Dental Issues in the Shetland Sheepdog

Mary Mahaffey, DVM, MS

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Ah, dental problems in Shelties!!! It is so disappointing to have those promising puppies develop dental abnormalities. The truth is, you don't know what you have until the pups are at least 6 months old and all the teeth have erupted. Even then, many breeders and owners may not identify abnormal dentition as some dogs have persistent deciduous (baby) teeth that are mistaken for permanent (adult) teeth that are absent! The Shetland Sheepdog is a breed that should have full, correct dentition; however, deviations from normal are faults much like any other conformational fault. Luckily, most dental anomalies do not seriously harm the dog. Most, but not all possible dental anomalies are discussed in this article.

My goals for this article are for the reader to 1) learn to correctly assess bites which will help with making breeding and purchasing decisions and 2) learn more about some of the dental abnormalities seen in Shelties and be able to recognize them. At the end of the article, you can "judge" the bites of several Shelties, and see how well you did! ☺

Normal Dentition – adult dogs: Shelties should have full, correct dentition meaning that on each side, there are 3 incisors (I), 1 canine (C) and 4 premolar (PM) teeth top and bottom and 2 molars (M) on the top and 3 on the bottom (Figs 1-4).

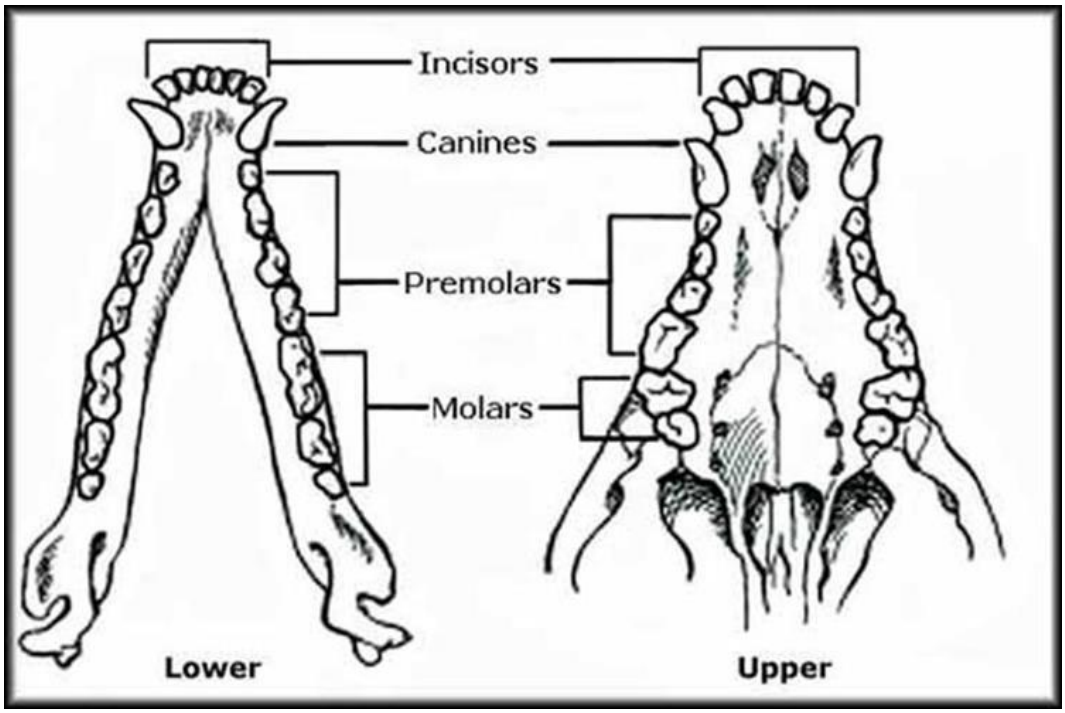


Figure 1: Normal dentition of an adult dog. From: http://www.efoza.com/post_skull-and-dog-dental-chart_471836/

Figure 2: Normal adult dog showing incisor, canine, premolar teeth, and the lower 1st molar. Notice that going from nose to tail, each premolar tooth is larger than the one before it. Also, notice that the tip of each premolar tooth is centered in the space between the teeth of the opposite jaw giving a "pinking shear" appearance when the mouth is closed.

Figure 3: Normal teeth in an adult dog (nose to the right). Left - lower molar teeth. Right - upper PM4 and molar teeth. Image source of Figures 2 & 3: Jan Bellows, DVM, Dipl. AVDC, Dipl. ABVP, DVM NEWSMAGAZINE, March 20, 2013 https://www.dvm360.com/view/take-time-count-your-patients-teeth .

An easy way to identify the correct number of molar teeth is to look for 2 smaller teeth behind each large side tooth. Generally, most breeders/owners are not concerned with missing molar teeth since judges rarely check for them; however, the genes for missing molar teeth may be related to those responsible for other missing teeth.

Figure 4: Normal adult teeth, front view. There are 6 incisors top and bottom. Notice that the upper 3rd incisor teeth are much larger than the central ones and are shaped like small canine teeth. Incisor teeth are numbered from the middle outward, 1, 2, and 3. Image source: Jan Bellows, DVM, The ABCs of veterinary dentistry: M is for malposition and malocclusion, DVM NEWSMAGAZINE, November 30, 2017 https://www.dvm360.com/view/abcs-veterinary-dentistry-m-malposition-and-malocclusion .

Normal Dentition – puppies:

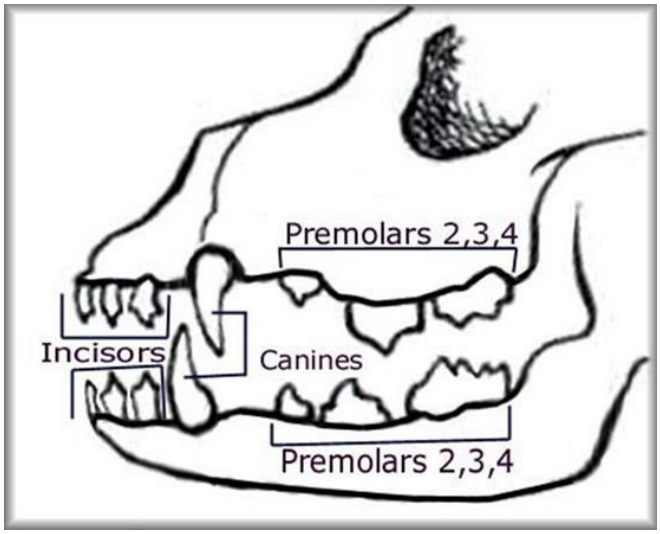


Figure 5: Normal puppy dentition. Puppies do not have 1st premolar nor molar teeth. From: http://www.efoza.com/post_skull-and-dog-dental-chart_471836/

Comparison of deciduous (baby) vs. permanent (adult) teeth in Shelties

The nose is to the left on all images with the deciduous tooth on left side and permanent on the right. All images are of Shelties. Photos courtesy of Nadine Verkerk.

Mandibular (lower jaw) teeth

Note: There are no deciduous precursors for the upper and lower 1st premolar teeth (PM 1), so if a tooth is present, it is a permanent one. Also, there are no deciduous precursors for the molar teeth.

Mandibular 2nd premolar teeth (PM 2) – (below)

Deciduous mandibular PM 2

Permanent mandibular PM2

The deciduous PM 2 has a convex (rounded) front surface while surface of the permanent tooth is straighter. The point is sharper and further forward on the deciduous tooth than on the permanent one. The permanent "leans back", whereas the deciduous "leans forward." This is the most difficult tooth to differentiate between deciduous and permanent without x-rays.

Mandibular 3rd premolar teeth (PM 3) – (below)

Deciduous mandibular PM 3

Permanent mandibular PM3

Notice the shape differences with the deciduous tooth having a sharper point.

Mandibular 4th premolar teeth (PM 4) – (below)

Deciduous mandibular PM 4

Permanent mandibular PM 4

Very different shape between the deciduous and permanent teeth. The permanent mandibular PM 4 tooth is a common missing tooth in Shelties. Occasionally, the deciduous one persists a few weeks or months before falling out, so it is important to be able to tell the difference, especially in a 6 to 7-month-old pup.

Maxillary (upper jaw) teeth

Maxillary 2nd premolar teeth (PM 2)

Deciduous maxillary PM 2

Permanent maxillary PM 2

The deciduous PM 2 tooth is shorter from gum to tip than from nose to tail. Also, it is less opaque (not as white) as the permanent tooth. The permanent maxillary PM 2 tooth is the most common missing tooth in Shelties (probably in most dog breeds). In Shelties, the deciduous PM 2 often persists in adult dogs if the permanent tooth is absent. For breeding purposes, it is important to tell the difference, if the breeder is looking for a mate with full dentition.

Maxillary 3rd premolar teeth (PM 3)

Deciduous maxillary PM 3

Permanent maxillary PM 3

The maxillary deciduous PM 3 tooth is shaped much like a permanent PM 4 tooth. (See below). The permanent PM 3 is rarely absent.

Maxillary 4th premolar teeth (PM 4)

Deciduous maxillary PM 4

Permanent maxillary PM 4

The maxillary deciduous PM 4 is shaped like the 1st maxillary molar in the adult, probably to perform the function of a molar tooth since the molars do not have deciduous precursors and are not present in young puppies.

Incisor teeth – From midline to canine, incisors are numbered as I-1, I-2, and I-3.

Deciduous incisor teeth

Permanent incisor teeth

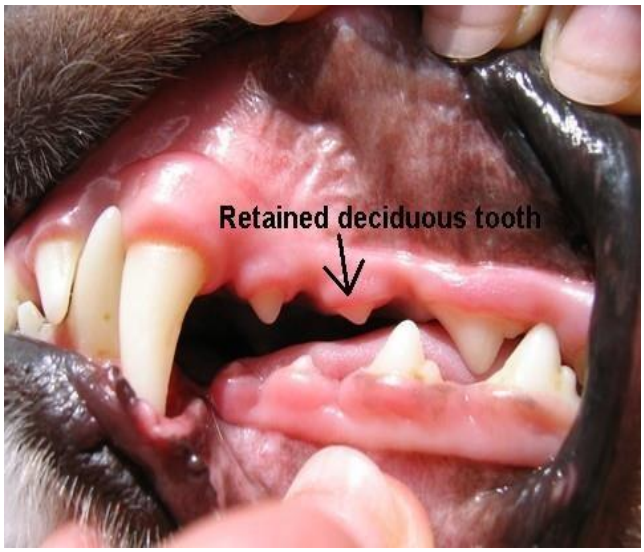
Notice that the permanent upper 3rd incisor teeth are larger than the central 4 upper incisors. Shelties have an unusual anomaly in which one or both of the permanent upper 3rd incisor teeth are absent. In such cases, there is delayed eruption of one or both of the deciduous 3rd incisors which may persist for years. (See below.)

Dental Anomalies – below is a discussion of some, but not all of the dental anomalies seen in Shelties.

Missing teeth

Missing premolar and molar teeth: Missing permanent teeth are common in Shelties. About 40% – 45% of the over 200 Shelties I have examined were missing one or more permanent teeth. The most common missing tooth is the upper PM 2, followed by the lower 2nd molar and the lower PM 4. Missing lower PM 1 and PM 2 and incisor teeth are also seen in Shelties. Most affected dogs are missing 1 or 2 teeth, but some are missing as many as 6 or 7.

Most of the time, missing permanent teeth are easy to discover as there is a gap where the missing tooth should be located. However, deciduous teeth may persist for months and years and be mistaken for permanent ones if the permanent teeth are absent. The maxillary PM 2 tooth is most commonly affected. For breeding purposes, it is important to tell the difference, as the adult tooth is absent!



Above left: Persistent deciduous maxillary PM 2 in an adult Sheltie; it is smaller than the PM 1 tooth. This dog also has posterior crossbite (discussion below) as the mandibular PM 4 is "outside" the maxillary PM 3. The mandibular 2nd premolar tooth is small and may also be a persistent deciduous one. **Above right**: Normal permanent premolar teeth in a Sheltie. In the normal adult, notice that as you look from nose to tail, each successive tooth is larger than the one in front, i.e., PM 2 is larger than PM 1, etc.

Missing incisor teeth

Persistent upper 3rd deciduous incisor (I-3) tooth: This is an anomaly in which one or both of the permanent upper I-3 teeth are absent, and the deciduous teeth persist for many years. It is easily missed by owners and judges. American breeder/judge Barbara Curry wrote an article in the *Sheltie International* in 1994 in which she talked about the problem, so it has been seen in Shelties for a long time [1]. It is an anomaly not often seen in other breeds.

Above left: Persistent deciduous upper 3rd incisor tooth in an adult Sheltie. **Above right:** Normal permanent upper 3rd incisor tooth. The permanent upper 3rd incisor tooth is missing in the dog on the left. Notice that the persistent deciduous tooth is smaller than the central 4 incisors and has a notch in the margin that faces the canine teeth. The normal permanent 3rd incisor tooth is larger than the central incisors and has a smooth surface that faces the canine teeth. Its shape is similar to that of a canine tooth.

Puppies with this trait can be detected as early as 3 – 5 weeks of age! In normal puppies, 6 tooth buds can be seen, but affected pups will be missing one or both of the upper I-3 buds. (See below).

Above left: Normal 2 ½ week old puppy. (Photo courtesy of Linda Nicholas). All 6 incisor and both canine tooth buds are visible. **Above right & below left:** A 3 ½ week old pup in which the upper left I-3 tooth is absent and the gum is flat. Below: The same pup at 5 ½ weeks of age. Both upper deciduous I-3 teeth were absent. Photos courtesy of Nadine Verkerk.

In affected Sheltie puppies, only 4 to 5 deciduous upper incisor teeth are present at 4 weeks of age rather than the normal number of 6. The central 4 incisors are present, but one or both I-3 teeth may be absent. In the majority of affected pups, the deciduous I-3 erupts from 9 – 19 weeks of age and is NOT followed by a permanent tooth.

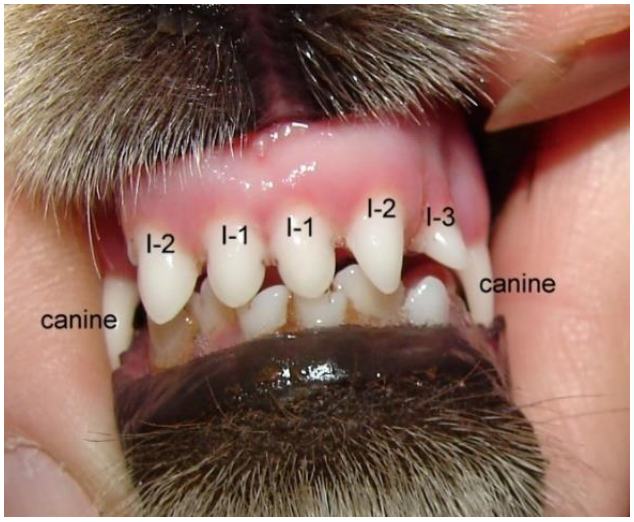
In a very few dogs, a permanent tooth may erupt within the hard palate (below right) behind the abnormal I-3 tooth necessitating removal of one or both teeth. Because of this, periodically check affected pups until 6-7 mos. of age for a late erupting permanent tooth. If this happens, have the deciduous one removed immediately.

Above: The adult left 3rd incisor tooth erupted behind the persistent deciduous one.

When erupted, the abnormal I-3 teeth may point outwardly and some may be rotated 90 degrees, as shown below. The abnormal I-3 teeth may persist indefinitely or exfoliate months or years later.

Left: The left persistent deciduous 3rd incisor tooth points outward and is rotated.

What is known about the inheritance of this trait is that affected dogs and those with normal dentition can produce normal and affected offspring. The good news is that the condition, in most dogs, is cosmetic, rarely requiring surgical correction or interfering with function of the dog like other abnormalities. Empirically, the number of affected dogs in the American show population is increasing, and affected dogs have appeared in Europe. My concern is that allowing the trait to increase in the population may lead to an increase in severity of incisor tooth abnormalities. There are reports of Shelties with missing incisors (below left), some with only 4 permanent central incisors with no deciduous I-3 precursors ever appearing. Breeding two carriers or affected individuals might result in a greater number of missing incisor teeth. Puppies with only 3 upper deciduous incisor teeth have resulted from such a breeding (below right).



Above left: A 23-wk-old Sheltie missing both permanent upper I-3 teeth. The left is a persistent deciduous one. **Above right:** A 7-wk-old Sheltie with only 3 upper deciduous incisor teeth.

If breeders are unaware of the condition and the number of affected dogs continues to increase, the condition could become so common that it would be impossible to eliminate or to keep it at a low prevalence. Superior individuals carrying the trait may well be desirable for a breeding program, and a DNA test for this anomaly would give breeders a mechanism for identifying normal appearing carriers, thereby allowing them to use that information in breeding decisions.

Links to additional reading about persistent deciduous upper I-3 teeth and research into the genomic mutations associated with it are at the end of this article.

Missing lower incisor teeth: Most often, affected dogs are missing only one lower incisor tooth and have 5 evenly spaced ones. Unless one makes a point to count teeth, the anomaly can be easily missed! The pup (below left) had all 6 deciduous incisor teeth, but the right 3rd deciduous tooth exfoliated prematurely and no permanent tooth followed. Other pups, may be missing deciduous teeth all together (below right).

Be sure to count the number of lower incisors!

Left: Five-month-old pup with only 5 lower permanent incisors.

Right: Seven-week-old pup with only 4 lower deciduous incisors.

Lance upper canine teeth: Lance upper canine teeth are also known as rostrally displaced or mesially displaced canine teeth. A lance canine tooth is one in which the upper permanent canine tooth is displaced forward toward the nose, so that it comes in contact with the upper 3rd incisor tooth, and it is located in front of the lower canine tooth rather than behind as is should (See below).

Normal canine tooth alignment

Lance upper canine tooth

The long axis of an affected tooth is more parallel to the hard palate rather than nearly perpendicular as for a normal canine tooth. In some dogs, the lance canine tooth can be so horizontal that the tip rubs on the upper lip. In most Shelties, the normal permanent upper canine tooth erupts shortly after 5 months of age. Delayed eruption of the permanent canine tooth may be an indication that the permanent tooth will be lance. Removing the deciduous tooth hoping the permanent tooth will come in straight rarely makes a difference. The abnormal position of a lance canine tooth may prevent the mouth from closing completely, and may force the lower canine tooth to point outward (See below).

Two views of the same Sheltie with a lance upper canine causing outward deviation of the lower canine tooth.

Although treatment is not required in all affected dogs, therapy is necessary in some. Treatment alternatives include extraction, crown shortening of the affected canine tooth, and orthodontic repositioning which can be expensive. The earlier treatment is initiated, the better. If nothing is done, debris will accumulate between the canine and I-3 teeth without diligent daily cleaning.

Left: Sheltie with severe gum and periodontal disease caused by debris accumulation between a lance canine tooth and the 3rd incisor tooth.

The condition is more commonly seen in Shetland Sheepdogs than other breeds. The American Shetland Sheepdog Association and others supported research at Clemson University to find genomic mutations associated with lance canine teeth. Sixty-five affected and 100 control Shelties from the US, Canada, and Europe were included in the study. The research resulted in the discovery of variants in two different genes associated with lance canine teeth [2]. These genes are also associated with size (height and weight), so that affected Shelties in general are smaller than those with normal canine teeth.

A DNA test resulting from the research is available for the gene with the strongest association with lance canine teeth. An article explaining research results, giving guidance on how to use the DNA test, and providing additional links can be found at Lance canine tooth research & breeder advice .

A link to additional reading is at the end of the article.

Base narrow (lingually displaced) lower canine teeth: This is an anomaly in which the lower canine teeth do not flair outward as they should causing crowding of the lower incisors and the mouth to incompletely close. In some cases, the tips of the lower canine teeth indent the hard palate.

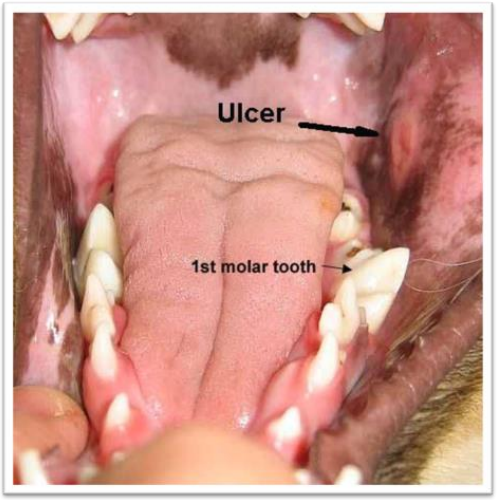
Above: Side and front views of a Sheltie with severe base narrow canine teeth. Photos courtesy of Julie Iverson, DVM.

Most Shelties with base-narrow canine teeth are less severely affected than the one above. Uneven spacing of the lower incisor teeth (below) is usually an indication of some degree of base narrow canine teeth.

Left: Crowded, misaligned incisor teeth caused by base narrow canine teeth.

In severe cases, crown amputation of the lower canine teeth would be least expensive fix. Less severely affected Shelties may be treated with an orthodontic device. [3] A good discussion of the topic along with additional photos was published by the Canadian Shetland Sheepdog Association [4], and a link is provided at the end of this article.

Posterior (caudal) crossbite: Posterior crossbite is a condition in which the lower premolar teeth are positioned outside of the upper ones. The anomaly has been reported in Shelties, but is seen more often in Collies. Fortunately, it is easy to detect if one just examines the side teeth.



Above left: Sheltie with posterior crossbite. Notice that the lower 4th premolar and 1st molar teeth are located outside the upper ones. In some affected dogs, the abnormally positioned teeth must be removed to allow for proper mouth closure and to prevent pain. **Above right:** Five-month-old Sheltie with posterior crossbite. The lower left 1st molar tooth points outward causing an ulcer on the inner cheek. The 1st molar tooth was surgically removed.

You Be the Judge!

Evaluate the dentition of these 5 Shelties. Answers at the end.

Sheltie #1 (right and left side views)

Sheltie #2 (right and left side views)

Sheltie #3 (right, left, and front views)

Sheltie #4 (right, left, and front views)

Sheltie #5 (right and left views) – 7 months old. (Black spots on the teeth are stick debris.)

Answers to the teeth evaluations:

Dog #1: The right mandibular 4th premolar tooth is absent. All other visible teeth are normal.

Dog #2: The right & left maxillary PM 2, the right and left mandibular PM 4 and the left mandibular PM 2 teeth are absent. This dog is missing at least 5 teeth.

Dog #3: The right maxillary permanent 3rd incisor and 2nd premolar teeth are absent, but persistent deciduous teeth still fill those positions. Compare the size and shape of each persistent deciduous tooth to the permanent versions on the opposite side. Many people might have mistakenly determined this dog to have full, correct dentition. The persistent deciduous PM 2 tooth exfoliated at a later time. Another note, many of those persistent deciduous PM 2 teeth can be easily moved when touched.

Dog #4: Normal, full dentition. Notice the "pinking shear" alignment of the upper and lower premolar teeth.

Dog #5: The left 4th mandibular premolar tooth is absent and the left maxillary 2nd premolar tooth is a persistent deciduous one that will likely be exfoliated within the next year. The right mandibular 4th premolar tooth is a persistent deciduous one that exfoliated about two weeks after the photos were made. This tooth has sharp points and has a different shape than the permanent version. (Comparison images below.) This dog is missing at least 3 permanent teeth.

Right mandibular PM4 teeth: Left – persistent deciduous PM4 of Dog #5. Right – Permanent PM4 tooth of another dog of similar age. (The nose is to the right.)

I hope that you readers were able to accurately assess the above dogs. I also hope that many of you will have an increased interest in evaluating the teeth of your own Shelties and be able to do so more accurately. I have placed a summary "bullet" point list that includes eruption dates below for your convenience.

Dentition "Bullet" Points

Dentition

- 6 incisors (I) top and bottom
- 4 canine teeth (C)
- 4 premolar (PM) teeth on each side, top and bottom
- 2 Molar teeth on top and 3 on bottom
    - On the top (upper jaw), the largest side tooth is the 4th premolar. The 2 smaller teeth behind it are molars.
    - On the bottom (lower jaw), the largest side tooth is the 1st molar and the 2 smaller teeth behind it are the 2nd and 3rd molars.
    - Just remember – there should be 2 smaller teeth behind the big side teeth top and bottom.
- Except for PM1 and the molars, all other premolar teeth, canine teeth, and incisors MUST have deciduous (baby) precursors. Adult versions of those teeth will NOT erupt unless the deciduous ones erupt first.
    - Not all deciduous teeth are followed by permanent (adult) ones, in which case, the deciduous ones may persist longer than normal!
- When looking at side teeth – going from nose to tail, each premolar tooth should be larger than the one in front.
- Persistent deciduous PM2 teeth are commonly mistaken for permanent teeth.
    - The persistent deciduous PM2 teeth are smaller and less opaque than the PM1.

Anomalies Seen in Shelties:

- Missing permanent premolar teeth (common in many breeds)
    - Missing upper PM2 teeth most common, often the deciduous one is persistent.
    - Missing lower PM4 tooth common in Shelties.
- Persistent deciduous (baby) upper incisor teeth – no permanent I-3 teeth - Learn to detect a deciduous I-3 tooth in older pups and adult dogs.
- 4-5 evenly spaced lower incisor teeth instead of the normal 6 – easy to miss anomaly.
- Lance canine teeth
- Base narrow lower canine teeth – crowding of incisors and trauma to the hard palate.
- Posterior (caudal) crossbite in which the lower side teeth are outside of the upper ones.

Things to look for in adults:

Missing incisor and premolar teeth:

- Are all permanent teeth present?
- Are all teeth present **permanent** teeth?

Things to look for in puppies:

- At 3-4 wks., look to see if all incisors are beginning to erupt and check for scissor bite.
- 6-7 wks. – confirm the presence of all 6 incisors top and bottom. All deciduous teeth (incisors, canines, and premolars) should be in place by 8 weeks of age. [4]
- 16 – 18 weeks of age – central permanent incisors begin to erupt – followed by I-2 and I-3. If any deciduous teeth persist when permanent ones begin to erupt, have them removed!!!
- 5 months of age - lower permanent canine teeth begin to erupt. All will look base narrow, but usually flair outward with time.
- 5+ months – upper canine teeth begin to erupt. Consider having the deciduous ones removed if the permanents are coming in. A late erupting permanent canine tooth is a bad omen and often occurs with lance canine teeth.
- 5 months of age, the 1st premolar teeth erupt (no deciduous precursor) and the permanent 2nd premolar teeth erupt (to the inside of the deciduous ones).
- All permanent teeth should be in place by 6 months of age! [4]

Additional reading:

Persistent upper I-3 and lance canine teeth: https://www.americanshetlandsheepdogassociation.org/dental/

Research on persistent upper I-3: https://www.americanshetlandsheepdogassociation.org/dental-studies/

References:

[1] Curry, Barbara A: Missing and crooked teeth. *Sheltie International* 13: 90, 1994.

[2] Abrams S, Hawks A, Evans J, et.al.: Variants in FtsJ RNA 2′-O-Methyltransferase 3 and Growth Hormone 1 are associated with small body size and a dental anomaly in dogs. PNAS: 117, no. 40 24929-24935, 2020. https://www.pnas.org/content/117/40/24929

[3] Jan Bellows, DVM, Orthodontic solutions: What to do with that bite, May 28, 2013, DVM 360, https://www.dvm360.com/view/orthodontic-solutions-what-do-with-bite

[4] Sherrie Sparling, Dental Issues in Shelties, Part I, Base Narrow Canine Teeth: *Canadian Shetland Sheepdog Association Fanciers, Inc.* Volume 30, Issue 2, pages 15 – 17, 2017. http://www.cssaonline.ca/index_htm_files/Summer%202017.pdf . Scroll down to page 15 for the article.

[5] Fulton AJ, Fiani N, Verstraete FJ: Canine Pediatric Dentistry, *Vet Clin Small Anim* 44 (2014) 303–324, http://dx.doi.org/10.1016/j.cvsm.2013.11.004