

cowpox and buffalopox

Etiology

Cowpox virus (CPXV) and buffalopox virus (BPXV) are members of the genus **Orthopoxvirus** in the family **Poxviridae**.

- **Other orthopoxviruses infecting agricultural animals include horsepox, and camelpox.**

-All orthopoxviruses are antigenically extremely similar, but they can be identified by a combination of phenotypic and genetic tests.

-**CPXV received its name as a result of the association of this agent with skin lesions on the teat and udder skin of dairy cattle.**

Notwithstanding, it is probably a misnomer because infection of cattle is rare, whereas infection is widespread among rodents in Europe and western Asia.

Epidemiology

-**Occurrence Infection with CPXV is endemic in wild rodents such as voles (Microtus spp.) in Great Britain, Europe, and western Asia, with infection in different rodent species acting as the reservoir host in different geographic areas.**

-**Domestic cats are commonly infected from hunting rodents, but CPXV infection can occur in a number of different mammalian species, one of which is cattle.**

-The clinical syndrome of cowpox in cattle is now extremely rare, but it occurs sporadically in Europe.

-**In recent decades, reemergence of CPXV infections in cats, zoo animals, and humans has been reported.**

- disease outbreaks affecting buffaloes, cattle, and humans have been reported in India, Nepal, Pakistan, Egypt, and Indonesia since then.

- BPXV is considered an important emerging or reemerging zoonotic viral infection in regions with a large buffalo population.

- A similar but distinct vaccinia-like virus has been associated with disease outbreaks among cattle and humans in Brazil.

- Origin of Infection and Transmission The origin of CPXV infection is most probably from infected farm cats or humans.

-Transmission from cow to cow within a herd is effected by milkers' hands or teat cups.

-Spread from herd to herd is probably effected by the introduction of infected animals, by carriage on milkers' hands, and in the absence of either of these methods, transport by biting insects is possible.

-In a herd in which the disease is enzootic, only heifers and new introductions develop lesions.

-Milkers recently vaccinated against smallpox may serve as a source of infection for cattle, although the vaccinia virus, the smallpox vaccine virus, is a different virus.

-BPXV is most commonly isolated from buffaloes, cattle, and people having direct and frequent contact with these animals. peridomestic rodents have been incriminated as potential vectors.

- Because disease outbreaks in buffalo herds are often associated with high disease occurrence among animal handlers and caretakers, transmission from animal to animal by means of people as vectors is considered to play an important role.

- It is generally assumed that the virus gains access to tissues through injuries to teat skin, and extensive outbreaks are likely to occur when the environment is conducive to teat injuries.

-Economic Importance Losses are a result of inconvenience at milking time because of the soreness of the teats and from occasional cases of mastitis, which develop when lesions involve teat sphincters and decreased milk production.

- An increasing incidence of clinical cases of BPXV and Brazilian vaccinia-like virus infection has been reported in humans, particularly among animal caretakers and animal handlers in India but also in Brazil, and has become a serious public health concern in some countries.

- Consumption of unpasteurized milk of affected animals has been incriminated as potential route of virus transmission from animal to human.

Pathogenesis

Five stages of a typical pox eruption can be observed. After an incubation period of **3 to 6 days**, a roseolar erythema is followed by firm, raised papules light in color but with a zone of hyperemia

around the base. Vesiculation, a yellow blister with a pitted center, follows. The subsequent pustular stage is followed by the development of a thick, red, tenacious scab.

In experimentally produced vaccinia virus mammillitis (produced by inoculation of smallpox vaccine), the lesions have three zones: a **central brown crusty area of necrosis, surrounded by a gray–white zone of microvesicle formation, again surrounded by a red border as a result of congestion.** The lesions are essentially hyperplastic.

Clinical findings

-Typical lesions are similar for CPXV and BPXV infection and may be seen at any stage of development, but they are mostly observed during the scab stage, with the vesicle commonly having been ruptured during milking.

- True cowpox scabs are 1 to 2 cm in diameter and are thick, tenacious, and yellow–brown to red in color.

- In cows being milked, scab formation is uncommon, with the scab being replaced by a deep ulceration.

- Distribution of the lesions is usually confined to the teats and lower part of the udder.

-Soreness of the teats develops, and milk letdown may be interfered with; the cow usually resents being milked.

-Secondary mastitis occurs in a few cases. Individual lesions heal within 2 weeks, but in some animals fresh crops of lesions may cause the disease to persist for a month or more.

-In severe cases, lesions may spread to the insides of the thighs, and rarely to the perineum, vulva, and mouth.

-Sucking calves may develop lesions around the mouth.

-In bulls, lesions usually appear on the scrotum.

- Ulcerative skin lesions with raised edges frequently affected by secondary bacterial or fungal infection are commonly observed on the ears of nonlactating cattle and buffaloes infected with BPXV.

CLINICAL PATHOLOGY

1-The virus can be propagated in tissue culture, and differentiation is possible by electron microscopy.

2- The presence of virus-related DNA sequences can be identified by means of PCR.

Differential diagnosis

A number of skin diseases may be accompanied by lesions on the udder and can easily be confused with cowpox if the lesions are advanced in age.

Most outbreaks of teat skin disease that clinically resemble classical cowpox are associated with vaccinia virus from contact with a recently vaccinated person.

1-Pseudocowpox.

2-Bovine ulcerative mammillitis associated with bovine herpesvirus-2 and bovine herpesvirus-4

3-Vesicular stomatitis and

4- foot-and-mouth disease

5-Udder impetigo

6-Teat chaps and frostbite

7-Black spot.

CONTROL

- Prevention of spread is difficult because the virus responsible for the disease is readily

-transmitted by direct or indirect contact.

-Udder cloths, milking machines, and hands should be disinfected after contact with infected animals.

-Dipping of the teats in an alcoholic tincture of a suitable disinfectant, such as quaternary ammonium compounds, is usually satisfactory in preventing immediate spread.

-Although the prevalence and significance of CPXV infection in cattle is too low to warrant the development of vaccines, the emergence of buffalopox in buffalo and cattle herds and the ensuing

zoonotic risk in some parts of the world may warrant considering the development of vaccines against BPXV for certain regions of the world.

Pseudocowpox (milkers' nodule)

Etiology

Pseudocowpox virus is a member of the **genus Parapoxvirus**, with close **similarity to the viruses of infectious papular stomatitis of cattle and contagious ecthyma of sheep and goats.**

-It is possible that pseudocowpox virus (PCPV) might be identical to bovine papular stomatitis virus (BPSV).

-The pseudocowpox virus was previously known as parapoxvirus bovis

Epidemiology

occurrence Pseudocowpox is reported in most countries. In an affected herd the rate of spread is relatively slow and may result in the disease being present in the herd for up to a year.

-The morbidity rate approximates 100%, but at any given time it varies between 5% and 10%, and occasionally up to 50%.

-Origin of Infection and Transmission **The source of infection is infected cattle.**

-The method of transmission includes

- physical transport by means of contaminated milkers' hands,

- washcloths, and teat cups.

-The virus cannot penetrate mucosa, and a preexisting discontinuity of it is necessary for the virus to gain entry.

Transmission by biting insects seems likely.

-The virus can be isolated from the mouths of calves sucking affected calves,

- and from the semen of bulls.

-Animal Risk Factors Freshly calved and recently introduced cattle are most susceptible, but all adult cattle in a herd, including dry cows, are likely to be affected.

- **The disease does not appear to occur in animals less than 2 years of age unless they have calved.** There is no seasonal variation in incidence. Little immunity develops, and the disease is likely to recur in the herd within a short time.

- **Economic Importance Pseudocowpox is relatively benign**, with most losses occurring as a result of difficulty in milking and an increase in the incidence of mastitis.

Zoonotic Implications The disease is transmissible to humans, with infection usually resulting in the development of milkers' nodule on the hand.

Pathogenesis

Transmission most commonly occurs at milking time and is mechanical, with the potential for transmission from cow to calf by suckling.

-The disease can be reproduced by the introduction of the virus onto scarified areas of skin. The lesions are **characterized by hyperplasia of squamous epithelium.**

Clinical findings

Acute and chronic lesions occur, and there may be up to 10 lesions on **one teat (the udder is very rarely infected).**

Acute lesions

commence as **erythema followed by the development of a vesicle or pustule, which ruptures after about 48 hours, resulting in the formation of a thick scab.**

-Pain is moderate and present only in the prescab stage.

-The scab, varying in size from 0.5 to 25 mm in diameter, becomes markedly elevated by developing granulating tissue beneath it; the **scabs drop off 7 to 10 days after lesions appear, leaving a horseshoe-shaped ring of small scabs surrounding a small, wart-like granuloma,** which may persist for months. The disease tends to disappear from a herd after 18 to 21 days but may recur cyclically about 1 month later.

-**There are reports of lesions occurring occasionally in cows' mouths.**

Chronic lesions

-also commence as erythema, but progress to a stage in which yellow-gray, soft, scurfy scabs develop.

- **The scabs are readily rubbed off at milking, leaving the skin corrugated and prone to chapping.**
There is no pain, and the lesions may persist for months.

-Milkers' nodules are clinically indistinguishable from human lesions associated with ecthyma virus.
The lesions vary from multiple vesicles to a single, indurated nodule.

- Clinical pathology and necropsy findings

Material for examination by tissue culture or electron microscopic examination, the latter being highly recommended as a diagnostic procedure, should include fluid from a vesicle.

Differential diagnosis

Differentiation of those diseases in which lesions of the teat are prominent is dealt with in the preceding section on cowpox.

Treatment

cattle from affected areas.

- Locally applied ointments of various kinds appear to have little effect on the lesions.

- **The recommended treatment includes the removal of the scabs, which should be burned to avoid contaminating the environment,**

- **application of an astringent preparation, such as triple dye, after milking and an emollient ointment just before.**

CONTROL

- Recommended measures, such as treatment and isolation of affected cows or milking them last, the use of disposable paper towels for udder washing, and disinfection of teat cups, appear to have little effect on the spread of the disease.

-An iodophor teat dip is recommended as the most effective control measure because it appears to exert some antiviral effect.

-An effort should be made to reduce teat trauma because infection is facilitated by discontinuity of the skin.