Crunch time: approaches to bite abnormalities and malocclusions

PICTURE the scene. Mrs Jones and her puppy, Zak, are in for the second puppy vaccination visit. She mentions that he appears a little uncomfortable when she touches his muzzle.

A quick look confirms that both his lower deciduous canine teeth appear to be misaligned and hitting the hard palate. Closing his mouth leads to the puppy wriggling and crying.

So, what to do? At this point it’s easy to say it will all come right on the night – but will it? The bad news is that it probably won’t. Points to discuss with the client at this time include:

• what to do now;
• what to do when the permanent teeth erupt;
• whether to contact the breeder; and
• ethics of treatment.

Small animal practitioners will realise that problems of bite and malocclusion are relatively common. Some breeds are more affected and most cases are presented early in their life.

Sometimes, owners are unaware or uninterested.

Normal bites
In dogs, the normal occlusal pattern is termed orthognathism (Figure 1). Problems exist commonly in dogs mainly due to great variation in skull type within the species. There are three basic skull types:

• dolicocephalic – long, narrow faces (for example, rough collie or greyhound);
• mesiacephalic – “normal” type face (German shepherd, Siberian husky); and
• brachycephalic – short, broad faces (boxer, bulldog and pug).

All adult dogs are genetically programmed to have 42 adult teeth. The reduction in length of the facial profile in small, short-faced breeds will lead to crowding of teeth at the very least, with more painful and disfiguring defects in more severe cases.

The normal points to look for when assessing dog bite are:

• The incisors should be in place;
• the lower canines should fit neatly into the diastema space between the upper canines and corner incisors when the mouth is closed, ideally, the lower canines should touch neither upper tooth;
• the premolars should form “shear mouth”, whereby the tips of the crowns of the mandibular premolars should point directly into the interproximal spaces between the premolars on the upper jaw, and vice versa. The upper fourth premolar (carnasal) should be latero-buccal to the lower first molar;
• The skull should be symmetrical in the sagittal plane.

Any deviation from this is a deviation from the normal. The degree of deviation and the direction – ie, forward or rearward shift of the mandible – is the determining factor for orthognathism.

Bite classification

• Class zero or orthoclusion 
  This is a normal bite for a dog as per the criteria listed above.

• Class one malocclusion/neooclusion
  In these cases, the overall relationship is correct relative to upper and lower jaws, but the line of occlusion is incorrect due to one or more teeth being out of alignment, rotated or changed in some way (Figures 2 and 3).

• Class two malocclusion/distoclusion
  In this situation, some or all of the mandibular teeth are distal in their relationship with the maxillary teeth. In effect this refers to a short mandible and a relatively long maxilla and is often called an overshoot jaw (Figures 4 and 5).

• Class three malocclusion/undershot jaw
  This is not normal in any breed, but is seen in a variety of dogs. It is reported to have an autosomal recessive mode of inheritance in long-haired dachshunds and German short-haired pointers. In most cases, this requires intervention due to abnormal contact between one or more teeth and soft tissues of the mouth.

• Class two malocclusion/mesoclusion
  These cases present with some or all of the mandibular teeth being mesial (rostral) in their relationship with their maxillary counterparts, with a long mandible and a relatively short maxilla.

Bite classification

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Aetiology and ethics

The primary problem facing the

veterinarian in regard to aetiol-

ogy is to decide whether the

referring practice.

Interceptive orthodontics

This grand title often means simply taking action at the time of temporary dentition to avoid problems later.

The four jaw quadrants all grow independently and, in a rapidly-growing animal, this can commonly lead to temporary malocclusions.

The most common is a class two malocclusion, in which the maxillary canines grow more rapidly than mandibular canines.

Interception is to decide which teeth will be impacted and which will erupt. Some species will have a class two malocclusion if the canine erupts before the first molar.

Figure 7. Rostral crossections of the two maxillary central incisors, with both teeth occluding distal to the normal position of scissor bite.

Figure 8 (left). Lingual displacement of mandibular canines. Figure 9 (below). A dog’s hard palate with an infected puncture wound, caused by lingually-displaced mandibular canines. Immediately rostral are damaged areas of mucosa from the incisors.

Figure 10. Rostral view of dog with class two bite and lingually-displaced lower canines. When this mouth closes, all the lower incisors and canines will make traumatic contact.

Figure 9 (below). A dog’s incisors, with both teeth occluding distal to the normal position of scissor bite.

Figure 10. Rostral view of dog with class two bite and lingually-displaced lower canines. When this mouth closes, all the lower incisors and canines will make traumatic contact.

KEY POINTS
- The key to occlusion or bite type is seen in the relationship of the maxilla to the mandible in the premolar teeth. However, four separate sites should be examined for a bite appraisal:
  - The incisors should exhibit scissor bite.
  - The mandibular canine should fit neatly in the diastema between the upper incisor and maxillary canine, but should touch neither. It should be angled in a lingual buccal direction.
  - The upper PM1 should line up in a slot between the lower PM1 and PM2. The upper PM2 should line up in a slot between the lower PM2 and PM3 and so on caudally, producing a “pinking shear” effect.
  - The skull should be symmetrical in the sagittal plane.
- To safeguard the ethical position and to pre-

vent treatments that are not in the best interest of the animal or the breed, owners should be made fully aware of the need for treatment and the various options available.

- Often breeders firmly deny anything has ever been wrong with their dogs and maintain that the rest of the letter is normal. Your client may well have paid a tidy sum for the pup and will inordinately not wish to return it. What are the options?
- In most cases, a veterinary report with photographs is enough to leverage the return of most of the purchase price. Given that the pup’s owners cannot breed or show their new acquisition, and may well have to fund expen-

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sive surgery just to allow normal function, this is the least the breeder can do.

The veterinary surgeon should always act in the animal’s best interest. Orthodontic treatments that work successfully in humans often require months and years of professional treatment. Just because it can be done is often no justification for putting an animal through multiple anaesthetic episodes to improve its appearance enough to enter the show ring, and go on to produce more pups with the same problem. If there is any doubt or dispute, a specialist opinion should be sought.

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short lower jaws, rostral growth of the mandibles is prevented by the interlock, so the mandibular bodies then bow ventrally.

To provide space for the following permanent canine teeth. The permanent lower canine teeth erupt on the lingual side of the lower deciduous teeth.

Appropriate and careful extraction of the lower temporary canines at this time will relieve the pain and provide space, so the permanent canine teeth can erupt into the normal diastema between upper canine and incisor teeth, inclined buccally as is normal.

Another example is mixed dentition – temporary and permanent teeth, most often incisors. Extraction of the temporary teeth is desirable to relieve crowding. It is wise to radiograph the area first, as inadvertent extraction of a permanent tooth can result in a very unhappy client.

Common clinical malocclusions

Anterior crossbite

This defect can be inherited or acquired. Possible aetiology can be retained temporary incisors, crowding of the upper incisor arch or trauma that pushes the upper permanent incisors caudally. In most cases, the space available is insufficient for the number of teeth – even when the numbers are correct (Figure 7).

Breeders often carry out orthodontic manipulation using elastic bands, with disastrous results. The author has seen many cases of slipped bands causing periodontal disease and requiring extraction of the whole arch. Orthodontic treatment can involve an acrylic brace with an expansion screw, or an archbar with buttons and elastic bands, which has been reasonably successful in correcting this problem as long as the arch is not crowded.

If the arch is crowded, it is not possible to push a tooth to a location that has insufficient space without affecting a tooth that is currently there. In human orthodontics, this may require removal of a tooth or teeth to create space. In veterinary orthodontics, owners of show dogs will rarely give permission for extraction as they want to continue to show the dog with full dentition. Before embarking on orthodontics of this type, the owner and the vet must remember that the device may well have to be in place for 12 weeks or more.

In addition, the veterinarian should carefully examine the ethional position. This is generally not a dysfunctional condition and is usually due to crowding of the incisor arch. In these circumstances, such treatment may not be in the best interest of the animal or the breed.

Wry mouth

In this condition, which is considered to be inherited, one side of the mandible and/or maxilla is longer, leading to asymmetry in the sagittal plane.

Treatment, if required, must centre on abnormal tooth contact that either causes soft tissue trauma or prevents normal mouth closure. Strategic extraction of crown amputation with appropriate root canal work is the usual treatment performed.

Posterior crossbite

In these cases, the mandibular carnassial (molar one or 409/309) is located buccal to maxillary carnassial (premolar four or 108/208). This often results in more rapid accumulation of calculus and the area becomes more prone to periodontal disease.

Treatments range from diligent homecare to more sophisticated disease management. Odontoplasty (replacing of the tooth followed by sealing of the exposed dentine tubules) may be required if the sharp cusps cause trauma to soft tissue on the opposite arch.

Lingually-displaced mandibular canines (base-narrow canine teeth)

This is the most common reason for orthodontic referral, due to the pain and soft tissue damage involved. On its own it would be classified as a class one malocclusion, but in many cases it is combined with mandibular brachygnathism and, therefore, rates as a mixed class two/class one malocclusion.

This condition is due to an autosomal recessive mutation in at least one breed, the German short-haired pointer1. If these animals are treated, restewing should be strongly advised.

The lower canines erupt in a dorsal direction, rather than buccally, and fail to find their normal position in the diastema between the upper canine and incisor three. This usually injures the soft tissue of the opposing hard palate. It can occur with both deciduous and permanent dentition, or with permanent dentition alone (Figure 8).

The permanent lower canine teeth erupt on the lingual side of the lower deciduous teeth.

If it is a problem with deciduous teeth, it is most often picked up at puppy vaccine visits. Appropriate and careful extraction of the lower temporary canines at this time will relieve pain immediately and provide space so the permanent canine tooth can eventually erupt into the normal diastema between upper canine and incisor teeth, inclined buccally.

Extraction of deciduous mandibular canine teeth requires great care for two reasons:

• The whole tooth must be removed. Fractured remnants may still degrade the following permanent tooth’s eruption path and cause local osteomyelitis from remaining infected pulp.

• The following permanent tooth bud is located immediately lingually to the deciduous tooth, so any instrumentation of the lingual half of the deciduous canine will result in enamel damage to the permanent tooth.

If this is seen in the young adult (five to eight months usually), treatment is usually essential to allow the mouth to close without pain. Most pups already have large pits in the hard palate filled with pus, food and other debris (Figures 9 and 10). Treatment can take three forms, depending on the clinical picture:

• Orthodontic tipping with a custom-built composite resin bite plane attached to the upper arch.

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Reference

1. Byrne and Byrne (1992), Veterinary Record, 130: 375-376.

Figure 9 (right view following closure of extraction flap for 504 and crown amputation and root canal filling of the right lower permanent canine (404)).

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