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Bacterial septic arthritis in the tarsal joint bones of two rabbits

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Septic arthritis, also referred to as infectious arthritis, is rare in rabbits. Microorganisms invade one or more joints, causing painful inflammation, swelling of the joint and alopecia over the affected area.

Arthritis is defined as an acute or chronic inflammation of a joint. Bacterial septic arthritis is, for its part, a pathology caused by the presence of microorganisms in the synovial fluid that surrounds and lubricates the joints of the limbs. The disease is serious and can have serious consequences on the health of the animal. There is no predisposition related to rabbit age, sex or race for this disease.

Figure 1: A crossbred rabbit with joint swelling and joint pain on 3 of its limbs.

Figure 2: Detail of the swollen joint of the front left limb of this rabbit.

Pathogen microorganisms

Septic arthritis is caused by bacteria or mycobacteria as well as viruses or fungi that invade the joint. Their multiplication in the synovial fluid causes an acute or chronic inflammatory reaction of the synovial mucosa.

The most common and destructive pathogens are bacteria. Without prompt treatment, their presence in the joint and

body leads to a rapid deterioration of health, and even death. Bacteria are often of cutaneous, urinary or fecal origin: *Pasteurella multocida*, staphylococci (*Staphylococcus aureus*), streptococci (*Streptococcus pyogenes*), *Pseudomonas aeruginosa*, *Enterococcus* spp., *Escherichia coli* or anaerobic bacteria. *Borrelia burgdorferi*, a bacterium transmitted by ticks and responsible for borreliosis in humans, can also cause septic arthritis.

Septic arthritis caused by a fungus is mainly observed in individuals suffering from immunosuppression. In rabbits, mycotic infections affecting internal organs are rare because their body temperature is higher than that of humans or other animals.

Pathogenesis

In the majority of cases, an acute inflammation of the synovial membrane of the joint develops via the hematogenous pathway: the presence of bacteria in one region of the body and their migration to another region via the blood circulation (bacteremia). These infections are often chronic, e.g., infection of the paranasal cavities, presence of an abscess, a bladder infection or dental problems. Septic arthritis can also be the result of trauma of the skin or tissues (muscles, tendons, fat) adjacent to bones such as, being bitten by another rabbit, fracturing a claw, developing ulcerative pododermatitis, or osteomyelitis with intracapsular metaphysics. More rarely, it results from arthrocentesis (synovial fluid aspiration) or a drug injection directly into the joint.

The onset of septic arthritis of bacterial origin usually depends on multiple factors related to the bacterium itself as well as the affected animal. They include:

- The pathogenic and invasive properties the bacterium;
- The mechanisms of escape of the

Figure 3: Tarsal joint bones of the hind limbs are also affected, here the inner side of the right hind limb.

bacterial strain to reactions of the immune system;
- The ability of the bacterium to adhere to the tissues and cells of the host in order to attach and invade them;
- The production of bacterial toxins;
- The presence of bacterial infections or abscesses elsewhere in the rabbit's body (infected skin lesions, respiratory tract infection, dental abscess, ear infections);
- Traumatic bone or joints lesions;
- The host's immune response.

If left untreated or treated incorrectly, septic arthritis may progress into a chronic degenerative joint disease with gradual degradation of the joint cartilage.

Clinical manifestations

The rabbit has a reduced appetite and becomes lethargic. When hopping, the gait is hesitant, exhibiting a reduction in the range of motion in the joints and limbs. As the range of motion decreases, the animal becomes more inactive and less able to perform normal movements such as using its litter box. The deterioration of movement may eventually cause the rabbit to stop using the litter box, altogether.

The joint is swollen, warm to the touch and/or painful.

The animal may suffer from infections occurring simultaneously in other parts of the body (see: Pathogenesis).

Diagnostic possibilities

Since septic arthritis is a serious condition that can lead to death, it is important to quickly recognize the pathology and perform various tests as quickly as possible in order to start a proper treatment ASAP.

The diagnosis of septic arthritis is based on various tests: the rabbit's medical history, clinical manifestations during the physical examination, laboratory results and imaging. The collection and analysis of the synovial fluid surrounding the affected joint provides valuable information. The liquid is viscous, and can be transparent or have a pale yellow color. Microscopic analysis makes it possible to determine the presence of bacteria and free neutrophils and/or the presence of bacteria within the neutrophils. The analysis helps also determine the type of bacterium and its sensitivity to antibiotics. This test is often completed by a blood test and a urine analysis.

X-ray imaging tests help visualize the joints and assess the damage to the joints. The most common are lesions, erosions or swelling of the soft tissues surrounding the joint, synovial effusion, growth of a periarticular bone protuberance (osteophyte) and/or osteolysis.

Preventive measures

It is important that a rabbit lives in a safe and clean environment. A damaged cage or pen may lead to injuries. A dog or a cat can suddenly bite the rabbit. The resulting wounds often become infected. When bacteria spread throughout the body via the bloodstream and reach a joint, septic arthritis can develop.

Exercise is important. A rabbit that has the opportunity to exercise and run regularly is less prone to develop arthritis.

Obese rabbits are also more prone to develop arthritis of the joints.

Treatment or surgical procedure

An antibiotic treatment should be started to avoid further damage to the affected joint. In some case, the thick pus present in the joint can only be eliminated by a surgical intervention. Arthrotomy allows a drainage and lavage of the joint, including the debridement of the inner layer of the

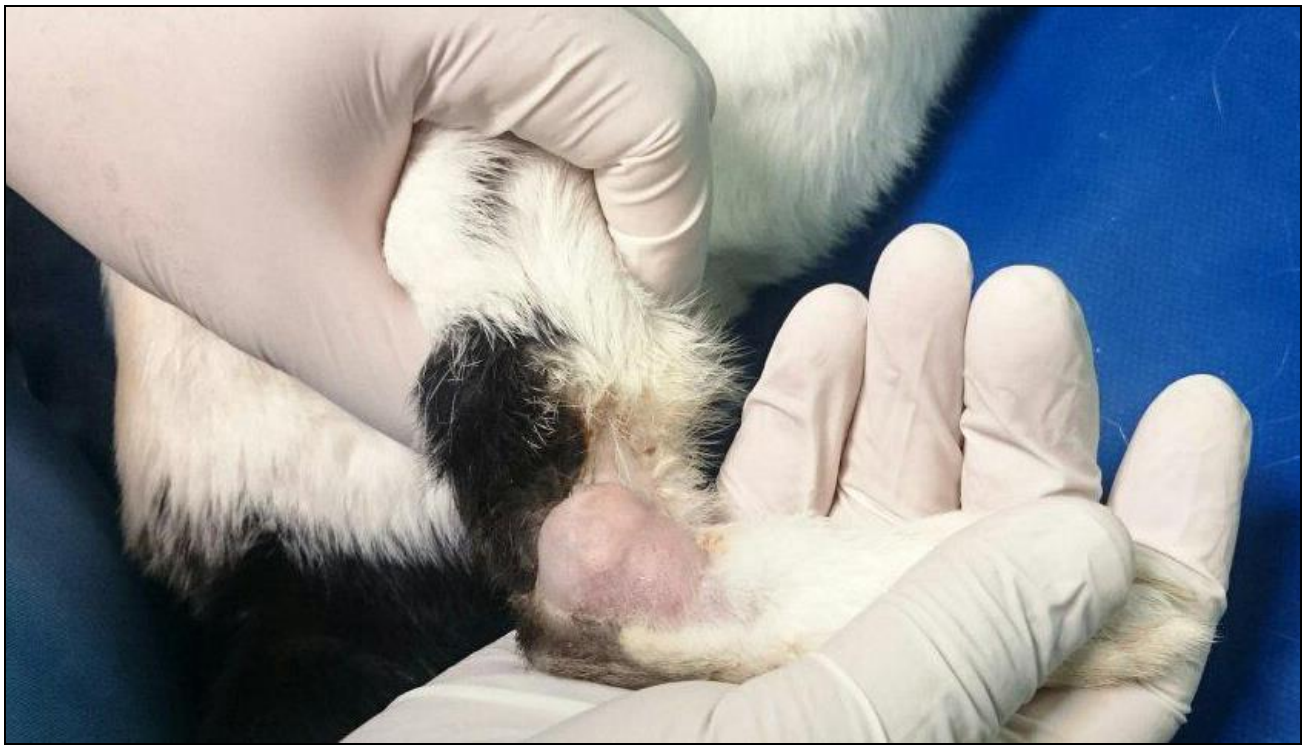

Figure 4: Tarsal joint bones of the hind limbs are also affected, here the right hind limb.

joint capsule (synovium) and the excision of infectious centers, abscesses and necrotic tissue. PMMA beads impregnated with an antibiotic are introduced into the intra-articular space and the cavity of the abscess. The choice of antibiotics depends on the result of the bacterial culture. The beads should be removed 4 to 6 weeks after surgery.

Rarely, when the infection is not responding to the given treatment, amputation of the limb is advised. Amputee rabbits usually move without problems, but should not become obese.

The rabbit must be placed on soft ground, e.g., covered with artificial sheep skins and its activity must remain limited during the recovery period. A healthy diet is important. The prognosis of healing is generally good.

Case Rabbit 1

A crossbred rabbit with a body conformation affected by age presents lateral swellings of the joints at the level of the carpal bones of one front limb and the tarsal bones of both hind limbs (Figures 1, 2, 3). It is accompanied by a loss of fur over the affected areas. The masses are hard to the touch and the rabbit does show signs of pain.

The anamnesis of this rabbit includes the elongation of several dental roots. As a result, several teeth have been extracted. He also suffers from abscesses. Several treatments have been attempted, without success. Only drainage was done.

The analysis of the first samples of articular fluid highlights the presence of pus.

A new sample of the joint fluid and a blood sample are taken for analysis.

The bacteriological examination and antibiogram confirm the presence of the bacterial strain *Escherichia coli* and its sensitivity to enrofloxacin.

The blood test indicates that this rabbit suffers from inflammatory anemia that is non-regenerative and normochromic. This is indicative of an inflammatory process. Anemia is accompanied by an increase in white blood cells (leukocytosis).

No x-rays were taken of the limbs taken, due to financial constraints.

Diagnosis: septic arthritis due to chronic dental bacterial infection resulting in ascending spread to the joints.

Treatment: The rabbit has been treated with the enrofloxacin antibiotic.

Case Rabbit 2

A young rabbit in poor health was found in a park. The inner sides of his pinnae were covered with thick crusts caused by the parasitic mite *Psoroptes cuniculi*. Shortly after his rescue, it was noticed that his hop had an odd gait, indicating that his left hind foot/leg was damaged.

Physical examination reveals that the left hind foot is swollen and shorter in length than the right foot (Figure 5). This is confirmed by X-rays (Figure 6). It is accompanied by a loss of bone density in the tarsal bones and a fracture of the calcaneal tuber. The origin of the fracture may be traumatic or a bacterial infection, or both. The swelling of the left foot may also be the result of scar tissue growth from an old healed bacterial infection.

Figure 5: Parker, young rabbit, whose left hind-limb (top) is swollen. It is also shorter (arrow) than his right one (bottom).

Figure 6: X-ray of Parker's healthy right hind-limb, and of his swollen left, which shows the presence of septic arthritis accompanied by a fractured calcanea tuber (arrow) and a loss of bone structure in the joint.

A sample of the synovial fluid is taken under general anesthesia. The cytological analysis confirms the presence of bacteria in the joint (Figure 7) and confirms the diagnosis of septic arthritis.

Diagnosis: septic arthritis.

Treatment: Enrofloxacin was started, pending the results of bacterial culture and susceptibility testing. These returned negative because the samples did not contain live bacteria. Parker also received meloxicam for pain.

The antibiotic treatment was continued for 10 days. In order to avoid problems of anorexia or intestinal dysbiosis with diarrhea, probiotics were administered.

Parker suffered throughout his life from the consequences of septic arthritis and fracture of the calcaneal tubercle bone despite all the care and proper floor

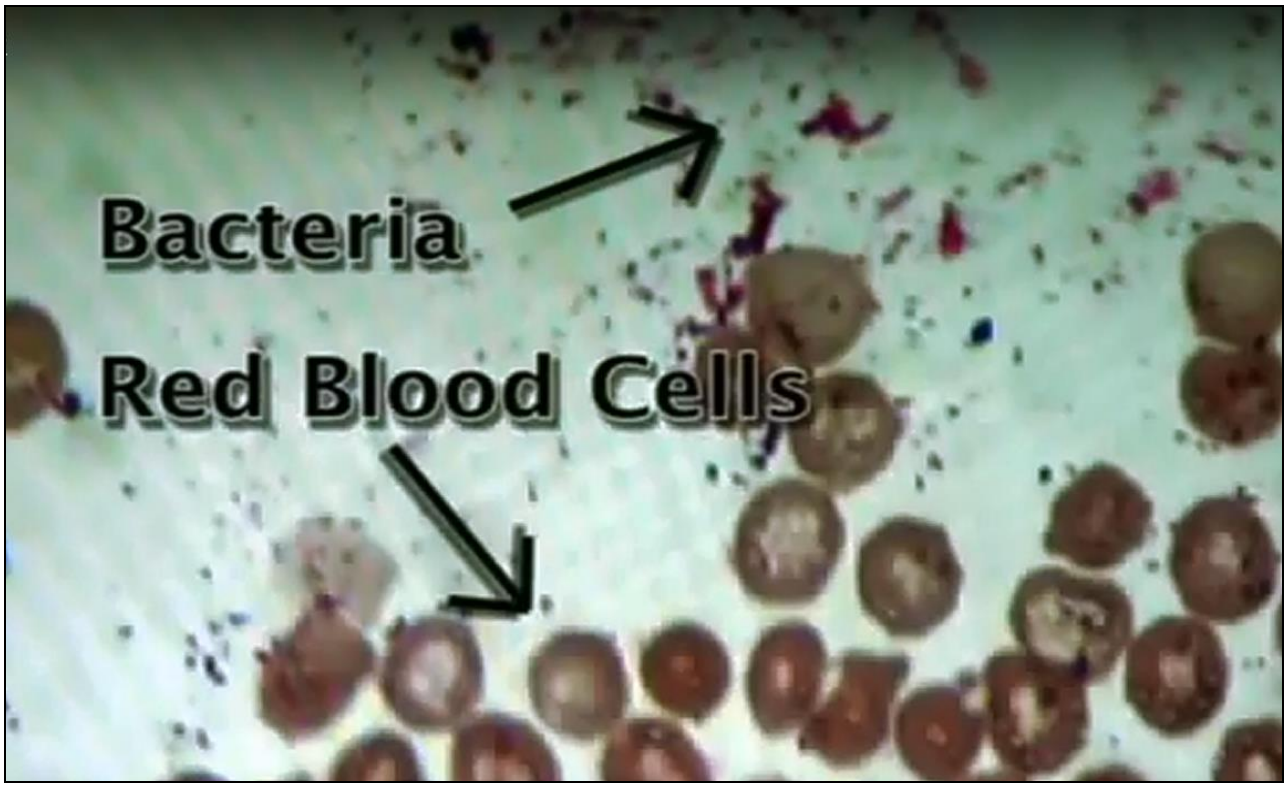

Figure 7: Sample of synovial fluid taken from the swollen joint of Parker, with red blood cells and bacteria.

arrangements with artificial sheepskins and bedding. As Parker aged, he became unable to use the litter box, so pet urine pads were provided for him. Also, he was given a daily dose of meloxicam for chronic pain.

Acknowledgements

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