Recent thoughts on the management of canine elbow dysplasia

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Introduction
Elbow dysplasia (ED) is the most common cause of thoracic limb lameness within the canine and affects mainly particular large and giant breeds. Elbow dysplasia is a term coined to describe a number of clinical manifestations affecting the elbow and although more than one pathology may be present in any one elbow, the diseases are not linked by a common genetic or pathogenic pathway.

Pathogenesis
The aetiopathogenesis of elbow dysplasia is poorly understood but two main underlying causes have been cited. A CT case study by Wolfschrijn and others (2005) looked at the coronoid process in a 20 week old golden retriever and found histopathological lesions consistent with osteochondrosis. (Wolschrijn and others 2005) In another study they looked at the microarchitecture of the coronoid and found changes within the cartilage canals. These changes in pigs are documented to predispose to osteochondrosis lesions and the authors hypothesised the same in dogs. (Wolschrijn and Weijs 2004). The other major factor often cited as a cause for ED is incongruency of the joint (Wind 1986). It is hypothesised that this incongruency leads to an overloading of the medial coronoid process and in turn fragmentation (Danielson and others 2006). In vitro mapping of the elbow joint has shown that the distribution of loads between the MCP and radius is about 50:50. Any humeroradial incongruency may lead to an increase load on the MCP which it may be unable to sustain. It is not clear from studies what defines incongruency and unfortunately radiography at the time clinical presentation does not often demonstrate convincing incongruency (Mason and others 2002).

Diagnosis:
The diagnosis of elbow dysplasia can be challenging in first opinion practice where limited imaging modalities are available. Radiography is the imaging modality of choice but poorly sensitive for ED. The diagnosis of a fragmented MCP based on a plain flexed mediolateral radiograph is difficult and certainly in the early stages of the disease little, if any, radiographic changes are apparent. Changes that are suggestive, but not necessarily conclusive, of ED include

- Subtrochlear sclerosis (STS) of the ulna notch. Although reported in the literature as an early indicator of ED (Hornof and others 2000) the assessment of STS is very subjective with some authors reporting high sensitivity (Draffan and others 2009) whilst others only a fair sensitivity (Burton and others 2008). This can be performed digitally which would increase the sensitivity although digital radiography is not widely available (Burton and others 2007)
- Osteophytosis – osteophytes secondary to elbow pathology are most readily seen on the dorsal aspect of the anconeus on a flexed mediolateral radiograph. Osteophytes may also be noted on the proximal radial head and lateral and medial aspects of the humeral condyle.
• Where displaced FCPs, ununited anconeal processes and OCD lesions can be seen, the diagnosis is certain.

Numerous modalities have been used to identify cases of elbow dysplasia. CT has been shown to be sensitive for the diagnosis of fragmented coronoid processes (FCP) (Moores and others 2008) and, in the 3D mode, for incongruency (Gemmill and others 2005). Mobile CT is becoming more widely available and is worthy of consideration in first opinion practice for equivocal cases.

MRI and ultrasound have been used to assess elbows but have reduced sensitivity when compared to other modalities.

Arthroscopy is considered the gold standard for diagnosis (and also treatment) of elbow dysplasia. Magnification, access to most parts of the joint and palpation of the intraarticular structures allow for the best chance of detecting cases of elbow diseases. When combined with CT, for the detection of subchondral defects where the overlying cartilage is normal, the sensitivity approaches 100%.

Management:
Treatment options for the management of elbow dysplasia depend on the dog’s age at presentation, the severity of the condition, expected performance level and financial constraints. Most dogs are young (less than 15 months) when first presented for thoracic limb lameness. The clinician has to decide between the various surgical options and conservative management for each case. Long term outcomes of FCP show little differences between conservative and surgical management as, for both treatments, the osteoarthritis will progress. However surgical candidates will, in most cases, get back to normal levels of exercise more quickly than those managed conservatively.

• **Conservative Management:** This is normally reserved to those older animals that have had a flare up of elbow lameness although in some cases, the option may be considered for younger cases. A recent study demonstrated objectively demonstrated that conservative management had similar outcomes to arthroscopic findings. The numbers were relatively low in this paper so a type two error may be why no differences were noted but conservative management is certainly a valid option. This has a multifactorial approach:
  • **Reduced exercise levels.** Initially it is necessary to reduce the level of the dog’s exercise down to maybe 10-15 minute walks two or three times a day, all of which should be ON lead. This can be gradually increased by five minutes per walk per week but no off lead exercise should be undertaken until the animal can cope with 45 minutes lead walking.
• **Analgesia.** A six week (or longer) course of an appropriate NSAID is usually prescribed. It is important to remember that different drugs appear to be more effective in different patients and therefore if an appropriate clinical response is not seen, it may be worth changing the NSAID used and also checking up on owner compliance. Owners (particularly those with young dogs) can be remarkably reluctant to give long term analgesia so education is important. In addition, in some patients who are very painful, adjunctive analgesia may be required. The next licensed product on the cascade is Pardale V® which is a paracetamol/codeine preparation although use in conjunction with an NSAID is not licensed. Other possible drugs include tramadol hydrochloride and Gabapentin. **Written owner consent should be obtained before using these drugs.**

• **Weight management.** (Marshall and others 2009) In human medicine the link between weight control and effects of the OA are well documented. Mild amounts of weight loss can result in marked decreases in lameness scores due to OA. In young dogs this is particularly important especially following neutering. Advice should be given to all dogs to reduce food intake by up to a third after the animals are neutered.

• **Hydrotherapy/Physiotherapy.** There is very little objective evidence based on force plate data to prove a direct benefit of canine rehabilitation. However, anecdotally, both hydrotherapy and physiotherapy can be very useful in improving the range of motion of joint movement and increasing muscle mass. It is important to maintain good communication with the rehabilitation centre to ensure that a gradual exercise programme is put in place rather than a high intensity programme being introduced immediately.

• **Nutritional Supplements.** A variety of products are available on the market and usually involve one or more of the following ingredients (Goggs and others 2005)
  - Glucosamine
  - Chondroitin sulphate
  - Omega-3 Fatty Acids (EFA) – eicopentaenoic acid (EPA) and docosahexaenoic acid (DHA).
• Green lipped mussel – EPA and DHA –

Omega three supplements are clinically proven to reduce levels of collagensases (in particular aggrecanase) which are responsible for destruction of cartilage. The objective evidence for other forms of nutraceuticals is less convincing with objective trials showing no significant difference between nutraceuticals and placebos. Significant differences were seen between those and NSAIDs (Clegg and others 2006, Moreau and others 2003). Pentosan polysulphate also has little evidence to support it in vivo as an analgesic although one study compared it favourably to surgery (Bouck and others 1995) The methods of this study were questionable with regards to the level of analgesia for the surgical candidates and the reader should closely scrutinise the evidence before deciding on the efficacy. As a disease modifying agent there was little objective evidence to support its efficacy (Sanderson and others 2009)

• Surgical Management

In the juvenile patient arthroscopy is recommended initially for the treatment of all causes of elbow dysplasia. Although, as previously mentioned, the individual pathologies are inherited separately they can occur together (Meyer-Lindenberg and others 2006, Van Ryssen and van Bree 1997).

Arthroscopy allows visualisation to assess the diseases present including the integrity of the cartilage within the joint. For cases of UAP the stability of the process can be assessed which may affect the treatment options. A study by (Meyer-Lindenberg and others 2001)showed that proximal ulna osteotomy alone was sufficient to obtain radiographic healing of the anconeus where it was stable at arthroscopy. A more recent study (Pettitt and others 2009)advised radiographic union is more likely to occur if the osteotomy is combined with lag screw fixation.

Coronoid disease is more problematical in its treatment. 60% of cases undergoing arthroscopic removal of the fragment will return to soundness whereas 30% will remain lame albeit only after long periods of rest or exercise. (Meyer-Lindenberg and others 2003) 10% will see no benefit. Arthrotomy to remove the fragment is less successful with 30% remaining lame and only 40% becoming sound. The problem with this is that it is
difficult at the time of surgery to give an accurate prognosis as cases with severe erosion of the cartilage may do well and those with mild changes on occasions do badly. Anecdotally, with cases seen at the hospital, those with obvious elbow effusions do not do well.

A number of other techniques are reported in the literature for the management of fragmented coronoid processes:

• Subtotal coronoid ostectomy (Fitzpatrick and others 2009a)
• Sliding humeral osteotomy (Fitzpatrick and others 2009b)
• Total elbow replacement (TER)(Conzemius and others 2003)

These are beyond the scope of this talk and readers are directed to the relevant literature for further information. With regards to TER this is a salvage procedure in order to address the pain associated with elbow osteoarthritis in cases where conservative management has failed. It is currently not a treatment that will return dogs to full function as seen in total hip replacements and owners are made aware of this from the outset. With advancements in implant design dogs may return to better function but currently this is not the case.

References:


