

Contagious Ecthyma

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Importance

Contagious ecthyma is a highly contagious, zoonotic, viral skin disease that affects sheep, goats and some other domesticated and wild ruminants. The skin lesions are painful and often occur on the mouth and muzzle, where they can cause anorexia or starvation. Lesions on the udder may result in the abandonment of offspring, and foot lesions can cause transient lameness. Secondary bacterial infections can occur and, in rare cases, the lesions may extend into the internal organs. Severe generalized infections have been described in Boer and Boer cross goats. Although contagious ecthyma usually resolves spontaneously and the mortality rate is generally low, fatality rates up to 10% have been reported.

Most infections in humans are localized and heal spontaneously; however, large, poorly healing lesions can occur in people who are immunosuppressed.

Etiology

Contagious ecthyma results from infection by the orf virus, a member of the genus *Parapoxvirus* in the family Poxviridae.

Geographic Distribution

Contagious ecthyma has been found worldwide in all countries that raise sheep. In the U.S., this disease is seen most often in the Western states.

Transmission

The orf virus, which is found in skin lesions and scabs, is thought to enter the skin through cuts and abrasions. This virus can be carried by clinically normal sheep as well as sick animals. It can be transmitted by direct contact or on fomites. The orf virus remains viable on the wool and hides for approximately one month after the lesions have healed. It is very resistant to inactivation in the environment and has been recovered from dried crusts after 12 years.

Contagious ecthyma vaccines contain live virus and can infect humans. Recently vaccinated animals can also transmit infections to humans.

Disinfection

The best disinfectants for the poxviruses are detergents, hypochlorite, alkalis, Virkon® and glutaraldehyde.

Infections in Humans

Incubation Period

The incubation period in humans is 3 to 7 days.

Clinical Signs

In humans, contagious ecthyma usually occurs as a single skin lesion or a few lesions. The initial lesion is a small, firm, red to blue papule at the site of virus penetration, most often a finger, hand or other exposed part of the body. The papule develops into a hemorrhagic pustule or bulla, which may contain a central crust and bleeds easily. In the later stages, the lesion develops into a nodule, which may weep fluid and is sometimes covered by a thin crust. It eventually becomes covered by a thick crust. The skin lesion(s) may be accompanied by a low grade fever that usually lasts only a few days, or by mild lymphadenopathy. In uncomplicated disease, the lesion heals spontaneously in 3 to 6 weeks without scarring. Secondary infections can occur.

Large lesions refractory to treatment can occur in people who are immunosuppressed. Unusually large lesions have also been reported in people with atopic dermatitis. Rare cases involving the eye, as well as a generalized vesiculopapular rash on the skin and mucosa, have also been reported. Possible complications include toxic erythema, erythema multiforme and bullous pemphigoid.

Communicability

Human-to-human transmission is nonexistent or very rare.

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Diagnostic Tests

Contagious ecthyma can be confirmed by electron microscopy of the crust, a small biopsy or fluid from the lesion; however, this technique cannot distinguish the orf virus from other parapoxviruses. Polymerase chain reaction (PCR) assays can give a definitive diagnosis. Histopathology can also be helpful. Virus isolation can be attempted but the orf virus grows slowly and cannot always be isolated. Animal inoculation into lambs has been reported. Serology and the detection of viral antigens can be used in research, but are not ordinarily used for diagnosis.

Treatment

In immunocompetent humans, contagious ecthyma is usually self-limiting. Treatment is supportive and typically consists of moist dressings, local antiseptics, finger immobilization and/or antibiotics to treat secondary bacterial infections. Large lesions can be removed by surgery, and curettage and electrodesiccation may be used for persistent lesions. Cryotherapy has been reported to hasten recovery.

Prevention

Abraded or cut skin should not be allowed to contact infected animals, scabs and crusts, wool or hides. Non-porous gloves (rubber or latex) should also be considered when asymptomatic sheep, goats or other susceptible ruminants including deer are handled. This precaution may be particularly advisable when handling an animal's mouth. The contagious ecthyma vaccines are pathogenic for humans, and gloves should also be used when vaccinating animals.

Any skin that has been exposed should be washed with soap and water. Some sources suggest additional disinfection with 70% isopropyl alcohol after washing. People who are immunosuppressed should avoid contact with infected animals.

Morbidity and Mortality

Contagious ecthyma is most common among people who are in close contact with sheep and goats, such as herders, sheep-shearers, veterinarians, butchers and abattoir workers, particularly those who handle hides and wool. Most infected people develop a solitary lesion but generalized infections have also been reported. Ocular lesions are rare. In most cases, spontaneous recovery, without scarring, occurs in 3 to 6 weeks. Large lesions refractory to treatment can occur in those who are immunosuppressed. Reinfection has been seen, and usually results in smaller lesions. No deaths have been reported.

Infections in Animals

Species Affected

Contagious ecthyma occurs in sheep, goats, alpacas, camels, reindeer, musk oxen, bighorn sheep, deer, prong-

horn antelope and wapiti. Rare cases have been reported in dogs that ate infected carcasses.

Incubation Period

The incubation period in sheep and goats is 2 to 3 days.

Clinical Signs

The initial signs are papules, pustules and vesicles, found on the lips, nose, ears and/or eyelids, and sometimes on the feet or perineal region. Lesions can also occur inside the mouth, particularly in young lambs. Massive oral lesions have been described in some reindeer. Rarely, the lesions may extend into the esophagus, stomach, intestines or respiratory tract. Nursing lambs can transmit the virus to their dam, resulting in lesions on the teats and udder. The skin lesions eventually develop into thick, brown, rapidly growing scabs over areas of granulation, inflammation and ulceration. The scabs are often friable and bleed easily. Papillomatous growths sometimes occur.

Contagious ecthyma lesions are painful and may result in anorexia or even starvation. Young animals may refuse to nurse, and lesions on the udder of the dam can cause it to abandon its offspring. Foot lesions can cause lameness. Uncomplicated infections usually resolve in 1 to 4 weeks. Secondary bacterial infections and maggot infestations can occur. Contagious ecthyma may predispose animals to bacterial mastitis.

More severe infections have been described in Boer and Boer cross goats. In these animals, the disease consisted of multifocal, severe proliferative dermatitis accompanied by chronic pneumonia, arthritis and moderate to severe lymphadenopathy. The disease persisted for three months until the animals were euthanized.

Communicability

Contagious ecthyma is highly communicable. The orf virus is present in the skin lesions and crusts. It can also remain viable on the wool and hides for approximately one month after the lesions have healed.

Post Mortem Lesions [Click to view images](#)

Papules, pustules, vesicles, ulcers, granulation tissue, inflammatory lesions or thick, friable brown scabs can be seen on the mouth, nose, ears, eyelids, feet, udder and or/perineum. Occasionally, lesions can be found inside the mouth. Rarely, lesions have been reported in the esophagus, rumen, omasum, lungs, heart and lower intestinal tract. On histopathology, the skin lesions include ballooning degeneration of keratinocytes and eosinophilic cytoplasmic inclusions.

In addition to skin lesions, Boer goats with severe infections had severe to moderate lymphadenopathy of the draining lymph nodes in areas of affected skin. Suppurative arthritis, chronic fibrinous pneumonia and premature thymic involution were also reported in these animals.

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Diagnostic Tests

Infections in animals are usually diagnosed symptomatically. The diagnosis can be confirmed by electron microscopy of the scabs, which should be collected from animals in earlier stages of the disease. PCR tests are available from some laboratories.

Uncommonly used tests include virus isolation and serology. Virus isolation can be attempted in a variety of cell cultures or embryonated eggs, but the orf virus grows slowly and cannot always be isolated. Serological tests include serum neutralization, agar gel immunodiffusion (AGID), complement fixation and agglutination. ELISA tests have been developed but are rarely used for diagnosis.

Treatment

There is no specific treatment for contagious ecthyma. Diathermy and cryosurgery have been used to treat intraoral lesions in lambs but may not be economical. Repellents can be used to keep flies away from the wounds, and antibiotics are given for secondary infections. Supportive care, including tube feeding, may be necessary.

Prevention

To prevent contagious ecthyma from entering an uninfected herd, new animals should be quarantined; some carriers may not have clinical signs. Precautions should be taken to prevent virus introduction on equipment and other fomites. Harsh vegetation should be removed from pastures or feed, to reduce the risk of cuts in the mouth or on the muzzle. At shows and fairs, some exhibitors prefer to open their own animal's mouth, to prevent inadvertent spread between animals on the hands.

Vaccination is practiced in some areas. Contagious ecthyma vaccines contain live virus prepared from dried scabs or propagated in tissue culture. Vaccines should be used only on premises where infections have occurred in the past, and recently vaccinated animals should be isolated from unvaccinated animals. The duration of immunity after vaccination is controversial; outbreaks have occurred in vaccinated animals, but vaccine breaks may be due to the virulence of the strain.

Isolation of infected animals can help prevent the spread of the disease. The orf virus is difficult to eradicate once it has entered a flock or herd.

Morbidity and Mortality

The morbidity rate is usually high, often 80% in an unvaccinated flock. In endemic areas, annual outbreaks may occur on ranches. Any age can be infected in a naïve flock; however, in endemic regions, most cases occur in sheep and goats less than a year old, as older animals usually have some degree of immunity. The duration of protective immunity is controversial. Clinical disease is usually milder and shorter if reinfection occurs.

Contagious ecthyma is most serious in young animals, which may refuse to nurse and can die of starvation. Lesions transmitted to the udder of the dam can also cause

abandonment. This disease tends to be more severe in goats than sheep. Boer and Boer cross goats may be particularly susceptible to severe persistent infections.

Although the mortality rate is usually low, fatality rates up to 10% are occasionally reported. Deaths are usually the result of complications from secondary infections. Extension of the lesions into the internal organs is rare. Screw-worms can infect wounds in areas where they are endemic, and maggot infestation can occur in most locations. Most uncomplicated infections resolve in 1 to 4 weeks.

Internet Resources

- Centers for Disease Control and Prevention
http://www.cdc.gov/ncidod/dvrd/orf_virus/
- eMedicine.com - Orf
<http://www.emedicine.com/derm/topic605.htm>
- Iowa State University Sheep Health Factsheet
Contagious Ecthyma
<http://www.extension.iastate.edu/Publications/PM829X1.pdf>
- Medical Microbiology
<http://www.gsbs.utmb.edu/microbook>
- The Merck Manual
<http://www.merck.com/pubs/mmanual/>
- The Merck Veterinary Manual
<http://www.merckvetmanual.com/mvm/index.jsp>

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* Link defunct as of 2007