tubes need to be replaced either because the child outgrows the size of the tube, the tube and its connections become scarred and narrow, or because the valve in the tube no longer works well. The decline in the valved tubes usually occurs slowly and does not cause noticeable health problems, so that your doctors can plan further treatment when it becomes necessary. The further treatment may be another operation to replace the valved tube, or it may require a heart catheter treatment to stretch the narrowed valved tube with a high pressure balloon.

There are many types of valved tubes, but we do not yet know which one is the best. We also do not know what properties of the conduit, such as the size or the material of the conduit, make the conduit last longer or shorter. The size of the conduit is often expressed as a 'Z-score'. The Z-score basically refers to how large the conduit is compared to the size of your child. A Z-score of zero is normal, while if it is less than zero the conduit is smaller than normal for the child's size, and if the Z-score is greater than zero, the conduit is larger than normal for the child's size.

We began the CHSS Pulmonary Conduit study to find out which conduit is best for children under two years of age and to find out the best type of conduit to use for these children when they need their conduits replaced.

CHSS Study

We looked at all infants who were entered into the study between 2002 and 2005. During this time 218 babies who were cared for in one of 17 CHSS hospitals were included in the study.

The purpose for looking at these results are:

1) To find out how long the valved tubes last (i.e., how long the conduit lasts before needing to be dilated with the balloon catheters or replaced at surgery with another conduit)
2) To find out how the different types of conduits work over time. We looked at whether the conduit was getting narrowed (stenosis) or whether the valve starts to leak (regurgitation)
3) To find out what might cause the conduit to work better over the long-term and to increase how long it might last.

A Brief Summary of the Results

Among the 218 infants there were many different heart defects. Some of the more common types of heart defects were truncus arteriosus (a single tube coming from both pumping chambers of the heart rather than two separate tubes) and pulmonary atresia (lack of a lung artery from the right-sided pumping chamber of the heart).

There were also many different types of valved tubes used, including those donated from people who had died (allografts), those made from pig (porcine) or cattle (bovine) tissue, and those that were completely man-made (mechanical). Allografts were the type that was used the most, being put in 68 percent of children.

On average, the chance of any valved tube lasting for 3 years without needing to be replaced or dilated with the balloon catheters is only 43%. That means that 57% of the infants with a valved tube will require further surgery or heart catheterization within 3 years of their first operation with a tube placement. Many children underwent balloon catheter procedures to dilate narrowings in the tube in order to make the conduit last longer.

We discovered some important things that improved how long the tubes lasted. The size of the conduit is very important, and should not be either too small or too large at the time that it is put in place. Smaller conduits did not last as long, and those that were either too large or too small were more likely to become narrowed or develop a leaky valve more quickly than conduits that were the right size for the patient. Importantly, the type of conduit used (whether allograft, porcine, or mechanical) did not affect how long the conduit lasted. This information is important because surgeons have been taught in the past to put in conduits that are as large as possible in the hopes that the conduits would last longer. Our study is one of the first to be able to look at how well this approach works and allows us to find out when 'big' is 'too big'.

Another important finding in our study was that different types of conduits lasted for similar lengths of time, and therefore it does not seem to matter what type of conduit is used at first as long as it is of the correct size. In addition, using balloon catheter procedures can help to make the conduit last longer. These balloon catheter procedures allow the surgeons to delay having to replace the conduit until the patient is older and better able to cope with another operation.

We thank you for your continued participation in this CHSS study of children with Pulmonary Conduits. The information reported for our study is read by child heart specialists around the world. It is your participation that makes these important studies possible and helps us to improve the care for children with heart birth defects. The CHSS Data Center welcomes any comments or suggestions from the participating families. For further information and to see a complete version of the published report for doctors, please visit our website (www.chssdc.org).

Sincerely,

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