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RETROSPECTIVE REVIEW OF THE CASE OF CUTANEOUS ANTHRAX – MALIGNANT PUSTULE FROM 1995 IN 15-YEAR OLD GIRL

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ABSTRACT

A 15-year-old girl was admitted to our Department with cutaneous lesion resembling black eschar. Anamnesis revealed that before getting ill she was wearing pullover made of rough sheep's wool and ornaments made of leather like straps. Cutaneous anthrax was confirmed by identification of *B. anthracis* in specimens from weeping ulceration, culture from black eschar, thermoprecipitation test, and bioassay on guinea pig. The girl was treated with crystalline Penicillin. She responded well to the therapy and recovered after 28 days. What attracts attention in presented case is the fact that the girl didn't belong to high risk group of human anthrax, which might lead to misdiagnosis.

In 1990-1999, Poland there were reported 22 cases of anthrax - it was almost exclusively cutaneous form. In the years following 1999 anthrax was reported even less often - in the period 1991-2013 it was recorded a total of 26 cutaneous anthrax cases.

Key words: *black eschar, cutaneous anthrax, Bacillus anthracis*

INTRODUCTION

Anthrax is an acute infectious disease (zoonosis) caused by *Bacillus anthracis*, large, Gram-stained, aerobic, nonmotile, encapsulated, chain-forming rods which form centrally located oval spores in culture but not in vivo. The source of pathogens are first of all herbivorous animals like cattle, horses, sheep, goats. The major reservoir of anthrax is soil contaminated by feces, urine and saliva of infected animals. In the environment outside the host organism, *Bacillus anthracis* produces spores (1-3). The anthrax spores can persist for a long time in the environment. Meteorological factors such as floods, heavy spring rains, shifts between rainy and dry periods can contribute to migration of anthrax spores on the surface of pasture land (1, 4-7). Anthrax is significantly more common among grazing herbivores in agricultural regions in sub-Saharan Africa, Latin America, southwestern Asia, and southeastern Europe (1). People may be infected by direct contact with ill or dead because of anthrax animals or their contaminated products - hair, wool, leather or other materials. In most

cases human anthrax affects farmers, vets, tanners, butchers, workers handling imported and unprocessed animal products, gardeners using bone meal as fertilizers. Males are more often infected than females-3:1. In Europe, human anthrax is relatively common in Turkey, Greece, Balkan countries, Romania, Bulgaria, and the Russian Federation (1, 3, 4, 8-12). Clinical features are determined by means of entering the microorganisms into the host. The most common and also the mildest type of human anthrax is cutaneous form (1). Other forms of human anthrax – gastrointestinal, inhalational or injectional are seen very rarely. In the last five years, several reports of anthrax infections in heroin drug users have been reported in European countries (13-15). The spores of *B. anthracis* remain a significant agent of bioterrorism. Soon after terrorist attacks on New York City and Washington, D.C. on September 11, 2001 letters containing anthrax spores were sent through the U.S. Postal Service to several news media offices and two Democratic U.S. Senators, killing five people and infecting 17 others (1, 16).

CASE REPORT

A 15-year-old girl was referred to our Department with local cutaneous lesion of 4 cm. in diameter looking like black eschar and located on the neck on the left side, below angle of the mandibule. She gave a two weeks' history of clinical manifestations. The initial lesion was in the shape of red macule, later papule. Next, the lesion evolved through vesicle to ulcer. Eventually, the change went dry and assumed form of black eschar (pustula maligna, carbuncle malignant, black crust). The black eschar was surrounded by indurated, painless, extensive swelling and tiny satellite vesicles-pearl wreath. (Fig.1)



Fig.1. Black eschar

Anamnesis revealed that girl had contact with animal products. Before getting ill she was wearing pull-over made of rough sheep's wool which irritated neck's skin and made its reddening. The pullover had been bought on the country market in the south of Poland some days earlier. Besides she used to wear ornaments made of leather like straps.

Suspicion of anthrax was established on the ground of clinical picture. The diagnosis was confirmed as follows:

1. Specimens, which were taken from weeping ulceration and Gram-stained revealed abundant spores of *B.anthraxis*.
2. Anthrax bacilli sensitive to Penicillin were cultured from black eschar.
3. Culture on solid and fluid medium was characteristic for *B.anthraxis*.
4. Thermoprecipitation test (Ascoli test) was positive with sera obtained from patient and with control positive sera.
5. Biological assay on guinea pig was positive- the laboratory animal died. The diagnosis was carried out by Biological Threats Identification and Countermeasure Center of Military Institute of Hygiene and Epidemiology in Puławy.

The girl received crystalline Penicillin in daily doses of 12 million units intravenously (3 million every 6 hours). The patient responded well to therapy, however Penicillin treatment had to last up to 28 days. Separation

of blackened necrotic eschar occurred after 10 days of Penicillin treatment. Detachment of black crust revealed weeping crateriform base. Finally lesion became dry and we could observe healing of ulceration.

DISCUSSION

In Poland human anthrax occurs sporadically. In years 1991-2013 26 cases of cutaneous anthrax were reported (17, 18). The danger of anthrax infection is slight but permanent. Spores of *B.anthraxis* remain viable for years in dry soil and that's why cattle have may become infected by grazing in field where animals died of anthrax decades before. Control of the disease in humans fundamentally depends on control of the disease in animals and control of animal products. Animals dying of anthrax should be buried intact deeply (below 2 metres) or cremated. Necropsies shouldn't be performed because sporulation of *B.anthraxis* occurs only in presence of oxygen (1, 3).

Because today the disease is so rare in Europe, sporadic cases of anthrax are easily overlooked as the diagnosis often is not considered. In fact, small early skin lesions may be difficult to recognize but in any patient with a painless ulcer with vesicles, oedema, and a history of exposure to animal or animal products, cutaneous anthrax should be considered (2, 8). The goat-hide souvenirs such as goat-hide drums from tropical and subtropical countries can be contaminated with *Bacillus anthracis* spores. Cases of cutaneous and inhalation anthrax have been reported among people who have handled or played drums made with contaminated goat hide from countries endemic for anthrax (2).

The differential diagnosis includes cowpox virus infections, staphylococcal skin infections, erysipelas, tularemia, scrub typhus, actinomycosis, zoster, orf (1, 3, 19). In extraordinary cases cutaneous anthrax may mimic severe, acute insect bite reaction (20).

It should be reminded that there is more rare form of cutaneous anthrax - oedema malignum. It occurs first of all within face on the border of skin and mucosa. Oedema develops rapidly around the infected spot and the skin turns violet. The appearance of black eschar is never observed. Cutaneous anthrax is usually a self-limited. However, in 10 to 20% of untreated cases the infection generalizes and leads to fatal course. Penicillin G (benzylpenicillin) and Ciprofloxacin are first-line drugs. Antibiotics that may be also given include tetracyclines, macrolides, aminoglycosides, chloramphenicol, first-generation (but not second- or third-generation) cephalosporins (1, 2, 3).

B.anthraxis may be identified in smears by Gram's stain or direct fluorescent antibody test. It's worth mentioning that culture and smears may be unreliable

when patient had been given antibiotics earlier. For confirmation of the infection we can also perform thermo-precipitation test (Ascoli test), more sensitive indirect microhemagglutination test (IMH test), or bioassay on guinea pig. PCR (polymerase chain reaction) method, as a sensitive and specific test, may be used for rapid confirmation or exclusion of anthrax in potentially infected animal or contaminated animal products (1, 2, 3).

What attracts attention in presented case is the fact that the girl didn't belong to high risk group of human anthrax, which might lead to misdiagnosis. On grounds of this case it's worth reminding that cutaneous form of anthrax can occur at persons wearing things or ornaments made of wool, leather or other animal products, or using their i.e. drums. The healing was slow but progressive. Therefore, you shouldn't give up antibiotic treatment too early.

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