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Carpal laxity syndrome in puppies

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Introduction and definitions

Two separate conditions are recognised in young pups in which the carpal joint or joints exhibit abnormal position or range of movement. Unfortunately, the sparse literature about these conditions is confusing due to inconsistency of nomenclature and different interpretations of the term carpal hyperextension.

• Extension of the carpal joint refers to straightening of the limb. The normal standing angle of the carpus is 180-190 degrees.
• Hyperextension refers to an increase in the angle of extension, this angle being measured on the palmar surface of the carpus and foot.
• Flexion of the carpus involves a decrease in the angle of the carpus below 180 degrees due to a movement of the foot caudally with respect to the axis of the radius and ulna.

In the more commonly recognised of the two conditions, the carpal joint is hyperextended so that the stance is markedly plantigrade, with the accessory carpal bone and pad in contact with the ground in severe cases. I prefer to refer to this syndrome as carpal hyperextension. The second condition is somewhat the reverse of the first in that the carpal joint is virtually hyperflexed, with the carpus positioned cranial to the foot and to the normal long axis of the limb when the pup is standing. In some cases the carpus is also deviated laterally with respect to the foot when the pup is weight bearing. I refer to this type of problem as carpal laxity syndrome.

Carpal hyperextension

a) Clinical presentation

Pups with this condition may present at any age from 6 weeks onwards. One or more pups from an individual litter may be affected. The problem may have a sudden onset or develop over a number of days and one or more limbs may be involved. The forelimbs are more commonly affected in my experience than the
hindlimbs. In the less severe cases, the owner may not notice any change in willingness to play and exercise but
the more severely affected cases appear weak in the affected limbs. The plantigrade stance and dropped carpi
and/or hocks are evident when examining the dog’s stance. There is usually no pain on palpation of affected
limbs and no palpable ligamentous instability of the carpal/metacarpophalangeal or tarsal/metatarsophalangeal
joints. Radiographs of affected limbs are usually normal although in very young pups (less than 8 weeks of age)
some retardation of ossification of the carpal bones is sometimes detected if radiographs are compared with
those of an unaffected littermate.

b) Possible causes

There are two distinct aetiological groups within this disease population. In pups in which the condition is
generalised (all 4 limbs) or there is bilateral forelimb involvement, the presenting signs are most commonly a
manifestation of overall weakness of the limb musculature. The muscle weakness is most commonly due to
simple management problems such as inadequate exercise on secure surfaces to encourage ambulation and
development of normal muscle tone. Although dietary deficiency of calcium has been proposed as an important
aetiological factor, there is no firm evidence in the literature to support this view. In my experience, dietary
deficiencies have not been associated with this problem. Treatment of this group involves regular periods of
exercise on secure surfaces such as a grassed area. Light supporting bandages may be used to support the carpus
in very severely affected cases but splintage should be avoided because it protects the muscles from the load
induced by exercise which is essential for the development of increased muscle tone. Most pups respond in 2-6
weeks to this form of treatment and the prognosis is good.

Carpal hyperextension can also occur in the contralateral limb of pups in which one limb is either cast,
bandaged or splinted for a number of weeks. In these cases, the cause is probably a combination of inadequate
exercise and inability of the muscles of the contralateral limb to support the increased load placed on this limb
by the lack of weight bearing on the injured limb. Treatment includes massage and graded exercise as already
described and the prognosis is again favourable although improvement to normal may not occur until the
primary disease in the contralateral limb has resolved.

Carpal laxity syndrome

a) Clinical presentation

This condition occurs in many different breeds but in my experience the large and giant breeds are more
commonly affected. Age of onset is similar to that of carpal hyperextension (ie from 6 weeks onwards).
Although some pups are affected bilaterally, it is more commonly a unilateral condition or certainly more
severely manifest in one forelimb. Some of these dogs appear either slightly lame or weak in the affected limb
but the majority show no lameness or unwillingness to exercise and play with littermates. The carpal joint is
virtually hyperflexed, with the carpus positioned cranial to the foot and to the normal long axis of the limb when
the pup is standing. In some cases the carpus is also deviated laterally with respect to the foot when the pup is
weight bearing.

They are presented by breeders or owners because of the marked postural deformity that is visible when the
dog is weight bearing, this deformity usually involving a cranial and lateral deviation of the carpus, which gives the impression of limb deformity due to growth plate disturbance.

Physical examination and detailed palpation of the affected limb(s) is remarkably normal. In most cases, the abnormal angulation of the limb disappears once weight bearing ceases. Therefore, it is important to examine and palpate the limbs with the puppy both standing and lying down. If the limb is only abnormally angulated when the pup is weight bearing, the problem is purely postural. Abnormal limb angulation due to growth plate disturbance and bony deformity will persist regardless of whether the patient is weight bearing or not. The joints, tendons and muscles of the affected limb(s) should be carefully palpated for normal range of movement and stability. Radiographs of affected limbs should be taken and compared to the contralateral limb, especially in unilaterally affected cases. In my experience, carpal laxity syndrome is rarely associated with any radiographic abnormalities of the lower forelimb. When they occur, any changes must be carefully evaluated to ascertain whether they are part of the primary cause, or whether they are developing secondary to the abnormal forces generated by weight bearing in an extremely angulated position. The susceptibility of growing bone (and in particular growth plate cartilage) to abnormal compressive forces caused by limb rotation or angulation is well proven, but is only likely to occur in severe and chronic cases of carpal laxity syndrome.

Treatment is similar to that for carpal hyperextension. Graded exercise and walking should be encouraged on surfaces which provide a secure footing. Physiotherapy in the form of massage and passive joint manipulation is helpful, and has the added benefit of training the pup to accept this form of treatment from a young age. Support bandages may be helpful in severely affected cases to assist the pups to walk more normally and perhaps to minimize the chances of secondary bony deformity (see above). However, I prefer if possible to avoid support bandaging as the exercise is important to developing muscle tone in the carpal extensors. Support bandaging and in particular splinting the affected limbs may protect the muscles and tendons from the work/stress of normal activity, which is a necessary part of the process of self-correction which usually results in a good prognosis in this condition. Therefore, splinting should be avoided, and bandaging only used in the most severe cases. Exercise may need to be carefully monitored in severely affected cases to ensure that the limbs are being used relatively normally. If the pup is repeatedly collapsing forward at the carpus and in danger of damaging the skin on the dorsum of the limb, bandage support should be provided.

Prognosis is good for a complete resolution of the problem over a 6-8 week period. In the majority of cases, the dog is completely untroubled by the condition – so it is often more important to spend time with the owner explaining the problem and reassuring them of the usually excellent prognosis.

b) Possible causes

The aetiology of this condition is even more obscure than that of carpal hyperextension. The fact that it is a self-correcting problem in most cases and carries an excellent prognosis means that few cases are euthanased so histopathological examination of the affected tissues is rarely carried out. The fact that the joints are stable on palpation tends to rule out a primary ligamentous laxity problem as the cause. The normal radiographic anatomy and the lack of long-term clinical effects of joint disorders such as osteoarthritis suggests that a primary bone or joint disorder is not present. This again leaves us with the muscle/tendon unit as a possible source of the primary problem.
Given that the problem is almost entirely postural, an imbalance of strength or tone of the flexors and extensors of the carpus is an attractive hypothesis. This type of problem is difficult to diagnose, but a primary problem of shortening of the flexor carpi ulnaris muscle has been previously suggested by one author (Vaughan LC: J Small Animal Practice 33:381-384, 1992). In this report, two severely affected pups which did not respond to conservative management over 2-3 weeks were treated surgically by cutting the tendon of the flexor carpi ulnaris muscle approximately 1cm proximal to its insertion on the accessory carpal bone. Both these dogs improved eventually, although one required repeat surgery. I have no experience with surgical treatment, as all cases I have been involved with have responded to conservative management.

**Conclusion**

Both carpal laxity and carpal hyperextension are conditions that cause great consternation for both dog owners and dog breeders, but are of little bother to the patients themselves. A complete and thorough physical examination should be carried out and the history checked for any underlying problems, previous injuries, or dietary deficiencies. A favourable prognosis can usually be predicted in uncomplicated cases. Physiotherapy and graded exercise play an important role in assisting these patients to develop normal soft tissue support for their growing skeletal structures.