Pododermatitis and Musculoskeletal Disorders in Rabbits and Rodents

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Pododermatitis and osteoarthrosis are one of the most common diseases associated with hunched posture and lameness in guinea pigs and rabbits. Pododermatitis is also very common in rats and chinchillas.

**Pododermatitis**

(Synonyms: pressure sores, sore hocks, ulcerative pododermatitis, feet pyodermia)

Pododermatitis is a deep bacterial inflammation of the skin of the foot. Affected tissues may include interdigital spaces, foot pads, nail folds (paronychia), claws, or other tissues of the foot. Pododermatitis occurs frequently on the plantar metatarsal surface and is usually of chronic origin. Lesions consist of a circumscribed ulcerated area covered by granulation tissue and necrotic debris. The disease tends to become progressive, invasive, and eventually could affect joints and bones in the absence of appropriate therapy.

Pododermatitis occurs almost always secondary to some underlying factor. Predisposing factors are poor sanitation, traumatic injury, foreign body penetration, large breed, and wire-floor housing. In pet rabbits and guinea pigs, the main factors which are involved in lesion development are malnutrition and limited amount of movement due to obesity, orthopaedic disease (spondylosis, arthrosis), or painful systemic diseases (urolithiasis, paralytic ileus, enteritis, hypovitaminosis C in guinea pigs). Foot pad urine staining and faecal contamination worsen the condition. Author also sees more problems in rabbits and guinea pigs kept on carpet flooring. Parasitic origin (*Demodex* spp.) and autoimmune disease (sebaceous adenitis) should be also on the list of differential diagnostics in rabbits.
Rabbits bear weight on the digits and claws of the hind feet during locomotion and on the area between the hock and the claws at the rest. Rabbits have large amount of hairs on plantar and metatarsal surface and in lesser extent on palmar surface of the paws which protect the feet from injury during the movement and leaping. In contrast, guinea pigs, chinchillas, and rats do not have hairs on the palmar or plantar surface. If this natural protective barrier is disrupted, the pressure sore will develop. In rabbits, shaving of hairs in palmar or plantar surface could be an initiating factor of the disease.

The main pathophysiological factor seems to be a devitalization of plantar skin (palmar lesions are less common) from bruising and excessive pressure, permitting microbial entry into skin and underlying soft tissue pedal tissues. Pressure necrosis and reduced vascular perfusion reduce immune factors as well as antibiotic delivery to the affected area. There is a generalized failure to degrade phagocytized pathogens, which leads to chronic granulomatous disease as was described also in raptors. Local inflammatory response producing cellulitis and swelling which induce further pressure necrosis (ischemia) and allows pathogen to enter the skin. Repeated trauma and infection allows spreading the infection into surround structures such are tendon sheaths, ligaments, joints, and bones. Displacement of the superficial flexor tendon causes abnormal gait, with claws, which cannot be flexed and with the weight bear on the point of hock.

The most commonly cultivated pathogen from these lesions is *Staphylococcus aureus* along with *E. coli*, *Corynebacterium* spp., *Bacillus* spp., *Fusobacterium* spp., and other secondary pathogens. Skin lesions could be infected with low-virulence or high-virulence *S. aureus* which produce endotoxin and exotoxins. Due to chronic inflammation and immune complex formation, kidney damage could develop.

First signs are seen as erythematous swellings of the affected area of skin and typically involve a circumscribed region of varying size on the plantar aspect of the metatarsal bones or palmar aspect of metacarpal bones.

As the condition progresses, one or more feet may be affected by interdigital erythema, fistulae, ulcers, alopecia, scar formation, and/or swelling may be present. Serosanguinous or seropurulent discharge may adhere to the lesions and could also stain surrounding hairs.

Pruritus, pain, reluctance to move, or lameness may be present. Obvious regional lymph node enlargement is in exotic companion mammals uncommon. Pruritus could be so severe that the animal will lick or bite into the affected paw. Oedema of the whole metacarpus or metatarsus could be also seen. Infection of the tendons and other synovial structures can result in displacement of the superficial flexor tendon.

Based on the clinical signs and affected tissues, pododermatitis could be graded from early asymptomatic stage to severe irreversible disease (I–V).
<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
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<tbody>
<tr>
<td>I</td>
<td>Alopecia of plantar and/or palmar area</td>
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<tr>
<td>II</td>
<td>Erythema, swellings, skin is not affected</td>
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<tr>
<td>III</td>
<td>Erosive to ulcerative changes, scab formation, hemorrhages, pain serous, fibrotic, caseous</td>
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<tr>
<td>IV</td>
<td>Deep inflammation, tendovaginitis, patient retains normal pedal use of the foot</td>
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<tr>
<td>V</td>
<td>Osteomyelitis, arthritis, displacement of superficial flexor tendon, loss of function</td>
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A thorough history and physical examination findings provide the diagnosis of pododermatitis. Several predisposing factors should be taken into consideration, so general health of the rabbit should be evaluated. Further diagnostic testing is necessary to rule out possible diseases of the genitourinary, degenerative spinal disease, or other systemic disease. Conventional dermatological test, such are skin scrapings, cytology, bacteriology, or skin biopsy, should be used in all cases. All these procedures should be performed prior the surgery.

Blood haematology and plasma chemistry could show systemic disease. Direct haematological changes due to chronic ulcerative lesions are nonsignificant. Radiographs will help to determine the extent of the soft tissue damage and possible inflammatory involvement of joints and bones.

The treatment is difficult and in advance cases could be frustrating, so a client should be educated with prognostic factors and treatment plan. If any disease or predisposing condition is present, it should be addressed along with the therapy of the pododermatitis.

Chronic granulomatous inflammatory process makes healing difficult without surgical removal of the granuloma because it shields the infections from cellular and humoral immune responses and systemic antibacterial agents. Lesions heal with scarring, which makes the foot more susceptible to further infections. Delays in treatment could cause the spread of pathogens through the body, arthritis, and osteomyelitis.

Based on these facts prompt and surgical treatment is recommended. Surgical treatment with a patient under general anaesthesia and lateral recumbency consists of wound debridement; removing of infected, necrotic, and fibrotic tissue; and surgical dressing. The small area of surrounding hairs is clipped and the limb is prepared for surgery. Author recommends using a tourniquet which should be applied above metacarpus to facilitate wound debridement. In a first surgical session, an enzymatic debridement could be also used.
(proteinase). Other possibility is to apply antibiotics locally. Good results were obtained with the use of sulphadiazine (*sulfadiazinum argenteum*) and hyaluronate acid (*natrii hyaluronas*) to promote healing and wound granulation. AIPMMA beds could be also used, but they are not the author's therapy of choice.

Other possible adjunctive topical therapy consist of chlorhexidine (0.025%) and/or topical dimethyl sulfoxide and steroid administration. Even though is reported that rabbits do not tolerate bandaging, postoperative dressing and soft casting of the leg is, based on the author experience, essential. A foot bandage protects the wound from pressure and contamination and allows optimal local treatment.

Systemic antibiotic therapy comprise of fluoroquinolones administration (marbofloxacin 10 mg/kg IM, PO q24h). In severe cases, administration of other antimicrobial agents based on bacteriology and sensitivity testing, such are betalactams (parenterally, benzylpenicillin 60.000 IU/kg IM q12h, only in rabbits) or metronidazole (20–30 mg/kg PO q12h) is necessary. Antibiotics should be not administered into the hind limb or gluteal muscles. Pain management is summarized at the end of this paper.

The prognosis is good to very guarded based on the underlying cause and infection severity. In severe cases, where the osteomyelitis is present, prognosis is very poor.

**SELECTED MUSCULOSKELETAL DISORDERS IN RABBITS AND GUINEA PIGS**

**Osteoarthritis**

**Osteoarthritis** is a painful and progressive disease involving joint inflammation, cartilage destruction, and eventually bone changes. Osteoarthritis is the most common cause of lameness in guinea pigs and rabbits. Although the disease cannot be cured, much can be done to control the associated pain, slow the disease progression and improve the animal's quality of life.

**Spondylosis Deformans**

**Spondylosis deformans** is a generalized disease of aging animals and is often secondary to degeneration of intervertebral discs. This disease can affect all animals, also young animals, even though old animals are overrepresented. It is characterized by the formation of a bony spurs or a total bridge of bone around the diseased disc. With a severe degree of spondylosis, this can lead to pressure on the spinal nerves, which is manifested by sensory and motoric limitations for the animal. The incidence of spondylosis in rabbits seems to be up to 10%.
Symptoms associated with spondylosis can be manifested by skin, urological, gastrointestinal, or neurological problems. As spinal flexibility is decreased, grooming behavior is affected and this could lead to accumulation of dead hairs and skin debris in the fur. Urine sludge and scalding and perineal fecal staining could be also present. Deficient caecotrophy intake and back pain commonly lead to gastrointestinal stasis. Back problems may also lead to reluctance to move, and may lead to a passive behavior.

These symptoms are secondary and the real cause of the problems may be discovered by radiographs or computed tomography.

**Satin Syndrome in Guinea Pigs**

The satin guinea pig breed gained popularity due to its attractive coat. Satin syndrome is a metabolic bone disease associated with secondary renal hyperparathyroidism with fibrous osteodystrophy, which is seen most commonly in satin or crossbred satin guinea pigs.

Clinical signs consist of reluctance to move, lameness, progressive weight loss, and dental disease. Radiography will reveal different stages of bone loss, double cortices of long bones, osteoarthritis (esp. knee joints), and dental disease. Computed tomography and bone densitometry will reveal advanced bone lesions with bone loss and dental disease. Blood chemistry can reveal kidney disease, but not in all cases. Kidney ultrasonography will show hyperechoic changes of kidney medulla and cortex.

Therapy consist of dietary management (optimal dietary calcium to phosphorus ratio - at least 2:1, force-feeding), fluid therapy and pain medication. Prognosis is guarded to very poor.

**PAIN MANAGEMENT**

Pain management of pododermatitis and osteoarthritis is essential part of therapy. As the pain is chronic in most of cases, a multi-step approach must be implemented. The goal is to treat not only primary, but also secondary (and concurrent), diseases (urine sludge, dermatitis, gastrointestinal stasis, ectoparasites), which aggravated general health status.

General guidelines established for dogs and cats should be followed (e.g., weight management, exercise and physical therapy, diet modification, drugs, and potential surgical intervention). In case of mild or severe pododermatitis, surgical therapy should be started as soon as possible to avoid spreading the disease into deeper tissues and consist of relieving pressure on the affected area and treating the inflammation.
Rabbits and herbivorous rodents should be offered with grass and hay-based diet to promote optimal gastrointestinal functions and feeding behaviour. If it is possible, the animals should be kept outdoor or walk on natural soil/floor (meadow).

Analgesia is provided by the use of combination of nonsteroidal anti-inflammatory drugs (NSAIDS) and/or opioids. NSAIDs with good or very good positive effect are meloxicam (0.2–0.8 mg/kg PO q12–24h) and carprofen (1–5 mg/kg PO q12–24h). Care must be taken when dealing with kidney or gastrointestinal disease. Tramadol (10 mg/kg PO q12h) or buprenorphine (0.03–0.05 mg/kg SC q8–12h) are the authors’ opioids of choice.

Each clinical case must be assessed individually and the drug dosage adjusted to the patient needs. Especially in case of meloxicam dosage, author managed chronic pain in some rabbits and herbivorous rodents with meloxicam as low as 0.1 mg/kg. Client education about pain recognition is therefore essential.

Therapy can be supplemented with laser therapy (pododermatitis), acupuncture, L-tryptophan, glucosamine chondroitin administration, and herbal therapy.

Review the treatment plan frequently and change to an alternative drug if there is a poor response to therapy or patient intolerance.

References


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