

HEMORRHAGIC SMALLPOX CAUSED BY ALASTRIM VIRUS: REPORT ON A CASE IN RIO GRANDE DO SUL, BRAZIL¹

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This report implicates the variola minor (alastrim) virus in an apparent case of early hemorrhagic smallpox. It had previously been thought that this especially severe form of the disease was caused only by the variola major virus.

Introduction

A number of authors have described the various clinical forms of smallpox and the principal characteristics of each form. These accounts note that the names type I smallpox, early hemorrhagic smallpox, and purpura variolosa are synonyms referring to a rare form of the disease that appears to account for between 1 and 3 per cent of the total number of reported smallpox cases. According to A. R. Rao, a 1959-1963 study of 10,857 cases at the Hospital of Infectious Diseases in Madras, India, showed that 100 cases (0.96 per cent) were of this early hemorrhagic type, while 1.2 per cent (140 cases) corresponded to late hemorrhagic smallpox, known as type II.

A notable feature of early hemorrhagic smallpox is its extreme severity, which constitutes one of the most important elements in the clinical picture. Until now, available evidence indicated that this form of the disease was caused by the variola major virus. The present report, which concerns a case apparently caused by the virus of variola minor (alastrim), does not attempt to deal with weaknesses in current explanations of the pathogenesis of hemorrhagic smallpox.

Literature is scarce on the subject of hemor-

rhagic smallpox in Brazil. Both existing publications and experience obtained over the past three years in the country's smallpox eradication program indicate that only cases of variola minor (alastrim) have been registered. An article by Juan J. Angulo in Ricardo Veronesi's *Doenças Infecciosas e Parasitarias* cites three apparent cases of hemorrhagic smallpox observed at first hand. The author notes that two of the three patients survived, and says he believes the cases involved were probably alastrim.

Another work, by Rodrigues da Silva, *et al.*, discusses 48 smallpox cases studied at the Adolfo Lutz Institute in São Paulo and describes a case of the hemorrhagic type. Consideration of its clinical characteristics, including those of its latter stages (the patient survived), led it to be classified as late hemorrhagic smallpox.

The outcomes reported by these sources contrast markedly with the pathogenesis of early hemorrhagic cases found on other continents, which are reported by various authors to be fatal 100 per cent of the time. In connection with the case reported below, considerable efforts were made to find additional information on this subject, without noteworthy success.

Case Data

Personal History

M. K., a four-year-old boy, was born and raised in Colonia Alicia, Misiones Province,

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Argentina, where he was residing when he became ill in June 1970. Urgently seeking medical care for their son, his parents brought him to the Brazilian Municipality of Horizontina (Mauricio Cardozo District, State of Rio Grande do Sul), where he was admitted to the Mauricio Cardozo Hospital on 21 June.

Epidemiologic Background

For about 20 days before falling ill, the boy was in direct daily contact with a family of 12 persons, nine of whom were going through various stages of an illness that had the clinical characteristics of alastrim.

The boy was vaccinated against smallpox for the first and only time two days before his illness began. His parents and two one-year-old twin brothers were vaccinated at the same time. Though M.K. had experienced measles two months previously, he had no history of smallpox or chickenpox.

A clinical examination was carried out seven days after vaccination and five days after the onset of illness. At that time no trace of the vaccination could be found. However, the parents and brothers developed a severe reaction—even though the parents had been vaccinated in previous years with resultant scarring.

Course of Illness

The illness ran a seven-day course, characterized from the start by severity and progressive deterioration. Its predominant symptoms consisted of bleeding, toxemia, and cyanosis. Death resulted from respiratory arrest.

The onset, marked by abdominal pain and severe headache, occurred on 16 June, and was followed the next day by a fever of about 102° F. This persisted, at lower temperatures, until the patient's death. On 19 June the parents noticed erythematous manifestations, which were limited first to the face and then spread to other parts of the body.

From 21 June on the patient lost blood through his nose, mouth, and urethra; his urine

was decidedly bloody. During the last two days these symptoms became more severe and sensory alterations were noted.

Physical Examination during the Last 30 Minutes of Life

The patient's general appearance was that of a person in critical condition, with sensory involvement and cyanosis.

The left conjunctival and nasal mucosae, and the visible part of the meatus urinarius, had multiple lesions that could not be clearly observed because they were obscured by hemorrhage.

The skin had small, widely distributed maculopapular lesions. Small round spots (petechiae) covered the entire cutaneous surface, but were more intense in certain anatomical regions. Larger spots (ecchymoses) were observed chiefly in the region of the buttocks, where their development was favored by the patient's position.

Smooth pemphigoid blisters of various sizes were also observed; these had a soft consistency and irregular margins. Pressure on them appeared to cause expressions of pain on the patient's face. The contents of most seemed watery, though some contained a dark bloody fluid.

The patient had a tachycardiac pulse rate of 140 beats per minute. His heart tones were very audible, and detection of three sounds indicated a possible gallop rhythm. Respiration was extremely rapid, and moist rales were noted. The patient's liver, spleen, and lymph nodes were not palpable.

Treatment

The medical care provided included administration of hormones (corticoids); antibiotics (penicillin, chloramphenicol, and erythromycin); glucose; physiologic saline; antipyretics; and gamma globulin and oxygen in the last minutes of life.

Laboratory Test Results

Blood cells: Megaloblasts, including some undergoing mitosis, were observed. Basophilic, polychromatophilic, and orthochromatic erythroblasts were also found.

Among the white blood cells there was a marked presence of myeloblasts (paramyeloblasts).

Smears: Samples taken from the blisters were positive for virus of the variola-vaccinia group.

Cultures from coagulated blood: The material was inoculated onto the chorioallantois of chick egg embryos and incubated at 36°C for 72 hours. This produced a viral growth that upon re-inoculation into fresh chick egg embryos formed isolated lesions with the characteristic morphology of those caused by variola virus.

Diagnosis

A diagnosis of early hemorrhagic or type I smallpox was arrived at, taking into account the following points:

Clinical factors: Noteworthy features of the illness included sudden onset, high fever, multiple purpuric and hemorrhagic lesions of the skin and mucosae, hematuria, and a deteriorating and rapidly fatal course.

Epidemiology: Before immunization, and for about 20 days before onset, the patient was in daily contact with cases clinically diagnosed

as variola minor (alastrim). This is the main reason why the Director of the Mauricio Cardozo Health Station, who referred the case to the hospital, first gave serious consideration to this clinical form of the disease.

Laboratory work: Virus of the variola-vaccinia group was observed with the electron microscope and was isolated on chick embryo chorioallantois.

Conclusions

This report deals solely with characteristics observed in a case of smallpox that was clinically compatible with the early hemorrhagic form of the disease. Obviously, the conclusions derived from these observations are not definitive.

Bearing this in mind, the following tentative conclusions have been made:

1) Early hemorrhagic or type I smallpox may be caused by the variola minor or alastrim virus.

2) The etiology and severity of early hemorrhagic or type I smallpox would not appear directly related to the virulence of the causal agent, judging from the known attenuated virulence of the alastrim virus.

3) These conclusions suggest a need to consider other possible causes of hemorrhagic smallpox pathogenesis, in which a reduction of the body's defenses may play an important role.

SUMMARY

Until now it has generally been felt that early hemorrhagic smallpox, a fatal form of the disease, was caused by the variola major virus. The alastrim (variola minor) virus, usually responsible for a very much milder sort of illness, had not been implicated in early hemorrhagic cases.

Nevertheless, a child exposed to a number of alastrim cases in Argentina during mid-1970

developed rapidly fatal symptoms compatible with the clinical picture of early hemorrhagic smallpox. This suggests that the early hemorrhagic form may be caused by variola minor under certain conditions, and that other factors, such as the effectiveness of the patient's bodily defenses, may play a key role in this regard.