

Tricuspid Dysplasia: A Cardiologist's Perspective

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Tricuspid Valve Dysplasia (TVD) is a congenital, heritable heart defect that seems to be increasing in prevalence in Labrador Retrievers. The tricuspid valve is one of four heart valves and allows blood to flow in one direction from the right atrium into the right ventricle. If a puppy inherits the gene (or genes) responsible for the defect, its tricuspid valve will be malformed in utero. The medical term for malformation of a valve is "Dysplasia". Thus, the puppy will have a dysplastic valve at birth that does not shut tightly, allowing blood to leak (regurgitate) back through it. The size of the leak will dictate the severity of the disease. A puppy with mild regurgitation will likely have a normal life span. If the regurgitation is severe, the puppy may not live to see its first birthday.

Severe TVD causes the right side of the heart to progressively enlarge. The blood leaking backwards into the right atrium eventually causes the pressure inside this chamber to rise. Since veins returning from the liver connect to the right atrium, the pressure in the veins of the liver also increases. The high venous pressure causes fluid to ooze from these liver vessels which then accumulates in the abdominal cavity. This fluid is termed "ascites" and is a form of congestive heart failure. The onset of ascites indicates advanced, end stage cardiac disease. Medications can help palliate the symptoms ,but it is considered a terminal condition.

How can you tell if your dog has TVD? Fortunately any leakage from a dysplastic valve that is significant enough to cause health problems should be detectable on a physical exam. Most of the time, a heart murmur will be heard with a stethoscope. Occasionally a gap between the valve leaflets will be so large ,that rather than producing an audible heart murmur, the leak can be felt by placing a hand on the right side of the chest- the palpable buzzing sensation is called a "thrill". If a heart murmur or thrill is detected in a young dog, chest x-rays and an ultrasound of the heart (echocardiogram) should be done to confirm the diagnosis and stage the disease. Labradors can have other congenital heart defects besides or in addition to TVD, so a full cardiac work-up for these dogs is important.

The diagnosis of TVD is controversial only when attempting to screen asymptomatic breeding animals for the disease. This becomes problematic because TVD is expressed on a continuum: Severe, Moderately Severe, and not affected. It was originally believed that all dogs with TVD would have a heart murmur, but it has since been discovered that occasional dogs in the Mild range do not have an audible heart murmur. The small amount of leakage combined with the fact that tricuspid regurgitation has a low velocity means that a soft murmur may not be able to penetrate through the chest wall. Even if a murmur can be heard in perfect conditions, there may be extenuating factors ,which cause it to be missed by the examining veterinarian. These factors would include ambient noise, panting, wiggling, and individual variation in sensitivity to different frequencies of sound. For these reasons, I personally believe that echocardiography (cardiac ultrasound) is the best tool for screening for TVD. The heart should be examined with 2-D ultrasound which gives a black and white 2 dimensional picture and just as importantly, with color Doppler. The latter uses Doppler technology to show blood flowing through the heart. It highlights abnormal blood flow such as leakage from a valve.

We cardiologists are in the process of perfecting our ability to evaluate the canine tricuspid valve with ultrasound. The tricuspid valve is a complicated structure. It has several components: : the leaflets, the chordae tendinae (string like attachments connecting to the leaflets), and the papillary muscles (protrusions from the heart muscle that anchor the chordae tendinae). The valve is in constant motion, which increases the challenge of evaluating these structures. This is why only an experienced echocardiographer should be solicited to screen for TVD.

At this time, we are still trying to come to a consensus as to how much leakage is normal for a dog's tricuspid valve. With the advent of better ultrasound technology, we can detect even minute amounts of valvular regurgitation. Two facts indicate that the presence of very mild amounts of regurgitation is a normal variation, especially if the valve itself appears structurally normal. The first is that we humans (one study found as many as 50% of the population) have small tricuspid leaks that are considered normal. Secondly, other breeds of dogs that are not predisposed to TVD have individuals with detectable amounts of tricuspid regurgitation. The major difficulty occurs when attempting to differentiate Labs with subtle TVD from those normal variations in valve anatomy and tricuspid regurgitation. Medicine has many "gray zones" and this issue is certainly one of them. For dogs that fall into this gray area, we give them a grading of "Equivocal" This describes a dog who is not obviously affected with TVD but whose echocardiogram is abnormal enough to not pass with flying colors. This gray zone should become more narrow as greater numbers of Labs are echoed, but will likely never be eliminated altogether.

The equivocal grade frustrates many breeders who desire a "yes or no" answer. Even human cardiologists experience the same dilemmas and are always reassessing what normal really is as newer technologies become available. The good news is that we are still advising that dogs with equivocal grades be bred, especially if they have cleared their other screening tests.

The puppies born to equivocal dogs should be screened for heart murmur, and any puppy over 6 months with a persistent murmur should have an echocardiogram done. If we begin to see a pattern of equivocal dogs producing TVD puppies, then we would have to revise our current recommendations.

A few groups are collecting pedigrees of Labradors that are ultrasounded in order to establish the mode of inheritance for TVD. One of those interested in this research is Dr. Donald Patterson at the University of Pennsylvania. A recent comment by him on his findings thus far is that they need more echocardiograms, especially from mildly affected dogs, before they will be able to establish the mode of inheritance. Another large database is located at The Institute for Genetic Disease Control in Animals (GDC) which is located in Davis, CA. It is a non-profit open registry that has been accumulating numerous pedigrees of Labradors in their TVD registry. They have not yet analyzed their pedigrees for heritable patterns. However; for a small fee, they will issue a "Kin Report" This is composed of the pedigrees and the results of any screening tests done on the parents, siblings, half siblings and progeny of a given dog. For further information, call GDC at (530)- 756-6773.

It is impressive how diligently breeders are working to improve the health of the Labrador Retriever. Acknowledging that there are problems and striving to cleanse the breed of them is the surest sign of true love for these wonderful dogs.