OCCURRENCE OF PARAPOXVIRUS INFECTIONS IN OVINE FLOCKS IN THE STATE OF RIO DE JANEIRO.

ABSTRACT

The etiology of ulcerated lesions followed by the formation of infectious crusts in two ovine flocks in the years 2003 and 2004 in the counties of Cachoeiras de Macacu and Itaborai, respectively have been studied. Electron microscopy observations characterized the etiological agent of both episodes as parapoxviruses, confirming the presence of this virus in the state of Rio de Janeiro, where animal and human infections caused by poxvirus have been recorded in recent years.

INTRODUCTION

Poxviruses comprise an important virus group, being agents of infections in human and veterinary medicine. They present a complex DNA viral genome replicating in the cellular cytoplasm. The poxviruses belong to the family Poxviridae, with two sub-families which infect arthropods (Entomopoxvirinae) and vertebrates (Chordopoxvirinae) (Esposito & Fenner 2001, Moss 2001). The Chordopoxvirinae present 8 genera and among them the most important are Orthopoxvirus, with a typical cubic morphology including the smallpox, vaccinia, cowpox, monkeypox and camelpox viruses; the parapoxvirus with a ovoid morphology with the orf virus agent of the infectious pustular dermatitis infecting caprines, ovinus and other artiodactyls, bovine papular stomatitis and pseudo-cowpox or milkier’s nodule; the capripoxvirus, from caprines and ovinus; suipoxvirus, infecting swine worldwide, and the genus Leporipoxvirus, with myxoma and sarcoma virus, infectious agents of leporines. Among the non-classified poxviruses, Cotia virus was isolated from a sentinel rodent in the state of São Paulo.

Key words:
sheep, parapoxvirus, electron microscopy

The infections caused by poxviruses are characterised by dermatological lesions, being transmitted by direct contact with patient or animal skin lesions, by aerosols or by mechanical transmission through contaminated instruments or other objects.

It is generally accepted that the poxviruses originated from ancestral strains infecting wild rodents, which are still important reservoirs of the group (Esposito & Fenner 2001).
Poxviruses are present in all continents. In Brazil, variola virus has been eradicated since 1971, when the last cases occurred in Rio de Janeiro. However, poxvirus infections by other members of the group have been described in the states of Rio de Janeiro (Weiblen 2002), Minas Gerais (Lobato et al. 2002) and São Paulo (Pitucco et al. 2002).

Studies in the northern and northeast regions of Rio de Janeiro state show the presence of a vaccinia-like virus strain (Cantagalo) causing human and animal infections in the area (Damaso et al. 2000, Schatzmayer et al. 2000). Parapoxviruses have also been identified in humans and bovines in the Paraíba do Sul valley (Mazur & Machado 1989, Mazur et al. 2000, Schatzmayer et al. 2001).

Orf virus, previously identified in the state of Rio de Janeiro, have been characterized at molecular level (Mazur et al 2000; Mazur et al. 2000).

This paper describes two episodes caused by parapoxvirus affecting short-haired ovine flocks in Rio de Janeiro State during 2003 and 2004.

MATERIAL AND METHODS

Flocks studied.

In March 2003, ovines in Cachoeira de Macacu county, a flock composed by 150 animals, presented skin lesions suggesting infectious pustular dermatitis, at a rate of about 80%. The lesions were observed as crusts around the lips and noses (figure 1a and 1b).

In September 2004, another episode occurred in the Itaborai county, in a flock of 84 animals with 25 infected. The lesions were distributed at the head, including gums, ears, armpit and udder, and the animals showed dehydration and anorexia. All infected animals recovered, but economical losses have occurred, due to the reduction of food intake by the animals during the episode.

Collection of clinical specimens.

Dry and wet crusts were collected from animals with typical lesions in both episodes and maintained at -20°C until laboratory examination.

Laboratory studies.

The crusts were macerated and homogenised with distilled water. One drop of the suspension was spread on a copper grid covered with collodium and carbon followed by constricting with 2% phosphotungstic acid, pH 7.2, according to standard techniques on viral negative contrasting (Barth 1984). The observations and photomicrographies were carried out using the transmission electron microscopes Zeiss EM-900 of the Department of Virology and Zeiss EM-10 of the Department of Ultrastructure and Cell Biology of the Instituto Oswaldo Cruz.

Attempts to produce virus from the crust suspensions were carried out by Vero cell cultures inoculation, maintained in the Department of Virology.

RESULTS

The affected flock in Cachoeira de Macacu was established more than 10 years ago and since then only one animal has been introduced, about three years before the episode. It was the first time that the disease has been observed in the flock and no lesions which could suggest a poxvirus infection in humans in direct contact with the animals have been recorded. An evaluation of the surrounding areas in a 5km radius from the farm, did not show any similar lesions in other flocks. The presence of a secondary forest, about 500 meters from the area where the animals were kept, was recorded, as well as evidence of wild rodents close to the affected sheep, specially during the dry season (July to August).

In relation to the animals in Itaborai county, the majority of the flock were ewes, 20 of them with clinical signs. Fourteen animals had been introduced in the flock, coming from the Northeast region of the country, two weeks before the onset of the episode.

A solution of iodine and glycercine was used as treatment on the lesions of the animals, which evolved from vesicles to crusts in about 10 to 12 days. After 70 days no scar could be observed.

By electron microscopy of the specimens collected in both episodes, it was possible to detect large viral particles (250x150nm) and to observe the typical morphology of parapoxviruses, confirming the clinical diagnosis in both farms. The surface viral proteins were organised in a threadlike structure with spirals around the particle (figure 1c). No cytopathogenic effect was observed in the inoculated Vero cell cultures.

DISCUSSION

The incidence of poxviruses in domestic animals, specially bovines, has been already described in the Rio de Janeiro state, where both orthopox and parapoxviruses have been identified or confirmed by electron microscopy.
This paper reports parapoxvirus infections in ovines, confirming that this group of viruses is present in the state of Rio de Janeiro and its incidence might be increasing due to ecological disturbances, specially destruction of ecosystems where wild rodents live. In the episode in Cachoeiras de Macacu, the origin of the etiologic agent could not be determined.

In Itaborai county episode the introduction of animals into the herd, two weeks before the first clinical observation of the infection, coincided with the incubation period of poxvirus infections (7 to 17 days) (Esposito & Fenner 2001), although wild rodents could also be involved in the virus introduction.

Parapoxviruses, specially Orf virus, may survive for long periods in dry scabs, which is an important feature for maintaining the infection in sheep under field conditions (Esposito & Fenner 2001). The viruses could also have been introduced earlier in the area coming from other flocks. The closest contact of rodents with the animals occurs during the dry season in the area, being confirmed by field observations of animal owners and professionals working there.

The clinical presentation of the animals was quite similar in both episodes. Atypical lesions associated with parapoxvirus as recently described in ovines, with extensive proliferative skin lesions which did not spontaneously resolve and were resistant to treatment, have not been observed (Smith et al 2002).

Parapoxviruses are difficult to isolate in the laboratory from clinical specimens and primary human and animal cell cultures are best used, but these were not available for this study. However electron microscopy is a rapid and safe diagnostic method which allows a result in few hours after the clinical specimen reaches the laboratory.

Since vaccines are not usually used in the region, a surveillance system of poxvirus infections, including control of animals introduced into the flocks and rodent control, should be implemented in order to reduce the occurrence of episodes such as the ones here described.

ACKNOWLEDGMENTS

The veterinary surgeons of the Agriculture Secretary of the State of Rio de Janeiro (SEAAPI), local Office at Niterói, João Batista Elias Soffre and Roosevelt Aquino Boechat which participated in the collection of laboratory specimens.

REFERENCES


