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Contagious Ecthyma

Orf, Sore mouth, Scabby Mouth
Ecthyma Contagiosum
Contagious Pustular Dermatitis
Contagious Pustular Stomatitis
Infectious Labial Dermatitis

Slide 2

Overview

- Organism
- History
- Epidemiology
- Transmission
- Disease in Humans
- Disease in Animals
- Prevention and Control

In today's presentation we will cover information regarding the organism that causes contagious ecthyma and its epidemiology. We will also talk about the history of the disease, how it is transmitted, species that it affects (including humans), and clinical and necropsy signs observed. Finally, we will address prevention and control measures, as well as actions to take if contagious ecthyma is suspected. [Photo: Flock of sheep. Source: USDA ARS]

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THE ORGANISM

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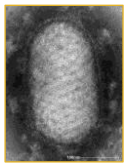
The Organism

- Orf virus
  - Genus *Parapoxvirus*
  - Family Poxviridae
- Viability
  - One month on wool/hides after lesions healed
  - Up to 12 years in lesion crusts
- Resistant to inactivation



Contagious ecthyma results from infection by the orf virus, a member of the genus *Parapoxvirus* in the family Poxviridae. 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. [Photo: Negative-stained transmission electron micrograph (TEM) image of an Orf virus, genus Parapoxvirus. The criss-cross pattern is an artefact caused by superimposition of images of top and bottom surfaces of the virion. Source: Cynthia Goldsmith/CDC Public Health Image Library]

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HISTORY

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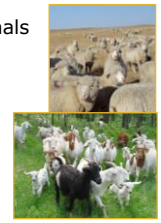
History

- Orf described in animals
  - Sheep: 1787
  - Goats: 1879
- Orf described in humans
  - 1923



Orf was first described in sheep by Steeb in 1787. In goats, Danish veterinarian Hansen recognized the disease in 1879. Orf was first reported in humans in the early 1920s.

[Photo: (Top) Flock of sheep. (Bottom): Goats on the move. Source: U. S. Department of Agriculture]

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EPIDEMIOLOGY

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Geographic Distribution

- Found worldwide in sheep-raising countries
- United States
  - Western states most affected
  - Orf reported on 40% of U.S. sheep operations

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. According to the National Animal Health Monitoring System (NAHMS) (2001), 40 percent of U.S. sheep producers reported that orf had occurred in their operation(s) within the past three years (Source: http://www.aphis.usda.gov/animal_health/nahms/sheep/downloads/sheep01/Sheep01_dr_PartII.pdf).

[Photo: Flock of sheep grazing. Source: USDA ARS]

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Who Is At Risk?

- Close contact with sheep/goats
  - Herders
  - Sheep-shearers
  - Veterinarians
  - Butchers
  - Abattoir workers

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.

[Photo: Sheep shearing. Source: www.geograph.org.uk (public domain)]

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TRANSMISSION

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Transmission

- Virus found in skin lesions/scabs
- Enters skin through cuts, abrasions
  - Direct contact
  - Fomites
- Healthy animals may be carriers
- Vaccines
  - Contain live virus
  - May infect humans

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. Contagious ecthyma vaccines contain live virus and can infect humans. Recently vaccinated animals can also transmit infections to humans. Human-to-human transmission is nonexistent or very rare.

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DISEASE IN HUMANS

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Clinical Signs

- Usually single skin lesion
  - Small, firm papule
  - Fingers or hands
  - Eventually lesion covered by crust

- Often resolves spontaneously
  - Immunosuppressed people at greater risk for complications

The incubation period in humans is 3 to 7 days. 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 some-times 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. Possible complications include toxic erythema, erythema multiforme and bullous pemphigoid.

[Photo: A thumb with two denuded orf lesions (eroded vesicles with an erythematous base and white halo). Source: Centers for Disease Control and Prevention. MMWR. 2006 Jan 27;55(03):65-68]

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Diagnosis

- Electron microscopy
- Biopsy
- PCR
- Histopathology
- Virus isolation
- Serology, antigen detection
  - Used in research only

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.

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Treatment

- Usually self-limiting
  - Supportive care
    - Wound dressings
    - Local antiseptics
    - Finger immobilization
    - Antibiotics for secondary infections
  - Surgery (large lesions)
  - Cryotherapy

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.

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DISEASE IN ANIMALS

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Species Affected

- Sheep
- Goats
- Alpacas
- Camels
- Reindeer
- Musk oxen
- Bighorn sheep
- Deer
- Prong-horn antelope
- Wapiti
- Dogs
  - Ingestion of infected carcasses

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.

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Clinical Signs

- Papules, pustules, vesicles
  - Lips, nose, ears, eyelids, mouth
  - Progress to thick, friable scabs
- Lesions very painful
- Usually resolves in 1 to 4 weeks
  - More severe in Boer goats

The incubation period in sheep and goats is 2 to 3 days. 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. 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. 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. Photo shows papules and crusts interspersed with erosions on the lips of a goat.

[Photo: Papules and crusts interspersed with erosions extensively disfigure the lips of this goat. Source: Armed Forces Institute of Pathology/CFSPH]

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Diagnosis

- Often diagnosed symptomatically
- Confirmation
  - Electron microscopy (scabs)
  - PCR
- Other tests (less common)
  - Virus isolation
  - Serology
  - ELISA

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.

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Treatment

- No specific treatment
- Intraoral lesions
  - Diathermy
  - Cryosurgery
- Insect repellents
- Antibiotics
  - Secondary infections
- Supportive care

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.

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PREVENTION AND CONTROL

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Prevention in Humans

- Avoid contact with infected animals, scabs/crusts, wool, and hides
  - Especially if immunosuppressed
- Wear gloves
  - When handling susceptible animals
  - When vaccinating
- Wash hands

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.[Photo: Hand washing. Source: CDC Public Health Image Library]

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Prevention in Animals

- Quarantine new animals
- Keep equipment/fomites clean
- Vaccination
  - Live virus vaccine
  - Only used where infections have occurred in the past
  - Isolate recently vaccinated animals
- Difficult to eradicate

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.

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Additional Resources

- Center for Food Security and Public Health
  - www.cfsph.iastate.edu
- CDC: Sore Mouth Infection/Orf Virus
  - www.cdc.gov/ncidod/dvrd/orf_virus/

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Acknowledgments

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