Bite Abnormalities and the Norfolk Terrier

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Introduction

Usually when Norfolk Terrier people gather there is much talk about 'bites'. We proudly show off our dogs' teeth when they look right, or sidle away when they don't. The disappointment is usually felt by many, when we hear that he or she had 'lost' its bite. We offer each other all sorts of advice and consolations, aware of how distressing it can be when an otherwise lovely puppy turns out to have a bite abnormality. Much whispering goes on around the subject of which judges will overlook/ignore/tolerate bite problems, and which judges are 'fanatic' or 'mad' about it. What is disturbing is that there appears to be a feeling among several exhibitors that judges who as much as *remark* on bites in their reports, are 'fanatic' about it. What is worse, however, is when breeders continue breeding with a dog or bitch (remember, she carries 50% of the genes inherited by the puppy!) when there is clear evidence in the offspring that the abnormality is inherited.

Simply scanning the judges' reports for the last few years reveals an alarming number of mentions/warnings/reprimands/allusions concerning bite abnormalities. There clearly is a problem. I will, as veterinary surgeon, address the controversy of where I think the 'bite' should figure in the overall business of judging, and why I think that it is a problem we should not be ignoring. I will also offer good news, however, by drawing attention to the fact that not all bite abnormalities are genetic and hereditary, but acquired. Many of these can be improved by simple means and early interventions that do not (and I emphasise) contravene ethical guidelines laid down by either the Kennel Club or the Royal College of Veterinary Surgeons. But before we address these two subjects, we need to brush up on what a normal bite actually is. For it is only when you know what a normal bite looks like that you can begin to comment on ones that are not.

The three basic skull types and number of teeth

The three skull types are:

- *Doliocephalic*: this kind of skull is found in the breeds with long narrow faces, eg. Greyhound, Borzoi, Afghan, and the Rough Collie.
- *Mesocephalic*: this is the 'normal' or 'medium' face type found in most dogs, purebred and otherwise, eg. German Shepherd, Border Collies, and the terrier types. The Norfolk Terrier falls into this category.
- *Brachycephalic*: this refers to breeds with short muzzles and broad faces, eg. Pug, Boxers, and Bulldog.

All normal adult dogs should have (accidents aside) 42 teeth, and these teeth should all relate in the normal way to each other. Missing (when there is no history of an accident) or extra teeth mean that the dentition is abnormal, and is very likely

hereditary in origin. We will see later, however, that a single missing Incisor *may* sometimes be the result of damage to the milk teeth.

Assessing a normal bite

Before we can begin to discuss the abnormal bite we need to be able to tell what a normal bite consists of. Before assessing the bite, make sure that the mouth is able to shut completely and neatly. There are FOUR criteria for assessing the normal bite in any Mesocephalic dog, of which the Norfolk Terrier is one:

- ≅ The Incisors (the small teeth in the front of the mouth) should meet in a Scissor Bite (as noted in our Breed Standard). This means that the upper incisors closely overlap the lower incisors, and sit square, or in a gentle arc, to the jaw.
- ≅ The lower Canines (the really big ones) should fit very neatly into the space just behind the upper Canines, without touching, when the mouth is closed.
- ≅ The Premolars (those teeth between the Canines and the Carnassials, which are the largest teeth on the sides of the jaws) should form a 'shear mouth' pattern, where the tips of the upper Premolars fit neatly into the spaces between the lower Premolars. The upper and lower Premolars must never meet tip to tip.
- ≅ The skull should be perfectly symmetrical in the long plane. This can be tested by looking at the incisors once again: the hairline space between the middle incisors of the upper jaw must coincide exactly with the same space made by the lower incisors.

ANY DEVIATION FROM THESE FOUR CRITERIA IS A DEVIATION FROM THE *NORMAL* IN ANY DOG (PUREBRED OR OTHERWISE) THAT IS CLASSIFIED AS MESOCEPHALIC. Using these four criteria means that one can assess the 'bite' in a matter of seconds.

NFTCGB drawings of teeth.lnk

How to classify a bite

- ≅ The Class 0 Bite (Orthoclusion):
  This is the normal bite as described above
- ≅ The Class 1 Bite (Malocclusion):
  The overall pattern and distribution of teeth is correct, but some teeth meet incorrectly because of poor alignment or rotation of individual teeth. This would include problems like retained milk teeth, cross-bites, Canines displaced inward/outward, missing teeth, impacted teeth, extra teeth, and

so on. Some of these abnormalities are not genetic or hereditary, but acquired.

- The Class 2 Bite (Malocclusion) (Overshot):
  This effectively means that the upper jaw appears longer than the lower jaw. This is never normal in any dog, but is seen quite frequently in some breeds. In the UK it is seen in the Bearded Collie, German Shepherd, West Highland White Terrier, and the Weimaraner. It has been proven to be hereditary in the Longhaired Dachshund and the German Shorthaired Pointer.
- The Class 3 Bite (Malocclusion) (Undershot):
  The lower jaw appears longer than the upper jaw. This is considered normal in some breeds like the Boxer and the English Bulldog. Such breeds often show overcrowding of teeth (and the related occlusion problems) due to lack of space in especially the upper jaw.

The health implications of Malocclusions

When it becomes apparent to the breeder that there may be an inherited pattern to the occurrence of these abnormalities, the problem must be faced and advice sought. Bite abnormalities (beside the implications for showing and further breeding) can result in health issues. Such a dog may have difficulty in chewing or keeping food in its mouth; it may develop tempero-mandibular joint (TMJ) pain later in life; there may be chronic trauma to the palate from lower Canines or poorly positioned teeth; and it may develop early and serious periodontal disease, with resulting loss of teeth.

The treatment of all these conditions require a general anaesthetic.

The veterinary ethics of bite abnormalities

The main problem facing both the breeder and the veterinary surgeon is deciding whether the abnormality is inherited or acquired. The four criteria for assessment of the bite, and the Classification as outlined above, are helpful in making that decision. No alteration can be made to a bite (or any conformation feature for that matter) if indications are that it may be genetic and inherited. If it is clear that the abnormality is acquired (like when a retained/delayed milk-tooth disturbs the eruption of the permanent tooth), then timely intervention is appropriate and correct.

No veterinary surgeon should ever be asked to alter a bite in a show dog or a dog intended for breeding (surgically, or by orthodontic methods) when the breeder is aware (or suspects) that the problem is hereditary in origin.

Kinds of bite abnormalities that may be found when examining a puppy

Anterior Crossbite

This defect is either acquired or inherited. One or more incisors in the lower and/or upper jaws appear to tilt forward, so that the dentition no longer has the 'scissor-bite' conformation. This must not be confused with what is known as a Level Bite. When a Crossbite is due to retained milk teeth causing overcrowding then it is considered to be 'acquired'. When there is overcrowding without retained milk teeth present, it is either hereditary or acquired (the desirable big permanent teeth of the Norfolk Terrier erupting before the jaws are large enough to accommodate them).

Some breeders choose to carry out orthodontic work themselves (using elastic bands), frequently with serious consequences. I know of two cases in the Norfolk where the bands had slipped down the incisors burying themselves out of sight below the gum line. At ten months of age, one of them had to have all the lower incisors removed. Both had to undergo general anaesthesia.

Wry Mouth

In this condition one or more of the quadrants of the skull is shorter or longer than the rest. It is worthwhile at this point to explain that the skull is divided into four quarters: top left and right, and bottom left and right. Each of the four parts of the jaw has its own growth plate. All should all grow at the normal rate for that breed. When this fails to happen, the result may be a Wry Mouth. There is usually no problem with space in this condition, but it can occur in combination with other bite abnormalities. It is considered to be strongly hereditary and serious, so this dog must never be used for breeding. Any vet treating a Wry Mouth for clinical reasons should advise that the dog be neutered at the same time.

Posterior Crossbite

In this condition the upper Carnassial teeth (those very large ones in the cheeks) sit on the tongue side of the lower Carnassial teeth when the mouth is closed. This results in more rapid accumulation of plaque and tartar, and early gingivitis. It is not known whether this condition is hereditary or acquired.

Base Narrow Lower Canines

In this condition the lower Canines protrude (sometimes painfully) into the palate on the tongue side of the upper Canines. That is, they do not point sufficiently outwards to take their normal position in the space just behind the upper Canines, called the Diastema.

The abnormality is currently known to be due to an autosomal recessive gene mutation in only the German Short Haired Pointer, and neutering is always advised at the same time as surgical treatment.

Importantly, the abnormality can, however, also arise from retained lower milk Incisors which compel the permanent Incisors inward toward the tongue, and jaw growth that is lagging behind the eruption of the teeth. This is often the case in the Norfolk Terrier.

Level Bites
In this abnormality the upper and lower Incisors meet edge to edge. That is, they meet edge to edge instead of the upper incisors overlapping the lower incisors fractionally.
To decide whether this problem is hereditary or acquired, you have to examine the occlusion of the upper and lower Premolars. If the Premolars are positioned correctly, then there is a very good chance that the Level Bite is acquired. If the Premolars themselves meet tip to tip, and the mouth cannot close fully, then it is due to the top jaw being short (the Undershot Bite). There is a very good chance that this abnormality is hereditary.
Untidy Bites
These must not be confused with Anterior Crossbites and Level Bites. More importantly, these two abnormalities must not be reported or criticised as simply 'untidy bites' and ignored.
An Untidy Bite is, as the name suggests, a bite in which the Incisors are not neatly arranged in a gentle arc (or square), and deviate from the classic 'scissor bite'.
If you can satisfy yourself that the Premolars are correctly aligned and the upper and Lower Canines are in the correct relationship to each other, then there is a very good chance that the problem is acquired. Breeders and owners of Norfolk Terriers take note.
If judges are to tolerate imperfect bites, then this should be the only category ever to be considered.
'Other' kinds of Bites
There are a variety of manifestations of bite abnormalities and names for them, but all coincide with the Bites listed above.

The Arguments
I have remarked previously that many judges' reports over the last few years refer to the number of poor mouths that appear in the show ring. Some even issue serious warnings and admonishments. I have also seen, at first hand, several dogs with poor mouths (including the genetically catastrophic Wry Bite) win their classes or get placed highly - and one or two get as far as the Challenge. I have read judges' reports where they express their relief at not seeing *that* many dogs with poor mouths in the younger age groups. Some express their worry only between the lines in their reports. And what is to be made of reports where some dogs are critiqued for their 'excellent bite', 'perfect scissor bite', 'good mouth', and so on – and no mention made of the bite in others?

There clearly is a PROBLEM. And from a veterinary point of view, there clearly is a CLINICAL PROBLEM. A bite that deviates from the NORMAL BITE (see 'assessing the normal bite') in the Mesocephalic breed (of which the Norfolk Terrier is one) is ABNORMAL and significant in terms of health, welfare, and breed-function. It is NOT merely a feature of the dog among all the other features assessed and compared in the show-ring.

The only argument that is offered by judges and breeders in defence of placing a dog with a poor mouth highly is, what I will call, THE OVERALL PACKAGE THEORY. In this theory the OVERALL PRESENTATION (as noted in the Breed Standard, and rightly so) comes first, and all the other individual features are equal in importance and come thereafter. These individual features may include poor heads, incorrect expression, soft coats, out of coat, wide fronts, narrow hinds, gay-tails, and bite abnormalities. In defence of these judges, it is fair to say that no dog will have everything absolutely correct, and it is up to him/her to sort things out by weighing up individual faults and virtues within each dog, and between dogs. How they prioritise these, and the bite in particular, under show conditions, is where the part of the problem is located.

The Overall Package Theory usually also offers arguments that run along the lines of: what is the point of having a perfect bite when the dog cannot actually get to the rodent because its gait is poor? Fair enough.

However, the counterargument to these arguments is this: IT IS ALL THE FEATURES OF A TERRIER WHICH MAKE IT A TERRIER, BUT THE *BITE* IS MORE FUNDAMENTAL TO IT THAN ALL THE OTHER *INDIVIDUAL* FEATURES. Compared to the significance of the bite in Sight and Scent breeds, it must be so. Some have argued, NO BITE, NO TERRIER! In fact, from an evolutionary point of view it is possible to argue: no bite, no dog!

It should be a NECESSARY requirement that the dog in the show ring conform as close to Type as possible - the Overall Package Theory is correct on this one. But it should be a MINIMAL requirement that the bite be correct.

The role of the breeder

- The breeder needs to learn how to distinguish between bite abnormalities that are hereditary and bite problems that are not. See above.
- The breeder needs to be aware that the pattern of inheritance of bite abnormalities (when it is hereditary) is RECESSIVE rather than Dominant as far as is known. It has been noted that the progeny of a stud (or bitch, NB) with a known hereditary bite abnormality will have an UP TO 50% chance of having that abnormality appear if mated with bitch (or dog) that is ‘clear’. The progeny from these offspring will, in turn, have an only UP TO 25% chance of having the abnormality. And so on. It is thus possible, within 3 or 4 generations, to get down to a 7%, and less, chance of producing litters the members of which will show the abnormality. The lesson is this: IT IS NOT DIFFICULT TO DILUTE OUT BITE ABNORMALITIES IN A LARGE BREEDING KENNEL. Bite abnormalities will still occur, but the incidence will be dramatically lower.

- This also means that kennels producing puppies with hereditary bite abnormalities on a REGULAR basis over a long period are doing something wrong. It would be possible to argue (and prove) that they are *knowingly* using both bitches and studs with known hereditary bite abnormalities in their backgrounds, and simply keeping their fingers crossed hoping that they get a 'stunning' puppy with a good mouth. The result of this is that hereditary bite abnormalities exist at quite a high level in these kennels as a whole.
- And at present these kennels are producing the puppies (frequently for the pet market) with clinically significant bite problems we see in veterinary practice. This is a health problem, never-mind showing.
- And on an even more serious note: if a large kennel SHOWS dogs with obvious bite abnormalities, it is feasible to speculate that things must be pretty bad back home.
- On a more conciliatory note: breeders who take care over the bite issue may *still* find the occasional puppy with a bite problem. In these cases it is possible to argue that it may be a consequence of selecting for a particular kind of head. If we are to aim for '*length of muzzle about one third less than the measurement from the occiput to the bottom of a well-defined stop'*, as the Standard says, then there a good chance of finding Untidy Bites in the dog with a pronounced short muzzle and a well-defined stop. This must NOT, however, be used as an excuse for allowing through a genuine bite abnormality. The way to make sure is to check the occlusion of the Canines, Premolars and the Molars. This must ALWAYS be correct as described in Assessing the Normal Bite.

But, it is not all doom and gloom

You may THINK you have a hereditary mouth problem in your kennel when you don't! As I have outlined above, not all bite abnormalities are genetic but ACQUIRED. If the milk teeth looked perfect in number and position (as they do most of the time), then there is little reason why the permanent teeth should not follow the same path. When a newly weaned puppy has the correct number and placement of teeth, abnormalities occur when something interferes with the normal development of the jaw bones or the eruption of the permanent teeth. Some of these causes are responsible for puppies that start out with good bites, but lose them later (leading to the sad refrain: 'he was a stunning puppy but lost his bite'). They include:

- **Growth Problems.** If the rate of growth of the individual jaw quadrants does not keep up with the growth and eruption of large teeth, there can be problems with alignment and space. This can lead to Untidy Bites which resemble Level Bites, Wry Bites, and other Malocclusions – and can remain with the dog for the rest of its life. This category of problem is usually NUTRITIONAL in origin. Let me explain: if the food is of such quality (when SCIENTIFICALLY analysed) that it does not contain the KNOWN required levels of ALL ingredients for puppy-growth, that puppy cannot physically eat enough to sustain normal growth – its

stomach is simply not large enough. A full stomach is meaningless if the food contained therein is of inappropriate/poor quality. Some 'home-made' diets may produce a puppy that looks good, but harbours problems that include Untidy Bites and large but weak bones. The ideal puppy diet must contain high levels of highly digestible protein, Calcium and Phosphorus in the CORRECT proportion to each other, with the correct level of Vitamin D to enable that Calcium to be utilised. Supplementing Calcium on its own is an act so ignorant that it renders one speechless. What is the answer? The best quality COMPLETE terrier (or 'small breed') puppy food you can get. No 'tried and tested' home recipe could ever compete – let alone ones that contain tripe, which is disastrously low in protein. Good quality complete puppy foods contain MEASUREABLY everything in the correct amount (and proportion) that a puppy of the terrier type needs for maintenance and growth. And you are welcome to ADD what you want to it, providing it does not fill the puppy up before it has had the correct amount of the main food.

Feeding the appropriate and correct diet will ensure that the bones in the skull grow fast enough to accommodate large terrier teeth (which itself has particular dietary requirements) coming through rapidly. Failure to do this will result in dental SPACE problems that RESEMBLE hereditary bite abnormalities.

- **Trauma.** Each of the four quadrants of the skull has its own growth plate as we have seen. The bones grow in both directions from the surfaces of these growth plates. These plates are very similar to thin sheets of cartilage within the bone, and are very delicate and easily damaged especially while growing rapidly. Jaw bones not growing in perfect tandem will result in asymmetry resulting in bite abnormalities. It is possible that the inexperienced bitch may damage these growth plates when carrying the pups by their heads. This is very difficult to prove, but, logically, very likely to happen. It makes good sense to ensure that the bitch is happy with her situation, thereby removing the need for her to keep moving her pups.
- **Suckling for too long.** As with human babies, the Incisors can be persuaded in a forward direction when suckling for too long (ie the jaw and teeth grow around the shape of the teat when sucking continues for longer than is necessary). The palate can also take on a domed conformation that coincides with the shape of the teat, thereby narrowing the width of the upper jaw.
- **Rough play causing loss of, or damage, to milk teeth.** Anything that disturbs the space available for growth of permanent teeth may result in problems. The space left by a lost milk tooth will be closed down by the body within in days, leaving the jaw slightly narrower. The permanent tooth which normally follows that milk tooth will have no space into which to erupt. This can result in an Untidy Bite or a missing tooth which, under sufficient pressure, will have been lost.

Now for some good news

Many bite problems can be improved and even solved using very simple means. As we have seen, SPACE is a crucial issue when the large permanent teeth come through in the terrier. You can almost not have enough space! It is possible to assist in helping many of the problems that could be categorised as 'acquired' if you do the following:

- From the age of 16 weeks you must, must, must examine the puppy's mouth every day. Some milk teeth, especially the Incisors, will loosen rapidly and fall out or get swallowed. Others, like the Canines, Premolars, and Molars may linger. If any milk tooth appears to obstruct the path of the permanents, this MUST be attended to.
- You must develop a relationship with your veterinary surgeon that is based on mutual trust and facts rather than hearsay (the 'I-spoke-to-a-friend-who-knows-about-dogs' syndrome, which angers so many vets). I say this because you may/will require your vet to do things at a particular time, when he/she may think it is fine to do later. I am referring here to the extraction of retained Canine milk teeth. It is patently clear that PERSISTENT LOWER *MILK* CANINES, may result in BASE NARROW LOWER CANINES, and the resulting SPACE problem. Not only will these protrude painfully into the palate, they can persuade the permanent lower Incisors in a direction that results in an APPARENTLY Undershot Bite or Level Bite. So, check these out TWICE daily. The very minute you notice the permanent lower Canines emerge on the tongue side of the milk Canines, these milk teeth MUST be extracted when they do not fall out by themselves. The CRUCIAL period is usually at 20 – 25 weeks. When it looks like the lower milk Canines have no intention of falling out, I give it no more than a three or four DAYS before intervening.
- Before rushing to your vet (to whom you are by now very well endeared), check to see if there is any movement in these milk Canines at all. If they can be wiggled, do it several times a day until the tooth is loose enough to ease out with your fingertips (never use force or pliers). And make sure that the whole tooth has come out in one piece.This will allow the permanent Canines to erupt correctly into the space previously occupied by the tooth you have just removed.
- When extracting the retained milk Canines, the following applies: it must be done under full sedation or anaesthetic so that the necessary time and care can be taken; it must be done very carefully, ensuring that the tooth is removed complete and intact; if the root of the tooth is broken off, this MUST be retrieved; nothing less will do. There is NO guarantee that the root will be absorbed – a retained root will remain an obstruction to the normal eruption of the permanent tooth.
- THIS IS IMPORTANT: once all the milk teeth have gone, do not stop checking the permanents for even one day. If you notice any of the following: untidy-looking upper or lower Incisors, Base Narrow Lower Canines, a Level Bite, one Incisor projecting forward or backward, you may have a problem. BUT, the good news is this: if the Premolars and Molars are in the correct position and correct in number (so less likely a hereditary problem), there is a very good chance that you may be able to improve things dramatically. And below is how you do it.

- THE UNDERLYING PRINCIPLE IS THAT THERE IS NOT ENOUGH SPACE FOR THE LARGE PERMANENT TEETH. YOU NEED TO MAKE MORE SPACE, AND YOU DO THIS BY MIMMICKING WHAT ORTHODONTIC APPLIANCES (THAT MAKE SPACE) DO. TAKE AWAY ALL SOFT TOYS IMMEDIATELY AND REPLACE THEM WITH *HARD* BALLS OR KONGS OF WHICH THE DIAMETER IS JUST A LITTLE MORE THAN THE DISTANCE BETWEEN THE CANINES. THIS WILL FORCE THE CANINES APART WHILE THE PUPPY IS ENJOYING ITSELF. ENCOURAGE THE USE OF SUCH TOYS BY SMEARING THEM WITH TASTY FOOD. AND THREE TIMES A DAY, WHILE PLAYING WITH THE PUPPY, PLACE BOTH OF YOUR THUMBS IN THE PUPPY'S MOUTH AND GENTLY PURSUADE THE CANINES APART WHILE COUNTING SLOWLY TO TEN. TURN IT INTO A GAME YOU CAN BOTH ENJOY.
  IN AS LITTLE AS A WEEK OR TWO THE INCISORS WILL HAVE MORE SPACE IN WHICH TO LINE UP MORE CORRECTLY, AND THE UPPER AND LOWER CANINE TEETH WILL OCCLUDE NORMALLY IN RELATION TO EACH OTHER – AND HOPEFULLY AS A 'SCISSOR BITE'.

Conclusion

It is important that breeders learn how to assess a normal bite. It is important that breeders and judges learn which bite abnormalities are likely to be hereditary and which are not – IF they are to allow these dogs through (I would advise against this in general). It is important that breeders and judges prioritise bites much more highly instead of seeing it as just another imperfection among others. It is important for breeders to admit that judges who mark down dogs because of bite abnormalities are not being 'fanatic'. It is important that breeders refrain from using orthodontic means to attempt to correct a bite – these usually don't work and is dishonest. It is important that breeders think twice about breeding dogs that have or carry bite abnormalities. It is important that, in the light of what I have written, breeders do not now call a bite abnormality 'acquired' when it is in fact hereditary. It is important that breeders understand that it is not difficult to dilute out bite problems in a large breeding kennel.

Please understand that I have not only examined the bite situation critically, but given you useful information, and offered the following SIGNIFICANT consolations:

- Not all bite abnormalities are genetic and hereditary, but acquired and preventable. So the problem may not be as bad as you suspect.
- Some Untidy Bites are merely that, and nothing more. And there is, therefore, little to worry about in terms of breeding with these dogs.
- The genes (and it is very likely to be several) responsible for the inheritance pattern of bite abnormalities are Recessive rather than Dominant, and are easily diluted out in 3- 4 generations in large breeding kennels.
- It is possible to improve, and even solve, some acquired bite abnormalities by very simple means delivered in time.

And finally, if we are to do our beloved Norfolk Terriers proud, we must move Bite Abnormalities further up our list of priorities, whether breeding or judging.