

## **Corns and Warts**

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In August of 1998, we adopted our third greyhound and named him Tybalt ('tib-bult'). He was 6 years old and had been bounced from home to home. We were his fourth owners. Tybalt had chronic left-sided lameness, and the cost for his veterinary care was excessive for his previous owners. When we adopted him, he was lame on both his left front and back legs and did not like to walk. He spent much of his time lying down. He seemed depressed, and did not show interest in daily activities or in eating. The lameness had gone on for so long that Tybalt developed permanent orthopedic and neurological changes on his right side due to the excess weight that he had to bear on that side. Once we adopted Tybalt, we were determined to find out the cause of his lameness. We visited 9 different veterinarians, including neurologists, orthopedic surgeons, chiropractors, and acupuncturists, and received varied diagnoses from tick-borne diseases to tendonitis. When the problem was finally isolated to his toes, we made the decision to do exploratory surgery and, if nothing revealed itself, amputate the affected toes. The orthopedic surgeon removed a sharp, pebble-like growth that was embedded in the paw pad, and this seemed to be the culprit. Following the recovery period, Tybalt was walking better than before, at least for a short time.

Laboratory tests revealed that the growth in Tybalt's foot was a "corn", a hyperkeratotic lesion that usually develops within the pad of the main weight-bearing toes. This was our first exposure to "corns", but unfortunately not our last. Once diagnosed, Tybalt underwent all of the traditional treatments for corns, including 4 surgeries and yet, one corn always returned, and often bigger and more painful than before. Through years of trial and error, we realized that this condition is very difficult to treat successfully, but it can be managed.

A corn (or callus) most often appears in the center of the paw pad, and presents as a whitish, circular area that can be extremely painful to the dog when palpated. Corns can also appear on the sides or tips of the paw pad, though these are not as common. Corns sometimes appear between toes. These corns are softer in consistency, but just as painful. The reason for the pain is that corns contain a cone-shaped core/root whose point can press on a nerve, causing severe pain and lameness (just image yourself walking with a sharp pebble in your shoe).

There are several reasons that corns appear on the paw pad. A corn can develop as a result of environmental trauma to the paw pad. In this instance, a small area of skin tissue becomes fibrous and scarred following a trauma to the paw pad. The traumatized skin tissue has a hyper-sensitive and hyper-responsive reaction to a cut, puncture, or small foreign body that may be lodged in the pad. Thick and hardened corns develop from an accumulation of the dead skin cells at the site of the trauma or lesion.

Some veterinarians also speculate that corns are the result of excessive pressure or friction over a bony prominence. For example, when a dog walks (especially on a hard surface such as pavement), there is pressure when the toe bone hits inside and against the pad skin. This constant concussion results in a hardened area over the bone that finally protrudes through the pad skin. The “hardening” is a normal body response to pressure or friction. Similarly, a corn can develop if a toe bone is misaligned or has an irregular edge (spur), which can also cause undue pressure on the pad skin. Corns that develop in between the toes usually form when the knuckle joint of one toe presses against the knuckle joint of the adjacent toe.

Corns can develop in all dog breeds but some dogs are asymptomatic. Indeed, some dogs may have large, protruding corns, yet show no sign of pain or lameness. Greyhounds seem to be very susceptible and sensitive to corns. Often greyhounds lack sufficient fat in their pads to

protect and cushion the pad skin. A fatty layer in the pad not only protects and cushions the paw pad, but also absorbs the concussive effects of bone on skin when the dog is walking or running. Greyhounds can lack this fatty layer in their pads and therefore, their pad skin is not adequately protected.

A wart is a raised, round, rough-surfaced growth on the skin. Warts are benign tumors of the top layer of the skin caused by the human papillomavirus (HPV). The virus replicates into almost normal-looking skin, and can be hard to detect.

In humans, warts occur most often on the hands and are not painful, but when they occur on the bottom of the feet, they can be quite painful. In dogs, warts often occur on the back/bottom side of the paw. If they occur on the bottom of the front paw, they are called “palmer” warts (because they are on the palmer side of the paw). If they appear on the bottom of the back paw, they are called “plantar” warts (because they are on the plantar side of the paw). These warts are also thought to be caused by the papillomavirus, and are often collectively referred to as papillomas. Though they are viral in origin, warts are not thought to be contagious to either dogs or humans.

Unlike corns, warts do not have cores or roots. They only grow on the top layer of skin. Warts normally grow out of the skin in cylindrical columns. On the thick pad skin, the columns are packed tightly together, giving the surface a mosaic pattern. Sometimes, black dots can be seen in a wart. These are blood vessels that have grown into the wart and have broken off. When this happens, they are referred to as “seed warts” because the broken blood vessels resemble small, black seeds.

Like corns, warts are also painful, and cause a discreet thickening of the skin. Corns and warts on the paw pad resemble each other, and the two disorders are often mistaken.

In humans, it appears that a person's susceptibility to warts (and the time it takes for them to go away) is related to the individual's immune system. People who have immune-related diseases such as AIDS or cancer tend to have more warts that last longer. The same susceptibility can be hypothesized about in dogs with immune-related conditions (e.g., tick-borne diseases).

For veterinarians who do not have extensive experience with greyhounds, corns and warts are often misdiagnosed (e.g., as arthritis/degenerative joint disease, nerve impingement, tick-borne diseases). The first step in treating corns and warts is a good evaluation. See your veterinarian, ask questions, and discuss treatment options. Corns and warts are often neglected until the pain is unbearable. Remember, most painful paw pad problems become more severe with age or neglect.

The number of treatments for corns and warts seems as numerous as the number of dogs affected. Treatment effectiveness varies from dog to dog, and is also dependent on other factors (e.g., dog's age, number of affected paw pads, secondary diagnoses such as immune-related conditions and arthritis). For example, some dogs are "cured" after a single application of tea tree or castor oil. There are other dogs for which nothing works except toe amputation. It is clear however, that standing and walking on padded and softer surfaces reduces pain and lameness, and may even correct the problem. Indeed, for the treatment of humans, protective padding over the affected area is the most common form of treatment.

Other common treatment methods for both corns and warts include supplements to stimulate an immune-related response, topical removers such as salicylic acid-based products (e.g., KeraSolv, Dr. Scholl's Corn and Callus remover, Compound W Wart Remover, and Freezone Corn and Callus remover), filing down/drilling out corns and warts, surgery for excision, and amputation of the affected toe.

Supplements have been found to stimulate the immune system to eliminate foreign pathogens such as viruses and bacteria. One veterinarian suggested stimulating the immune system with a product called dimethylglycine, (DMG). I do not have experience with this product, but some health food stores will have this and similar products.

Treatment with topicals has shown moderate success. Most often, a salicylic acid-based formula is used. I like the made-for-human products since their concentration (%) of salicylic acid is highest [percentage of salicylic acid: Freezone (17.6%), Compound W (17.0%), Dr. Scholl's (12.6%), KeraSolv (6.6%)].

In general, salicylic acid works by turning the top of the corn or wart into dead skin. Treatments methods using salicylic acid vary. Once or twice a week, the dead skin can be removed with either a file or by paring it down with a razor blade or pumice stone. The dead skin will be softer and easier to remove if you soak the area first in warm water for about 10 minutes. Soaking the paw in warm water before application will also aid in the absorption of the acid. Some claim that the acid will work faster if you cover the corn or wart with adhesive or duct tape after acid application. Others find success by drilling a small hole through the corn using a fine-point Dremel file, and then applying the acid directly into the hole.

Salicylic acid is a common over-the-counter treatment, but it requires consistent, daily application. Additionally, this remedy may only be temporary because the source of the pressure (in the case of a corn) has not been alleviated. Furthermore, some veterinarians believe that salicylic acid should not be used because of there is a risk of increased damage to the skin resulting in increased irritation, discomfort, and possibly, infection. On the other hand, this treatment is noninvasive and may be worth trying, albeit carefully.

When I tried this treatment for my dog, I used a Dremel fine-tipped file to drill through the head of the corn, and then I coated the area with Freezone. This procedure proved only moderately successful and was short-lived. In fact, I may have caused more harm than good. Salicylic acid and filing/drilling may have actually aggravated the affected site so that, in turn, the corn returned larger and tougher/more resistant than before. Though this procedure was unsuccessful in treating my dog, I have heard positive results from others using the salicylic acid and/or filing approaches.

If interested in using salicylic acid-containing products, make sure that you do not get any of the acid near the dog's eyes or mouth. It is not advisable to use these chemical agents if you have a dog with diabetes or poor circulation. Finally, keep the lid on the acid container closed tightly so that the acid will not evaporate from the liquid.

If the corn or wart is located on or near the tip of the paw pad, amputation of the tip of the toe (P3) appears to be a successful solution. With this procedure, the majority of the paw pad is left intact and the dog can still use it to bear weight. I had the tip of the digit amputated on one of my dogs (which included the nail and up to the first joint). Two years post-operation, he shows no sign of pain or lameness.

If the corn or wart is located in the center of the paw pad, surgery is less successful. The excised corns and warts will return within 1 month to 1 year after surgery in 50% of the cases.

Complete amputation of the toe is a common solution and can be effective. Note that, once the affected weight-bearing toe is removed, there is a chance that a corn or wart may develop in the remaining weight-bearing toes.

I had the hind toe amputated from one of my dogs. He is nearly two-years post his surgery and has partial weight-bearing ability (about 50%) on that foot (compared to about 10% weight-

bearing ability before the surgery). There is no evidence of corn growth in the remaining toes of that foot. I would only consider this procedure for a dog with a corn or wart on his hind leg paw pad since most of the greyhound's weight is distributed to the front legs. Hind legs carry only about 25%-35% of the dog's weight, and most of the concussive effects that occur during walking are distributed through the front paws and toes.

Please keep in mind that amputation is permanent and may not always be the best solution. Indeed, some dogs have had devastating secondary effects from amputation in that the corns appeared on the remaining toes. Once this occurs, managing the problem becomes much more difficult. To my knowledge, there are no data available on the percentage of corn growth on the remaining toes following amputation, or whether toe amputation for back toes has a better long-term success rate than amputation on the front toes. For those who are considering this approach, please proceed with caution.

Most recently, novel approaches to the treatment of corns are being investigated at Auburn University by an orthopedic surgeon who has extensive knowledge in paw and paw pad injuries. He has developed a way to cushion the paw pad from the inside. He excises the corn and implants crushed silicone block in the remaining cavity (similar to silicone implants used in humans). The bone and paw pad are then separated by this thick, soft silicone implant. This solution seems reasonable since clear silicone pads are often used by podiatrists to treat human patients affected with corns. So far, this new treatment for corns has been attempted on a greyhound, and has provided positive and lasting effects.

Arthroplastic procedures are also being researched. Surgical correction of an underlying deformity to relieve internal pressure of bone on pad may be a solution for some patients. Once the internal pressure on the paw pad is no longer present, the pressure-related corn disappears.

Most recently (October, 2002), a study was published in a human pediatrics journal concerning corns/plantar warts in children. The study showed that duct tape was more effective than salicylic acid in removing corns and warts. According to this article, duct tape placed over the affected area acted to deplete oxygen to the site and to kill the growth. Corns and warts deprived of air and sun exposure die, and the adhesive in the tape removes the deadened area. Furthermore, the researchers believe that there is something in the adhesive material itself that may help to increase circulation to the affected area and stimulate the body's own overall immune response. The study showed that, not only did the tape-covered warts disappear, but so did the uncovered ones.

An orthopedic surgeon who has extensive experience with greyhounds and who is familiar with this study encouraged me to try this method for a 30-day trial on my dog. He instructed me to apply a small piece of duct tape directly onto the corn, then peel it off at night and immediately apply another piece, making sure that the tape does not cover the healthy pad. I am following his recommendations and though it is too early to tell, my dog is more willing to bear weight on his affected foot.

Additionally, I spoke with my local orthopedic surgeon who cautioned that duct tape might cause damage to the surrounding healthy pad if not applied carefully. He commented that the findings comparing salicylic acid and duct tape may not be a result of duct tape's effectiveness as much as evidence of the ineffectiveness of salicylic acid.

The one consistent method that seems most effective in alleviating my dog's pain and lameness is walking on a soft and well-padded surface (e.g., thick carpet, soft grass). I tried to create a padded walking environment for my dog by bandaging his feet, though this proved unhealthy and unsuccessful since the bandages did not allow his feet to breathe properly or they



became wet or dirty. I tried dog boots but none of them were padded. The boots were not designed for long-term wear, and they caused further problems.

By the summer of 1999, I decided to make “boots” for Tybalt that provided the padding and protection he needed, and that could be worn throughout the day. With the help of several orthopedic surgeons, I developed the Thera-Paw “foot glove” for Tybalt. Thera-Paw has a thickly padded and protective base that comforts and cushions his foot. The interior seams are removed to provide a non-irritating fit. The neoprene material is perforated to allow his foot to breathe so that he can wear it throughout the day. This padded foot glove provides Tybalt the relief he needs so that he is able to walk and run more comfortably.

To date, no solution has proven to be entirely effective. It is important to work closely with a knowledgeable veterinarian to produce the most positive results for your dog. While deciding on the best solution, providing your dog with a well-padded and comfortable walking surface (e.g., grass, carpet, padded boots) may go a long way in improving quality of life.