ULNAR OSTECTOMY/OSTEOTOMY:

A premature closure of growth plates makes things curvy

Overview—"I don't understand what Angular Limb Abnormality is; please help me understand the condition and the treatment."

Legs grow in length because of a growth plate ("physis"), several of them located on each end of each bone in the leg. Toes, foot bones, lower arm, upper arm, shin, thigh—they all have growth plates at the top and bottom that create new bone and thus make us, and your pet, grow taller. Any of these growth plates can be disturbed/slowed down/stopped by an injury, birth defect or nutritional abnormalities; they also can be purposefully altered by genetic tinkering to create short-statured breeds (i.e. basset hound, dachshund, etc.)

In any of those situations (regardless of the original cause), the result of a growth plate disturbance will be a bone that is not normal (and "normal" is relative when talking about purposeful breed alterations; the breed "normal" is not the bone "normal".) The bone can be just short. It can be long on one side and short on the other, creating a bend. Or, if it is paired with another bone next to it, one can be short and the other long, creating a slight dislocation of one of the paired bones from its corresponding joint.

The most common angular limb abnormalities are seen in the paired bones of the lower front limb, the radius and ulna, most commonly in the short-statured breeds. In these pets, presumably the genetic messages in the lower end of the radius and the lower end of the ulna are slightly wonky. They grow asymmetrically, with the ulna producing slower and stopping sooner. In the normal breed scenario, they grow at the same rate but finish sooner overall, resulting in just a short/crooked leg. In the angular limb scenario, in the short-statured breeds or other breeds after a minor (often unrecognized injury), the ulna slows/stops much too early but the radius wants to keep growing. What results is a "bow string" effect; imagine a bow (think…bow and arrow). The string is tight and shorter, while the wood is longer and bent. The ulna is the "string" and the radius is the "bow". The elbow is the loser. The radius keeps pushing up on the upper arm bone (humerus) but the short little ulna is just hanging on with its fingernails! A slight dislocation, in this case, is called subluxation. Subluxation of the elbow in the angular limb abnormality is the most common cause of pain and lameness in the growing animal and chronic arthritis in the adult.

"Why is a Corrective Ulnar Osteotomy/Ostectomy procedure being recommended for my pet?"

A relatively simple corrective procedure can be used in the still-growing animal to relieve the restrictions imposed by a prematurely closed/stopped ulna growth plate. The younger the better; if we catch it early (4-6mo), we can reverse and normalize many of the abnormalities that are created by the "bow string" effect. A little later in a youngster's development (6-10mo), we still can make some progress, but the cosmetic appearance of the crooked leg and the overall length of the leg may not be corrected. As a young adult, when growth has stopped, we can improve the elbow joint comfort to some degree, but leg length and curvature may need additional corrective surgical work to be improved.

The "low" ulnar ostectomy is a straightforward procedure to remove the restriction of the ulna "bow string". We simply remove a short but significant segment of the lower ulna bone/growth plate. In doing this, we are allowing the radius to dictate lower leg growth; we remove the restriction created by the ulna and the dislocation of the elbow caused by the asymmetric growth. The radius continues on with its development and self-corrects many of the abnormalities. Since the radius is the major player in the lower leg, we are not concerned about removing large portions of ulnar bone. (In fact, we worry more about removing too little and the ulna "healing" before the radius is done with its work, thus re-creating the bow string.)

The "high" ulnar osteotomy is slightly more involved, and involves cutting the ulna higher on the bone, closer to the elbow. This procedure is used in older youngsters when overall growth potential is less (i.e. there is less time and growth distance ahead to self-correct the abnormalities.) A cut is made in the upper ulna to free the segment closest to the elbow, allowing it to float a bit and find its happy spot within the elbow configuration.

"What options do I have to treat my pet's problem?

In young animals with enough growth potential to self-correct the elbow subluxation, the low ulnar ostectomy is a very good choice. If the only growth plate abnormality is in the ulna, this will remove the restrictions and allow the radius to keep doing its work. The procedure is relatively, minimally invasive; recovery is relatively quick.

In young animals with a shorter window of growth opportunity, the high ulnar osteotomy may be the surgical preference. If the elbow is the primary source of concern, making a cut in the ulna up near the elbow allows just that subluxated portion of the ulna to shift and find a more appropriate position in the joint relatively quickly/immediately.

In all patients with joint abnormalities of most sorts, there may be improvement in longterm joint health (i.e. less arthritis) using supplements longterm. Glucosamine/chondroitin/MSM supplements theoretically supply the building blocks of joint fluid and cartilage, keeping them healthier. High dose fish oil supplements counteract the inflammation and pain of arthritis and may minimize arthritis over the long haul.

Without treatment, most of these elbows will have reduced function and comfort. If the condition is in both front legs, this outcome may be hard to see and appreciate (i.e. one leg won't be lame, both legs will). In short-statured animals, their gait is not heavily dependent upon a full elbow range of motion and their activity levels may be dramatically less than their tall counterparts. It is difficult to gauge precisely whether any one animal is at his/her full potential relative to mobility.

"What postoperative complications do I need to know and understand when considering this surgery?"

For the low ulnar ostectomy procedure, the complications are few. The incision may develop a temporary fluid pocket underneath it, called a seroma. Rarely does that need more than a compression bandage or warm compresses and time to go away. The uncommon but biggest concern is that the ostectomy site heals/bridges too soon. If this happens, a second procedure to re-release the bow string restriction may be needed. This is more likely to occur when the procedure is performed in younger animals with a longer growth period to monitor.

With high ulnar osteotomy procedures, the combination of active patient and a highly mobile joint/surgery site creates a delay in bone healing that can be uncomfortable for several months. Many techniques to surgically stabilize the osteotomy have been tried through the years; they carry their own complications. Each patient is evaluated and a plan made to balance the risks of surgically stabilizing vs. leaving the osteotomy unstabilized at the time of original surgery.

"Are there situations when the surgical outcome is not what we hoped it would be?"

Precise predictions cannot be made about an individual animal's growth plates. We can tell on x-rays when they are completely closed, but prior to that, we do not have diagnostic tools to judge their status specifically. If

a small portion of a growth plate is damaged or abnormal, we can only comment on it retrospectively when the bone is curved. Because of this limitation, and the additional challenge of the balancing act of paired bones in the specific locations of the lower front leg (radius and ulna) and lower rear leg (tibia and fibula), a corrective osteotomy/ostectomy may not fully address or correct the limb problem caused by premature or asymmetric closure of one or more growth plates. Ongoing leg curvature or a leg that is too short both may need additional corrective procedures if the leg function is insufficient when development is complete.

"How is my pet's life and lifestyle likely to change after this procedure?

When corrected young, and when the growth plate abnormalities are not complex, the longterm lifestyle of comfortable leg use will be improved.

"Are there things I can do to prepare myself, my home and/or my pet for this procedure?"

Often these abnormalities, when found in short-statured breeds, effect both legs. Having surgery on both front legs can be logistically challenging during recovery. Your pet will need a lot of assistance from you in navigating the simple tasks of daily life until healing advances and comfort improves. A well designed, ergonomic sling is a good investment for this recovery period. (see www.directvetsurg.com →Pet Owner Portal→ Pet links for sling options.)

Outpatient surgery and anesthesia can be uncomfortable, painful, disorienting, and frustrating experiences for animals; watching your pet work through the early postoperative period and recover from anesthesia and pain medications can be worrisome, scary and frustrating for pet owners. The vast majority of the time this period of difficulty is brief, and *your pet is actually more comfortable and secure at home with you*. Sometimes it doesn't feel like that at two in the morning when your pet is anxious and not consolable, and you are unsure of what to do. You always have the option of transporting your pet to a 24-hour veterinary facility postoperatively. If you do not want to have your pet home in the first few days postoperatively, please advise your primary care veterinary staff. They will provide contact information for a local 24-hour veterinary facility and help get an estimate for the ongoing care.

It is important that you have proper expectations about this procedure; your experience and you pet's outcome will benefit greatly. Please discuss this information with your veterinarian when working through the decision-making process regarding **Angular Limb Abnormality**.

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