Study

An outbreak of cutaneous anthrax in a non-endemic district – Visakhapatnam in Andhra Pradesh

G. Raghu Rama Rao, Jyothi Padmaja, M. K. Lalitha*, P. V. Krishna Rao, K. V. T. Gopal, Hari Kishan Y. Kumar, Promila Mohanraj*

Departments of Dermatology and Microbiology, Andhra Medical College, Visakhapatnam, *Department of Clinical Microbiology, Christian Medical College, Vellore, India

Address for correspondence: Dr. G. Raghu Rama Rao, Professor and Head, Dept of Dermatology, Gopal Sadan, D. No: 15-1-2C, Naoraji Road, Maharanipeta, Visakhapatnam - 530002, India. E-mail: graghuramarao@hotmail.com

ABSTRACT

Background: Anthrax is a disease of herbivorous animals, and humans incidentally acquire the disease by handling infected dead animals and their products. Sporadic cases of human anthrax have been reported from Southern India. **Methods:** Five tribal men presented with painless ulcers with vesiculation and edema of the surrounding skin on the extremities without any constitutional symptoms. There was a history of slaughtering and consumption of a dead goat ten days prior to the development of skin lesions. Clinically cutaneous anthrax was suspected and smears, swabs and punch biopsies were taken for culture and identification by polymerase chain reaction (PCR). All the cases were treated with intravenous followed by oral antibiotics. Appropriate health authorities were alerted and proper control measures were employed. **Results:** Smears from the cutaneous lesions of all five patients were positive for *Bacillus anthracis* and this was confirmed by a positive culture and PCR of the smears in four of the five cases. All the cases responded to antibiotics. **Conclusion:** We report five cases of cutaneous anthrax in a non-endemic district, Visakhapatnam, Andhra Pradesh, for the first time.

Key Words: Cutaneous anthrax

INTRODUCTION

Anthrax is a disease of herbivorous animals caused by *Bacillus anthracis*, and humans incidentally acquire the disease by handling infected dead animals and their products.[1-4] Cutaneous anthrax is the commonest type; the other two, inhalational and gastrointestinal anthrax, are uncommon forms. Sporadic cases of cutaneous anthrax caused by biting flies have been reported.[5,6]

Anthrax is known to occur globally, and it has been estimated that as many as 20,000 to 1,00,000 human cases of anthrax occur annually, generally in underdeveloped regions of the world, where livestock are not vaccinated.[1,4,7] The actual incidence of anthrax in India is not known accurately mostly due to underreporting.[3,8] Many regions in India are still enzootic for animal anthrax, but it is less frequent or absent in North India, and sporadic cases of human anthrax have been reported, especially from South India.[9] According to a recent review of literature, there have been about 205 documented cases from India,

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the majority (109) of cutaneous anthrax.[8]

In Andhra Pradesh, Chittoor, Cuddapah, Guntur, Prakasam and Nellore districts are the known endemic areas for animal and human anthrax.[10,11] According to the Department of Animal Husbandry, Govt. of Andhra Pradesh, there were 1220 animal anthrax outbreaks in Andhra Pradesh from 1991 to 2004, all in these districts. For the first time five cases of human cutaneous anthrax were identified in a remote tribal hamlet, Pedalabudu, in Araku valley mandal situated 140 km from Visakhapatnam, which is a non-endemic district of Andhra Pradesh. These cases prompted us to take up this detailed study.

METHODS

Five tribal men were brought with painless ulcers with surrounding vesiculation and edema on the extremities since ten days. They had no constitutional symptoms. Three weeks earlier one of their goats died of sudden illness and these people were involved in slaughtering, cooking and eating it. After 10 days, they started developing these skin lesions.

The clinical details of all the cases are given in Table 1. On the basis of the history of contact with an infected carcass and the characteristic clinical features (Figure 1) a diagnosis of cutaneous anthrax was made. All five patients were hospitalized and investigated. Smears and swabs taken from the vesicles, ulcers and fluid from the surrounding edematous region were Gram stained and cultured. Full thickness 4 mm punch biopsies were also taken in all the patients from the edge of the ulcers. Some smears, cultures and biopsies were sent to the Department of Clinical Microbiology, CMC, Vellore for confirmation of the diagnosis of anthrax by PCR. Routine blood and biochemical investigations and chest X-ray were done in all patients.

All the patients were treated with intravenous ciprofloxacin 400 mg 12-hourly along with 500 mg ampicillin 8-hourly for the first five days, followed by oral ciprofloxacin 500 mg twice a day and ampicillin 500 mg 8-hourly for two weeks.

RESULTS

The direct smears of all the five suspected cases revealed thick Gram positive bacilli singly and in short chains (Figure 2). These findings were suggestive of *Bacillus anthracis*. Four out of five samples grew on blood agar non-hemolytic, large, irregular, raised, dull, opaque, grayish white coloured colonies with a frosted glass appearance, suggestive of *Bacillus anthracis*. Histopathology of the biopsy specimens showed foci of necrosis with marked congestion, hemorrhages and extensive neutrophilic infiltrates. Finally PCR was positive for the genes encoding the protective antigen (PA) and also capsular region (CAP), confirming *Bacillus anthracis* (Figure 3), in all patients.

Prompt clinical response to ciprofloxacin and ampicillin therapy was seen in all the five patients; improvement was seen in the form of reduction of surrounding edema within 5-7 days and eschar formation, followed by

Table 1: Clinical Features – Cutaneous anthrax

Cases	Age/sex	Site	Type of skin lesion	Associated features	Investigations
Patient 1	29 years/ male	Dorsum of right hand	Painless bullous lesion with central ulceration surrounded by extensive edema	Axillary lymphadenopathy present	Gram positive bacilli, PCR positive
Patient 2	45 years/ male	Dorsum of left hand	Painless ulcerated lesion with vesiculation surrounded with massive edema	Axillary lymphadenopathy present	Gram positive bacilli, PCR positive
Patient 3	35 years/ male	Left ring and index fingers	Two painless ulcers with vesiculation surrounded by erythema and edema	No lymphadenopathy	Gram positive bacilli, PCR positive
Patient 4	40 years/ male	Left palm	Painless bullous lesion with central ulceration with edema of the left hand	No lymphadenopathy	Gram positve bacilli, PCR positive
Patient 5	45 years/ male	Dorsum of right great toe	Painless ulcer with crusting and massive edema of the right foot	Inguinal Lymphadenopathy	Gram positive bacilli, PCR positive

Figure 1: A bullous lesion with central ulceration and surrounding edema

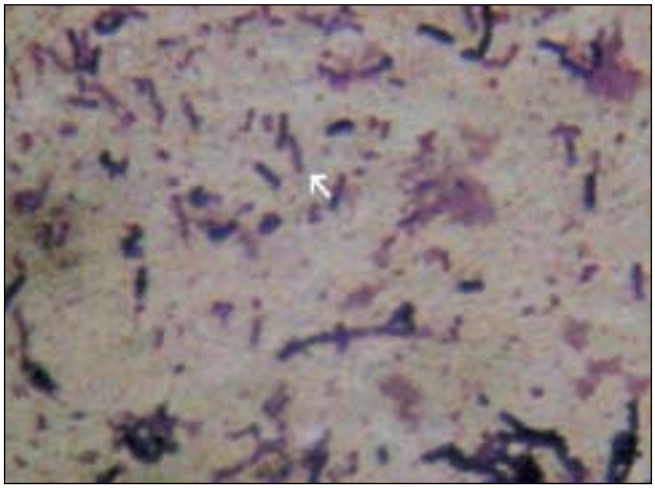

Figure 2: Smear from skin lesion: Gram positive bacilli singly and in short chains (Gram's, x1000)

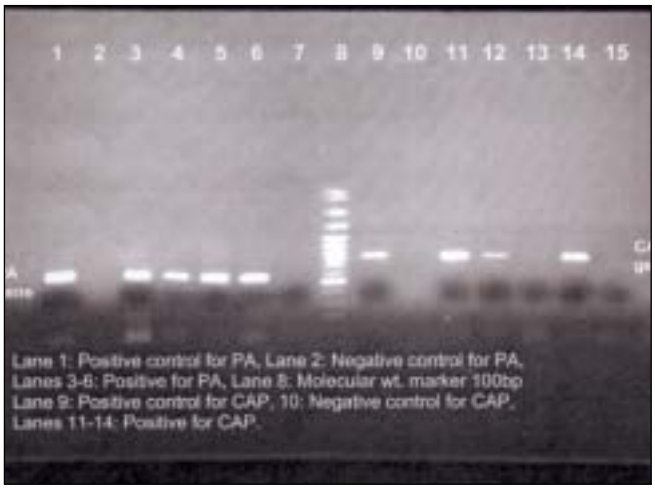

Figure 3: Agarose gel image of the PCR performed on smear from skin lesions

Figure 4: Healing of lesion with ciprofloxacin therapy

healing of the ulcers after two weeks (Figure 4).

DISCUSSION

Cases of cutaneous anthrax have not been frequently reported in India, though the disease is endemic in many parts of the country.[12] Cutaneous anthrax accounts for 95% of all human anthrax cases.[1,4,7,13] Unlike the other forms, inhalational and gastrointestinal anthrax, it is not a life threatening disease. Spontaneous healing occurs in 90% of cases.[7] However, mortality in untreated cases of cutaneous anthrax is estimated to be 5-20%.[7] The characteristic clinical features of cutaneous anthrax are a painless ulcer with surrounding vesiculation along with massive edema and eschar formation (malignant pustule). Mild constitutional symptoms may be seen along with regional lymphadenopathy. These lesions are seen commonly on the face, neck and extremities. These features clinically differentiate the disease from other common infectious conditions like impetigo, cellulites, orf (ecthyma contagiosum), milker nodules etc.[1,4,7]

To diagnose cutaneous anthrax, a high index of clinical suspicion and a good history are essential. In our patients there was history of contact with a dead animal and the characteristic lesions were seen on the extremities. The laboratory diagnosis of cutaneous anthrax depends upon recognition of the thick, Gram positive bacilli in smears from the lesions. Cultures from the skin lesions however are not useful diagnostically because the rate of positive cultures does not exceed

60-65%, probably due to the prior use of antimicrobial therapy or due to the microbicidal activity of local antagonistic skin flora.[1] Therefore confirmation of cutaneous anthrax depends upon a positive PCR for *Bacillus anthracis*,[1,7,8,14,15] even in patients who have received prior antimicrobial therapy. In all our five patients direct smears and PCR showed *Bacillus anthracis,* and in four the culture was positive, thereby confirming the diagnosis of cutaneous anthrax.

Though penicillin is the drug of choice for all forms of anthrax, beta-lactamase producing strains of *B. anthracis* have been reported.[6,16] Therefore the American Academy of Dermatology recommends ciprofloxacin or doxycycline and one or two additional antimicrobials for all forms of anthrax.[17] All our five cases responded dramatically to ciprofloxacin and ampicillin therapy and the lesions healed without scar formation.

Cutaneous anthrax occurs commonly in clusters or as an outbreak in endemic areas. Recently, three outbreaks of cutaneous anthrax similar to that of ours have been reported from Mysore (1999), Midnapore (2000) and Kolar (2001).[9]

Anthrax is a disease of public health importance and a notifiable disease. Once the diagnosis was established in our cases, the district health authorities and animal husbandry personnel were informed. Specialist teams visited the affected and the surrounding villages for door to door surveillance and for conducting medical camps to detect new cases. Nearly 1000 people were examined. Health education camps were conducted to educate the people about the handling of dead animals and also proper disposal of carcasses by using lime. In the affected and surrounding villages, sanitary measures were taken and the soil was decontaminated with bleaching powder. Animal husbandry authorities surveyed all the animals in these areas and found 6-8 animals suffering from anthrax (the diagnosis was established by smear and culture studies). Nearly 10,000 animals were vaccinated with live attenuated spore vaccine from Veterinary Biological Institute, Hyderabad, within a week of this outbreak under a mass vaccination program.

Dermatologists play a crucial role in the diagnosis of naturally occurring cutaneous anthrax and also in the event of bio-terrorism. The purpose of this report is to create awareness about cutaneous anthrax among dermatologists.

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