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CLINICAL, PATHOLOGICAL AND VIROLOGICAL STUDIES ON GOAT POX IN MOSUL, IRAQ

BY

M. HUSSEIN, H.I. EL-SADI, I.K. ZANGANA, M.Y. EL-ATTAR AND A.S. AL-BANA

Faculty of Veterinary Medicine, Mousul, Iraq

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INTRODUCTION

Goat pox is a contagious disease which causes heavy economic losses among goats in many countries. It is caused by a goat pox virus which is a member of the genus Capripox virus in the family poxviridae(Fenner, 1976). The virus can be propagated on the chorioallantoic membrane of chicken embryo (Rafyi and Ramyar, 1959; Tantawi et al., 1980), on cell cultures prepared from kidney and testes of sheep and goats(Ramyar, 1966; Pandy and Singh, 1970), Sheep thyroid (Nitzschke et al., 1967) and in embryonic goat lung (Dubey and Sawhney, 1975).

In Iraq, GPV was isolated for the first time from the northern part of the country and designated as the (Sersenk strain) by Tantawi et al., 1980. A second strain was isolated from another region in northern part of Iraq and was designated (Harir strain) by Al-Banna and Abass, 1983.

The purposes of the present study were to isolate and identify the pox virus from naturally infected flock of goats in Mosul (northern part of Iraq) and to describe the clinical and pathological aspects of the disease.

MATERIALS AND METHODS

1- Animals and Samples:

Skin lesions, scabs and sera were collected from affected goats during an outbreak of pox infection among a flock of 350 goats in Mosul.

2- Experimental Induction of the Disease:

Suspensions of infective material prepared from the naturally infected goats were inoculated intradermally into 3 apparently healthy, one year old, goats at a dose of 0.5 - 1.0 ml in the tail and the inner side of the thigh. The goats were observed for two weeks after inoculation to detect both local and systemic reactions.

3- Virus Isolation in Cell Culture:

Suspensions of the infective tissue material from naturally and experimentally infected goats were directly applied to secondary lamb testes tissue culture (LTC) prepared according to the method of Plowright and Ferris, 1958. The inoculated LTC were incubated at 37°C for 8-12 days with daily microscopic examination for detection of cytopathic effects (CPE).

4- Virus Adaptation on Chorioallantoic Membrane(CAM):

0.2 ml of antibiotic treated suspension prepared from dried scabs and skin lesions collected from naturally and experimentally infected goats were inoculated onto (CAM) of 11 - 12 days old chick embryos which were then reincubated at 37°C for 6 days with daily examination.

5- Serological Identification

A- Indirect Flourescent Test (IFT):

Sera samples collected from naturally and experimentally infected goats were heat inactivated at 56°C for 30 minutes and tested by GPV (Harir strain)grown on secondary LTC fixed on coverslips of Leighton tubes*. Rabbit anti-goat gammaglobulins** flourescein isothiocyanate conjugates were then used according to the method described by Rovozzo and Burke, 1973. All coverslips were examined using the flourescent microscope.

B- Microserum Neutralization Test (MSNT):

This test was done in secondary LTC using a constant virus concentration of 10^2 $TCID_{50}$/0.1 ml, and various dilutions of sera that were collected from naturally and experimentally infected goats. Several kinds of specific anti GPV sera and sera collected from recovered goats were used in this test.

6- Histopathological Examination:

Specimens of cutaneous lesions from various parts of the body of each naturally and experimentally infected animal were taken and fixed in 10% formol saline. After fixation, the specimens were embedded in paraffin wax, sectioned at 6, µm thickness and stained with hematoxylin and eosin (Luna, 1968).

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* Coster, 205 Broadway, Cambridge, Mass. 02139,USA.

** Nordic Immunological Laboratories, Tilburg,London.

RESULTS

1- Clinical Findings

A- Natural Infection:

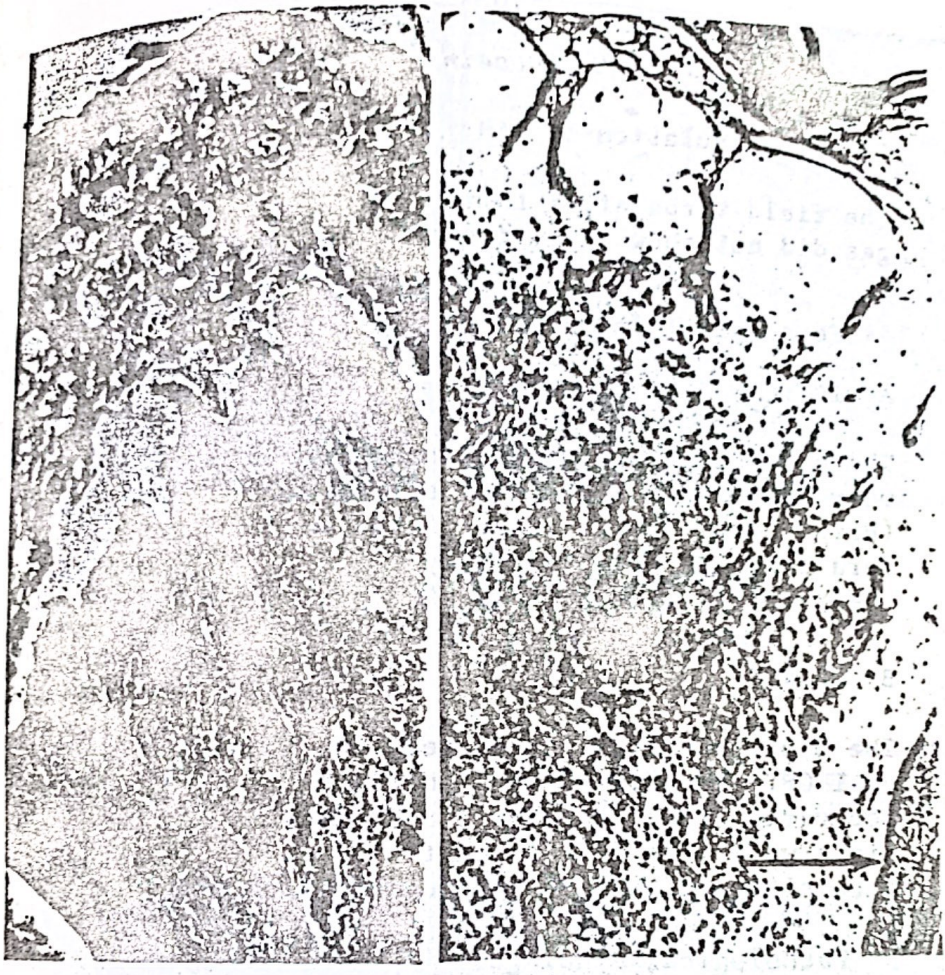
An outbreak of pox was detected in a flock of 350 native goats, one year old, in Mosul province during March, 1986. Morbidity was 100% but mortality was as low as 6%. Affected goats showed a serious generalized disease characterized by marked depression, prostration, high fever (41.5°C), severe dyspnea and discharges from eyes and nose. The pox lesions were in the form of nodules, 0.5 - 1.0 cm in diameter distributed all over the skin surface of the body as well as the face, udder and teats and the mucous membranes of the alimentary, respiratory and urogenital tracts.

B- Experimental Infection:

The experimentally inoculated goats developed the typical pox lesions at site of inoculation. The lesions started as macules on the 8th postinoculation day, then pustules on the 10th day and ended as scabs that remained till the 20th day. There was a rise of the body temperature that reached its peak (41.6°C) at the 10th day.

2- Virus Isolation in Tissue Culture:

The virus developed CPE in the form of cell rounding and few syncytia which developed 8 days after inoculation of LTC with infected material collected from the experimentally infected goats. However, direct inoculation of LTC with specimens from naturally infected goats did not result in CPE till the 12th postinoculation day.



ig. 1: Photomicrograph of a section of the cutaneous lesion of pox in a goat. Note thinning of the epidermis and the presence of several vesicles just beneath the epidermis. Separation of the epidermis and the subepidermal tissue from the dermis is an artifact. H&E stain; X 100.

Fig. 2: Photomicrograph of a section of the cutaneous lesion of pox in a goat. Note the subepidermal vesicles, proliferation of the skin adnexa (arrow) and infiltration of the dermis with histiocytes. H&E stain; X 100.

3- Virus Isolation on CAM:

The field virus after three successive blind passages did not show any noticeable change on CAM.

4- Serological Indentification

A- IFT:

The sera of naturally infected goats reacted positively against the reference strain of goat pox virus (Harir strain) with titer of 16. On the other hand, sera from the experimentally infected goats showed the reaction with a titer of 32.

B- MSNT:

The isolated virus was compeltely neutralized by the anti GPV serum (Harir strain). Sera from goats that recovered from the natural and experimental infections were also able to neutralize the reference GPV with titers of 8 and 16, respectviely.

5- Pathological Findings:

Grossly, the lesions were in the form of white hard cutaneous nodules, o.5 - 1.0 cm in diameter, scattered allover the body but more clearly on the back and head regions. These nodules although were elivated above the surface of the skin, they were strongly embedded in it.

Microscopically, the lesions were of two types. In the first type, there were thinning of the epidermis and accumulation of oedema fluid within and beneath the epidermis (Fig. 1). Additionally, there were proliferation of the skin adnexa and infiltration of the dermis with large number of histocytes (Fig. 2). Eosinophilic cytoplasmic inclusion bodies were visualized in these cells as well as the squamous cells

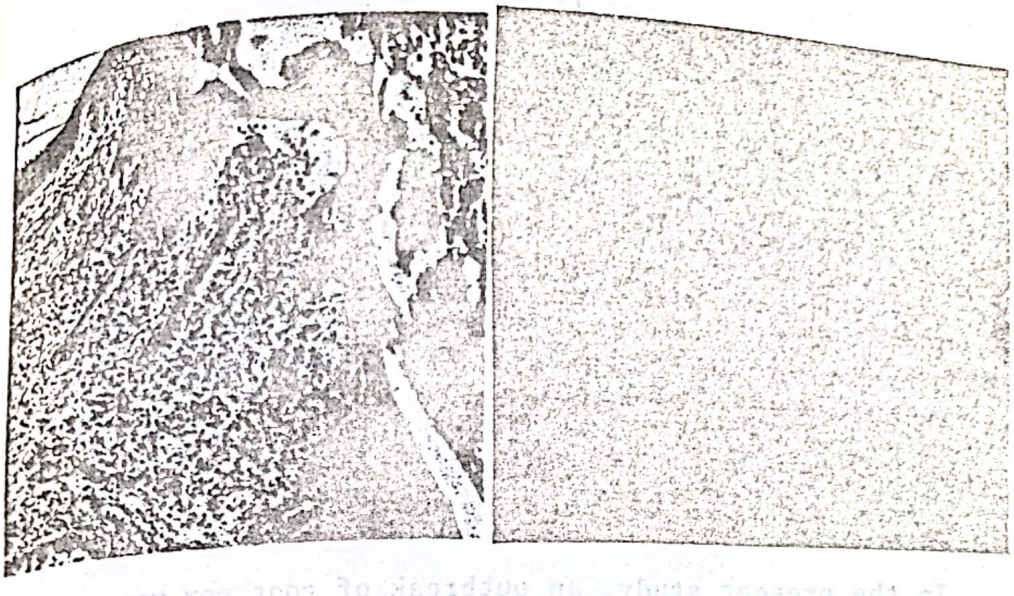


Fig. 3: Photomicrograph of a section of the cutaneous lesion of pox in a goat. Note thickening of the epidermis due to hyperplasia and hyperkeratosis (arrow). H&E stain; X 100.

Fig. 4: Photomicrograph of a section of the cutaneous lesion of pox in a goat. Note the accumulation of exudate (mainly polymorphonuclear cells) in the dermis. H & E stain; X 200.

Fig. 5: Photomicrograph of a section of the cutaneous lesion of pox in a goat. Note necrosis of the skin adnexa and the inflammatory cells. H&E stain; X 100.

of the epidermis. In the second type, there was epidermal thickening due to hyperplasia and hyperkeratosis (Fig. 3). Inflammatory exudate consisting mainly of PMN cells was seen immediately beneath the epidermis (Fig. 4). There was also necrosis of the skin adnexa (Fig. 5). Eosinophilic cytoplasmic inclusion bodies were seen in the squamous cells of the epidermis.

DISCUSSION

In the present study, an outbreak of goat pox was described. Diagnosis of the disease was based on clinical signs, pathology viral isoalation and serological identification. The clinical signs were in accordance with those described by others (Mohamed et al., 1982). Similarly, the gross and microscopical pathological changes were indifferent from those described by Mohamed et al., 1982 and Yager and Scott, 1985.

Direct isolation of GPV from naturally infected goats in LTC was not successful. The process needed a passage in susceptible animal. A similar finding has been reported by El-Zein et al., 1983. These workers found that the process needed either a passage in susceptible animal or treatment with trypsin or chymotrypsin.

In the present study, the isolated virus showed no growth on CAM even following three blind passages. A similar observation was made by Sharma et al.,1966 using an Indian strain of GPV and Tantawi and Al-Falluji, 1979 using the strain Dishanbe (from USSR). However, the Sersenk strain has been found to grow intensively on CAM (Tantawi and Al-Falluji,1979). The Harir strain has been shown to be incapable of growth in chicken embryo fibroblast cell culture (Al-Bana et al., 1985). Thus, the isolated virus of

the present study differs from the Sersenk strain. On the other hand, the virus isolated in the present study completely neutralized by the reference anti-goat pox hyperimmune serum (Harir strain). The virus from samples collected from experimentally infected goats developed typical cytopathic effect on LTC 8 days after inoculation. Accordingly, the isolated virus is a goat pox virus and can be designated as (Mosul strain).

SUMMARY

An outbreak of pox among goats in Ninevah province, Iraq was studied clinically, pathologically and virologically. Affected goats showed marked depression, prostration, fever, dyspnea, and nasal and ophthalmic discharges. Nodular cutaneous pox lesions, 0.5-1.5 cm in diameter, were seen scattered allover the body.

Microscopically, the lesions were quite variable. In some of the cases there was thinning of the epidermis and accumulation of oedema fluid within and beneath the epidermis. Additionally, there were proliferation of the skin adnexa and infiltration of the dermis with large number of histiocytes. In other cases, there was epidermal thicknening due to hyperplasia and hyperkeratosis. In these cases, inflammatory exudate consisting mainly of polymorphonuclear (PMN) cells was seen immediately beneath the epidermis. Necrosis of the skin adnexa was recognized in these cases. In all cases, acidophilic cytoplasmic inclusion bodies were seen in the infiltrating histiocytes and the squamous epithelial cells of the epidermis.

Experimental production of the disease was successfully attempted in apparently healthy goats through intradermal inoculation of infective material collected from naturally infected goats. The isolated

virus grew in primary lamb testis cell cultures (LTC) or developing chick embryo. It was serologically identified as a goat pox virus (GPV) and was designated as "Mosul" strain.

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