1-1-1986

Scholarship Funds

This paper is posted at ScholarlyCommons. http://repository.upenn.edu/bellwether/vol1/iss19/16
For more information, please contact libraryrepository@pobox.upenn.edu.
A New Technique to Diagnose Hip Dysplasia

Hip dysplasia in dogs was first described in 1935 by Dr. G. B. Schenelle of the Angel Memorial Hospital. Since then, much research has been done to determine the causes of the disease and to develop diagnostic techniques. It has been shown that hip dysplasia is a polygenic trait. About 90 percent of the disease is attributable to inheritance; environmental factors such as nutrition, exercise, and injury also play a part in the development of the disease. In dogs, hip dysplasia primarily affects large and giant breeds. It also occurs in chickens, pigs, horses, and cows. Hip dysplasia, an instability of the hip joint, causes osteoarthritis in the joint. This can be a painful, and in some cases a severely crippling condition. Affected dogs often have to be sedated and muscle relaxers used before they can be examined. This has been shown that the incidence of hip dysplasia in a breed can be reduced if only breeding stock is utilized which has radiographically normal hips. To that end a voluntary screening program is available through the Orthopedic Foundation for Animals.

The late diagnosis of the disease creates a problem for breeders, trainers, and pet owners. By the time a dog is two years old, much time and money have been spent in training it for tasks such as sentry duty or guide dog. If the dog is a hunting dog, much effort has gone into field training. Also a bond has developed between the dog and the family. By two years of age many dogs of the affected breeds have already been used for breeding, particularly males. Thus it becomes important to develop a method of identifying dogs that may develop hip dysplasia at an earlier age than one or two years.

Dr. Gail Smith, assistant professor of orthopedics at the University of Pennsylvania School of Veterinary Medicine, is developing a diagnostic method which would allow early identification of affected animals. Dr. Smith, a veterinarian and a bioengineer, has been looking at the hip joint not only from an anatomical point of view but also from a mechanical one. "The hip joint is the least constrained of all the joints in the body, and it has the largest range of motion. A ball and socket joint, it is held in place by the round ligma­ments, the joint capsule, and muscle forces. In addition to these three elements, there is a fourth, previously overlooked factor, the synovial fluid. It acts as a joint lubricant and, together with the joint capsule, creates an anticitational constraint to prevent coxofemoral subluxation. "Optimum performance of the joint is achieved when there is a fixed and minimal amount of fluid in the joint. The capsular/liquid dynamic phenomena can be negated by adding a small amount of fluid to the joint capsule, this will result in marked coxofemoral laxity."

According to Dr. Smith, hip dysplasia could be improved by altering the amount of synovial fluid in the joint. "We do not use the traditional positioning method with the dog on its back and the rear legs extended parallel. Rather, we put the legs into a flexed position and apply a small compressive force to seat the femoral head into the acetabulum. This is the normal stance, and it shows the joint in a natural position. It helps to evaluate the joint capsule and the internal structure of the joint."

"For the past two years we have been examining litter of German shepherds radiographically," Dr. Smith said. "We do not use the traditional positioning method with the dog on its back and the rear legs extended parallel. Rather, we put the legs into a flexed position and apply a small compressive force to seat the femoral head into the acetabulum. This is the normal stance, and it shows the joint in a natural position. It helps to evaluate the joint capsule and the internal structure of the joint."

"The second radiograph is taken with the dog in the same flexed position, but this time the lateral force is exerted to pull the joint apart slightly. If the normal amount of synovial fluid is present, its volume and the surrounding joint capsule act together to create a vacuum-like effect, preventing the socket from slipping out of the joint. If there is excess fluid, the joint capsule will be stretched, the anticitational constraint will not be present, and the joint will subluxate." Dr. Smith contends that the traditional positioning method actually slightly twists and thus tightens the joint capsule, resulting in some cases in false negative status of the hip joints (Fig. 4). "When you look at some dogs, which by the traditional method show no subluxation, with the new radiographic technique, you will find that subluxation does exist."

Dr. Smith and his colleagues have developed a formula which they calculate the degree of subluxation. "We can now look at the radiographs of 16-week-old puppies and determine whether subluxation caused by the lateral force is normal or abnormal. If it is the latter, we expect the dog to develop dysplasia." Dr. Smith and his colleagues have radiographed these puppies at a later age and have found that the dogs that had the normal amount of subluxation due to the lateral force developed normal hips. Dogs with greater subluxation became dysplastic. "It appears that by using this new technique we will be able to accurately predict which dogs will develop normal hips and which will not," he said. "We also think that this technique will be more accurate than the present one in detecting affected animals. By identifying affected animals at a young age, much time and money can be saved, as these dogs will not be used as sentry, guide, or field trial dogs. Also, it allows breeders to evaluate a breeding program much earlier."

Dr. Smith is now developing an apparatus which will hold the dog in the flexed position and exert a carefully calibrated lateral force. "We think it will be possible to design and build such a device which can be used by veterinarians. It is important that the lateral force exerted is proper to prevent damage to the joint." He is also studying the biomechanics of the hip joint, and he hopes that a medical treatment can be developed to prevent hip dysplasia once the subluxation has been detected. "Once we understand why some dogs have an excess amount of synovial fluid, perhaps steps can be taken to reduce it. But that is far in the future."

The research is supported by funds from the Morris Animal Foundation, The Seeing Eye Inc., and the University of Pennsylvania Research Fund. Dr. Darryl G. Berry is a co-investigator on the grant and provides expertise in radiographic interpretation.

Refurbishing of the Isolation Barn

New Bolton Center’s six-stall isolation barn is being refurbished through the generosity of the Cheever-Pollock-Nix Foundation. The garage door opening to the walkway between the barns is gone. In its stead is a regular door. The floor is resurfaced, and new drains and waterlines have been installed. Each stall is equipped with a faucet, making in-stall hydrotherapy possible, and added c-stands stainless steel sinks in each of the stall anterooms. Sliding windows at each feeding area were installed to permit adding feed without entering the stall. This new feature also allows clinicians to observe each patient. A pulley system for handling the 20 liter 1V fluid bottles was added, enabling one person to handle the heavy jugs. The common work area was improved. Now there is a counter with laboratory equipment for simple tests, a centrifuge, and a total solids meter. Also purchased and installed were a small refrigerator and a microwave oven.

"New Bolton Center’s isolation barn is much in use. We have a lot of horses with diarrhea here," said Dr. Jonathan Palmer. "As salmonella is a common diagnosis for horses with diarrhea, we must make sure that a patient does not have it before being moved to a common barn." CULTINATIONS are taken for each stall that was occupied in the isolation unit. "The stall is thoroughly scrubbed, disinfected, and then cultures are taken over a period of days. Once we have three negative ones, the stall can be used again." This results in a rather long turn-around time for each stall, but it is needed to protect each patient entering the unit.

A forced air ventilation system is also planned for the isolation barn. It will be installed at a later date. "We are planning to move the E-fence and have a more uniform air flow in the barn," said Dr. Palmer. "It has made it easier for the clinicians and nurses to work on the horses, and the new drainage system helps us to keep it even cleaner than before."

Scholarship Funds

The School has received $50,000 from the Salisbury Foundation for the Student Scholarship fund. Contributions to this fund were also made by Dr. Carol A. Dolinsky, a client of VHUP.