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Ulnar osteotomies: when, where, why, how?

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WHEN?
In keeping with the tenet to do no harm, ulnar osteotomies should only be performed in dogs with elbow disease that present with clinical signs referable to the elbow joint – lameness, reduced range of motion, pain on palpation - especially young dogs with significant pain/lameness and whose owners aspire to having a very active or working animal. Ulnar osteotomy is the most frequently performed procedure for the correction of elbow incongruity. It is also a generally accepted procedure for the treatment of UAP (Meyer-Lindenberg et al. 2001, Turner et al. 1998) as an alternative to the surgical removal of the loose fragment. In young dogs, it may be used as a ‘stand alone’ procedure, to induce spontaneous fusion of the anconeal fragment. Osteotomy of the ulna has also been described as an additional procedure to the surgical removal of a fragmented coronoid process. Osteochondritis dissecans (OCD) lesions of the humeral trochlea can be treated with osteochondral autograft transfer (OAT) procedures, but ulnar osteotomy may be required to achieve reproducible positive outcomes (Fitzpatrick and Yeadon 2008).

WHERE AND HOW?
Three studies (Thompson & Robbin 1995, Bardet & Bureau 1996, Ness 1998) have described a proximal ulnar osteotomy to treat coronoid disease. Most surgeons use an oscillating saw to create the osteotomy, but the bone can also be made with an osteotome or Gigli wire. A perpendicular or oblique proximal ulnar osteotomy can relieve abnormal pressure within the joint and restore congruity by allowing the proximal part of the ulna to move proximally and tilt cranially. An oblique osteotomy prevents extreme tilting of the ulna and reduces the mobility of the proximal part of the ulna, thus avoiding abundant callus and delayed healing; it also avoids the necessity of an additional intramedullary pin to prevent varus deformation. Pin breakage is a frequently reported complication when an intramedullary pin is used (Bardet & Bureau 1996, Ness 1998, Vezzoni et al. 2002). In a series of 10 dogs younger than 10 months, Ness performed a transverse, proximal ulnar osteotomy 25 mm distal to the elbow joint in combination with removal of the fragments via arthroscopy. The use of an intramedullary pin alone seemed to be redundant since a mild varus deformity did not cause any functional complications. Bardet and Bureau reported the combination of arthroscopic removal of the coronoid fragment with a proximal ulnar osteotomy, regardless of the animal's age. An in vitro study showed restoration of joint congruity was best achieved by a proximal oblique osteotomy combined with an intramedullary pin, while, due to the strong interosseus ligament between radius and ulna, a distal ulnar osteotomy did not have any effect (Preston et al. 2000). A proximal oblique osteotomy, without intramedullary fixation, has been reported to cause varus deformity (Preston et al. 2000, Schulz 2000). This is in contradiction to previously described clinical studies where intramedullary fixation was not inserted and a varus deformity was not seen (Sjöström L. et al. 1995, Bardet & Bureau 1996, Ness 1998). A second contradiction to the study of Preston and Schulz is the recommendation for the use of a distal ulnar osteotomy in dogs younger than nine months suffering from a FCP and incongruity (Vezzoni et al. 2002). They recommended that after surgical removal of the fragmented coronoid process, a partial osteotomy (5 mm) at the distal third of the ulna should be performed. The results of this treatment were reported to have been good in 77.5%, of a large number of patients (70% of 117 dogs) (Vezzoni et al. 2002). An oblique proximal ulnar osteotomy has been recommended in conjunction with the OAT procedure, and should be directed both caudoproximal to craniodistal and proximolateral to distomedial to counteract potential deleterious forces that may affect osteotomy healing or cause deformity at the osteotomy. Transverse osteotomy of the proximal ulna and dynamic distraction with an external skeletal fixator has been described as a treatment for UAP (Ferrigno et al. 2007).

WHY?
The rationale for a proximal ulnar osteotomy is that the osteotomy allows slight shortening and rotation of the proximal ulna, which relieves abnormal loading on the medial coronoid process. After transverse, proximal ulnar osteotomy, Ness found that nine out of ten dogs showed clear improvement after two months: five were completely normal, four had occasional stiffness and one remained significantly lame (Ness 1998). A 93% success rate was obtained following the treatment of 83 adult dogs (mean age of 12.7 months) in the Bardet study, despite an increased degree of arthrosis (Bardet & Bureau 1996). However, the use of osteotomies for the treatment of FCP has been reported to result in significant postoperative morbidity in some
cases (Meyer-Lindenberg and others 2001), and controlled large-scale studies evaluating the outcome of clinical cases after osteotomies are lacking. Furthermore, it has been suggested that in affected elbows, progressive collapse of the medial joint space may occur in the longer term (Schulz 2003). If medial joint collapse does occur in diseased canine elbows, radial lengthening or ulna shortening osteotomies may actually increase loading of the medial compartment of the joint in the long term, which may worsen the outcome. Correction of incongruency by osteotomy at one level may induce a subsequent incongruency at another level, which could lead to further problems. In cases of UAP, the chances are good, particularly in young dogs, that the anconeal process will fuse after the stress is relieved. Thomson (1995) was the first to describe the use of an oblique osteotomy in three joints with UAP, of which two healed. Sjöström et al. (1995) applied a perpendicular osteotomy in 20 dogs (22 joints) with UAP. The anconeal fragment fused in 21 out of 22 joints. Seventy percent of the dogs regained full function, while in 30% residual lameness was attributed to different factors such as arthrosis, too early healing of the ulnar osteotomy, or an abnormal shape of the trochlear notch. Since fusion of the anconeal process is not always achieved, several authors recommend a combination of an ulnar osteotomy with lag screw fixation of the fragment (Meyer-Lindenberg et al. 2001, Krotscheck et al. 2000).

REFERENCES


