Dynamic Ulnar Osteotomies to manage elbow/carpal joint incongruity

How does elbow and/or carpal joint incongruity occur?

The antebrachium (forearm) is composed of two bones, the radius and ulna, situated between the elbow and carpal (wrist) joints. The elbow joint is composed of three bones fitting together; the condyle of the humerus, the head of the radius and the ulnar trochlear notch. Growth disturbances may result in asynchronous growth of the radius and ulna (i.e. one bone grows faster/slower than the other) or one or both bones may stop growing earlier than they should. These growth disturbances may result in a "step" between the radial head and ulnar coronoid process inside the elbow joint, and subluxation (partial dislocation) of the elbow and/or carpus, which may result in joint dysfunction, discomfort, and development of osteoarthritis.

Treatment:

The ulna can be cut to reduce elbow subluxation and/or reduce the step (incongruency) between the radius and ulna. If the ulna is too long a piece can be cut from the shaft (ostectomy); as the ends of the bone compress together the ulna will be shortened. If the ulnar is too short, cutting the ulna (osteotomy) allows the two ends to move apart thus lengthening the ulna. The cut can be made higher in the ulna closer to the elbow, or lower in the ulna near the carpus. Higher cuts allow more movement of the ulna and may be preferable for older dogs that have finished growing and for more severe incongruities. Lower cuts are inherently more stable and heal more quickly; complications are relatively much rarer for distal (lower) osteotomies. For high cuts, the two ends are occasionally stabilised with a small pin, although it may be preferable not to stabilise the osteotomised bone so as to allow more movement between the bone ends. Early controlled activity is important after ulnar osteotomies; muscular forces and joint loading (weight bearing) assist the bone to move into a more favourable position. The ulna typically heals after osteotomy or ostectomy, even without stabilisation, although occasionally it heals very slowly (delayed union) or fails to heal (non-union).

Outcome and potential risks of surgery

The prognosis for incongruent/subluxated elbows and carpi depends on the severity of the incongruency, the growth potential remaining after repair, and the age at the time of repair. Prognosis is typically best for milder incongruencies when surgery is performed whilst the patient is still growing. For more severe cases surgery may need to be performed as early as three to four months. In these cases, the cut bone typically heals before the dog finishes growing and will need to be cut again to achieve and maintain improved congruency. If the incongruency is severe and surgery occurs later than 8 to 9 months of age significant osteoarthritis is likely to have developed. Results are more favourable where surgery is performed before significant osteoarthritis has developed.

As with any surgery, complications may arise and are detailed below, although serious complications are uncommon.

- Infection is a rare complication as the procedure is performed under strict sterility and antibiotics are administered in the peri-operative period. Should an infection occur, early detection and treatment generally result in rapid resolution.
- Controlled activity is important to help realign the elbow joint surfaces and improve congruency, however, excessive vigorous activity will reduce the likelihood of the bone healing in its new position and may cause pain and implant-related problems, where present.
- The antebrachium (forearm) is mildly weakened after cutting the ulna until the bone has healed. There is also a risk of damage to the radius by the saw during the osteotomy. Both factors contribute to an increased risk of radial fracture if excessive forces are applied i.e. jumping, running, or turning sharply, although the incidence of radial fracture for dogs whose activity is appropriately restricted is rare.
- Occasionally the bone doesn't heal at the osteotomy site. For high cuts, the continued instability may cause significant lameness. Where this occurs, further surgery is usually necessary to promote bone healing and may include placing cancellous bone grafts and implants e.g. bone plate.

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- Even after the bone has healed it is still important to have a controlled, gradual increase in activity, like human patients undergoing rehabilitation following surgery. If activity is increased too quickly after surgery straining of joint structures may occur. Rest and anti-inflammatory medications typically resolve these problems.
- It is common for dogs that have high cuts (proximal osteotomies) to have increased lameness until the bone heals. Management of these dogs may include strictly limited activity in addition to pain-relieving medications. Distal ulnar osteotomies do not typically result in lameness beyond the postoperative period.
- Arthritis may already be present at the time of diagnosis. It is not possible to reverse any arthritic changes in the joint or to halt progression.

Postoperative care

An adhesive pad may be covering the wound. This can be removed after several days, or immediately if soiled.

Medications e.g., Pain killers will be dispensed. Ice packs may also be helpful in the days following surgery to reduce swelling and improve comfort.

Confine appropriately to **eliminate running and jumping** for 8 weeks; chose appropriate confinement to achieve this for your dog; cage confinement is advised. Short **leash** walks in the garden (a few minutes four to six times daily) are recommended to allow toileting. Keep your dog at your side; use a lead of no more than 1-metre length.

- One week following surgery: commence lead walking for 5 minutes at a time, two to three times daily.
- Two weeks following surgery: increase lead walking to 7-8 minutes at a time, two to three times daily.
- Four weeks following surgery: increase lead walking to 10 minutes at a time, two to three times daily.
- Five weeks following surgery: increase lead walking to 12 minutes at a time, two to three times daily.
- Six weeks following surgery: increase lead walking to 15 minutes at a time, two to three times daily.

Always use a short lead when walking and maintain confinement **at all other times**; running, jumping and play must be avoided for at least 8 weeks.

Declaration:

I have read the information contained herein and am satisfied I have a sufficient understanding of the procedures my dog is scheduled to undergo, including potential complications that may occur and requirements for aftercare following surgery. I hereby consent for my dog to undergo ulnar osteotomies.

Owner's name: Dog's Name:

Owner's signature: Date: