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**UGLY CUTANEOUS FORM OF
CORYNEBACTERIUM PSEUDOTUBERCULOSIS
INFECTION IN BUFFALO—CALVES
(SPORADIC CASES)
IN SOHAG GOVERNORATE, EGYPT
(With 3 Figures)**

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شكل جلدي قبيح لعدوى جرثومة السل الكاذب في عجول الجاموس
(حالات منفردة) بمحافظة سوهاج-مصر

أحمد زيتون

خلال شهر يوليو ٢٠٠٠ تم إجراء الفحص الإكلينيكي لعدد ١٨٥ من الجاموس في إحدى قرى محافظة سوهاج ووجد أن ١٣ (٧,٠٣%) حالة غير بالغة تتراوح أعمارها من ٦ إلى ١٥ شهر أظهرت آفات جلدية مقرزة، وهي عبارة عن خراجات مغلقة ذات أحجام مختلفة منتشرة على كافة أجزاء الجسم - من الرأس إلى الذيل شاملة القوائم - مصاحبة أو غير مصاحبة بتضخم في الغدد الليمفاوية. تم وصف الأعراض المرضية للحيوانات السقيمة بأسباب عزلت جرثومة السل الكاذب (إما منفردة أو مقترنة مع جراثيم صديدية أخرى) من أغلب العينات المختبرة. المحاولات العلاجية للحيوانات السقيمة بجرعات عالية من المضاد الحيوي (سيفرادين) باءت بالفشل. الأسباب المحتملة للإصابة الجلدية العامة بعدوى جرثومة السل الكاذب في الجاموس الغير بالغ تم مناقشتها. من المقترح التخلص من الحالات المنفردة المصابة بعدوى جرثومة السل الكاذب والتي لم تستجب للعلاج في أسرع وقت لمحاولة اقتلاع المصدر الأساسي للعدوى (بؤرة العدوى).

SUMMARY

On July 2000, out of the clinically examined buffaloes (n = 185), 13 (7.03 %) sporadic immature cases (6 - 15 months in age) showed disgusting skin lesions. These lesions were bilaterally widespread of various sizes closed abscesses that distributed

from head to the base of the tail including the limbs of the infected cases with and/or without enlargement of the lymph nodes. Clinical findings of these infected cases were described in details. *Corynebacterium pseudotuberculosis* (CP), either alone or coupled with other pyogenic bacteria, was culturally isolated from the most tested samples. Field therapeutic trials of the infected cases with higher doses of antibiotic (Cephadrine) were unsuccessful. The probable reasons of the generalized skin form of CP infection in the immature buffaloes were discussed. It is suggested that, the drug-resistant sporadic infected cases with CP infection should be culled as soon as possible to rooting-out the main source of infection (focus).

Key words: *Corynebacterium pseudotuberculosis*, *gnerealized infection*, *buffalo calves*.

INTRODUCTION

Corynebacterium pseudotuberculosis was incriminated as a principal etiologic agent of caseous lymphadenitis in sheep and goats (Carter and Cole Jr., 1990, Zaitoun and Bayoumi, 1994 and Zaitoun and Ali, 1999), and of ulcerative or suppurative (or both) lymphangitis with and/or without lymphadenitis in cattle, buffaloes and horses (Abou-Zaid and Hammam, 1994; Yeruham *et al.*, 1997 and Ali and Zaitoun, 1999). Both conditions appear to be endemic in Egypt and commonly synchronized with the poorer hygiene and management.

CP infection in cattle commonly occurred in three forms: cutaneous, mastitic and visceral. The cutaneous form was most predominant than the others, manifested clinically by various sizes of one or more abscesses on the different parts of the infected cases particularly shoulder and/or flank regions including the regional lymph nodes (Abou-Zaid and Hammam, 1994 and Yeruham *et al.*, 1997). However, the results published by Abou-Zaid and Hammam, (1994) did not refer to the generalized infection with CP of the examined dairy farm (18 out of 218 adult Friesian cows were infected). Yeruham *et al.* (1994) reported that generalized cutaneous abscessation due to CP infection was not observed in all infected cattle (n= 609 in 29 herds).

In regard to buffaloes, CP infection commonly occurred as skin affections in different forms, edematous, suppurative, ulcerative and

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In regard to buffaloes, CP infection commonly occurred as skin affections in different forms, edematous, suppurative, ulcerative and

nodular (Soliman et al., 1963, Awad 1966; Al-Gaabary and Ammar, 1999 and Ali and Zaitoun, 1999). The authors epitomized that CP infection occurred in either sporadic or epizootic forms and the skin lesions of the infected buffaloes were usually restricted on one or two areas. Their results did not also refer to the generalized affection.

The aim of the present work was carried out to describe the clinical picture of buffalo-calves and younger showed generalized peculiar skin lesions and to clear up the probable etiologic agent(s). A therapeutic trail of some cases was achieved.

MATERIAL and METHODS

Animals:

During the summer training (the second half of July 2000) for the veterinary students, Faculty of Vet. Med. Assiut University, in the different villages of Sohag Governorate (Upper Egypt), 185 buffaloes of the different ages and sex were clinically examined in El-Na'ghameech village (South Sohag). Some of these buffaloes showed characteristic skin lesions. History of such cases and the previous treatment were recorded.

Samples and sampling technique:

A- Bacteriological examinations:

Under aseptic precautions, 20 samples of the diseased cases (n = 13) were taken. The skin lesion was incised and the content was swabbed. The collected swabs were inoculated into tubes containing brain heart infusion (BHI, Gibco) broth supplemented with 10% sterile horse serum and incubated at 37°C. Two days later, the inoculated tubes were cultured onto BHI agar with 10% sheep blood and incubated aerobically. The suspected colonies were picked up, purified and thereafter morphologically and biochemically identified according to the criteria of Carter and Cole Jr. (1990).

B- Parasitological examinations:

Direct smears from the excised lesions and skin scrapings till blood oozing of different areas of the diseased buffaloes were made and tested for the presence of mite infestation by using digestion-concentration technique (Coles, 1980).

C- Therapeutic trial:

The clinically infected cases were subjected to therapeutic trial with a heavy dose of antibiotic (cephradine, Velosef - Bristol - Myers Squibb, Egypt) for five successive days. Velosef

was chosen according to the results of Ali and Zaitoun, (1999). On the first day of the therapeutic course, 4 grams of velosef per head were infused intravenously with physiological saline. Thereafter, 4 grams of velosef / head / day / intramuscularly injected daily. The treated cases were monitored for one-month post medication.

RESULTS

Clinical examination:

Out of the clinically examined buffaloes ($n = 185$), 13 (7.03 %) sporadic immature cases (6 – 15 months in age) had peculiar skin lesions. Such lesions were bilaterally widespread of cutaneous closed abscesses that distributed from head to the base of the tail including the fore – and hind –limbs of the infected case (Fig A). These multiple abscesses were 3 – 7 cm in diameter and circumscribed or semi-spherical in shape (Fig. B). Most of abscesses were found inspissated, elevated with nipple like appearance similar to pimples (Fig. C) surrounded by firm wall (like capsule) and they were fastened to the skin. The apparently healthy skin that closely around the abscess was semi-doughy referring to edema (Fig. C). The abscess and the closely surrounding area were hairs-free (Fig. C). By incision, some abscesses discharged whitish or yellowish white caseo-purulent inspissated putty like material while others showed semi-caseated material. During incision, signs of pain were not remarkable. Cording abscessation along the lymphatic vessels could not be noticed in the ill cases. Enlargement of the prescapular and profemoral lymph nodes of the infected buffaloes could not be noticed with exception of three cases (23.08 %). This enlargement was cold and painless referring to the chronic nature of the condition. History taken and field observation revealed that there were no signs of itching of the infected cases. However, 4 cases out of the diseased buffaloes showed signs of wrinkling and excoriation of some affected areas. In spite of the generalized cutaneous abscesses of the infected cases, they were apparently drink and eat well and they were non-pyrexia. However, the owners were frequently claimed that there was no increased of the body weight of the infected cases and the therapeutic trials with long acting antibiotic (oxytetracycline, Pfizer-Egypt) failed to curc these cases. The owners also claimed that the dams of those infected buffalo-calves never previously showed cutaneous abscesses or swellings of one or more of the superficial lymph nodes.

Parasitological examination:

The parasitological examination of the wrinkled and abscessed areas of the examined cases failed to detect any type of mites.

Bacteriological examinations:

Corynebacterium pseudotuberculosis was isolated from 9 (45%) out of the tested samples in a pure culture. Six (30%) samples were culturally positive to CP coupled with *Staphylococcus aureus* and coagulase negative staphylococci. The remained samples (25%) appeared to be sterile.

Therapeutic trial:

The therapeutic trial of the infected cases with massive doses of veloscf did not improve the clinical abnormalities. However, the size of some abscesses was diminished, but they became more inspissated.

DISCUSSION

Cutaneous form of *Corynebacterium pseudotuberculosis* infection of the diseased buffaloes was clinically suspected on the basis of the occurrence of multiple abscesses of their skin and swelling of the lymph nodes in some cases. Such suspicion was supported by the bacteriological analysis, which revealed that 75 % of the tested samples were culturally positive to *Corynebacterium pseudotuberculosis*, either alone or coupled with other bacteria, referring to the role of this pathogen as a causative agent of the peculiar skin lesions of the infected buffaloes. Carter and Cole, Jr. (1990), Laak *et al.* (1992) and Yeruham *et al.* (1997) concluded that CP bacterium was an intracellular parasite surviving in the macrophages and produced different types of exotoxins including phospholipase D and dermo-necrotic exotoxins. These toxins were leukotoxic effect (pus-producing bacterium), increased the vascular permeability (which may facilitate the spread of infection), and causes dermonecrosis at the site of infection. The pathogenic role of phospholipase D produced by CP was briefly reviewed by Yeruham *et al.* (1997) and they concluded that this exotoxin plays a pivotal role in the pathogenesis and in the dissemination of the infection. Such conclusions may interpret the peculiar appearance of the cutaneous abscesses of the infected cases. The observed signs of skin's wrinkling and excoriation on some infected buffaloes without signs of itching and the absence of mites might be attributed to the nutritional deficiencies.

Concerning age susceptibility, Yeruham *et al.* (1997) reported that the mature (primiparous or multiparous) cows (96.7 %) were most

susceptible to the CP infection than young cattle. They found that the minimum age of the infected animals was ranged from 14 to 18 months (3.3% infection, heifers). In Egypt, Sharkia Governorate, a dairy Friesian farm consisted of 218 adult cows and 103 calves was afflicted by CP infection (Abou-Zaid and Hammam, 1994). They found that the clinical abnormalities of CP infection were restricted only in the adults whereas all calves were clinically free. Such results may suggest that calves are not susceptible and this may be ascribed to the role of colostral immunity.

During the past five years, the epidemic form of CP infection in buffaloes was recorded in different villages of north and south Egypt (Khalel *et al.*, 1995, Al-Gaabary and Ammar, 1999, Ali and Zaitoun, 1999 and Zaki, 1999). Their results indicated that the average (Mean \pm SD) ages of the infected buffaloes was 3.75 ± 0.51 years, and the prevalence of the disease was dramatically declined after 5 years-old. This may be refers to a buildup of acquired immunity post infection. Their results also concluded that the calves and the immature buffaloes up to 1.5-year-old appeared to be relatively unsusceptible. Such conclusion coincided with the results of Kariuki and Poulten (1982) who found that the corynebacterial infection rates in calves were crumbs (≤ 0.0021). Acquired immunity after primary CP infection was suggested in cattle (Yeruham *et al.*, 1997) and was experimentally induced in sheep (Pepin *et al.*, 1993), and the valuable role of maternal (colostral) immunity in repelling the CP infection was serologically monitored (Laak *et al.*, 1992). Consequently it is probably suggested that, when the immature buffaloes that born from the non-immunized or non-previously infected dams (history taken) exposed to CP infection, they may gained the seriousness from of CP infection. Another suggestive reason for such seriousness form of CP infection in the infected immature buffaloes, the immunity status of these cases might be dubitable. However, further investigations should be warranted to clear up the other possible reasons of the generalized cutaneous form of CP infection in buffalo-calves.

The unsuccessful therapeutic trials of the infected cases with massive doses of cephradine or long acting oxytetracycline (history taken) may ascribe to the intracellular parasitism of the causative agent. However, the purulent material and the firm wall surrounding abscess may act as obstacle for penetration of the systemic antibiotic. Therefore, it is recommended that, the sporadic seriousness infected cases with CP infection should be preferably culled as soon as possible to rooting out the endemic focus. However, frequent field observations revealed that

complete eradication of CP infection appears to be practically impossible because of this organism was highly resistance to the most environmental conditions (Yeruham *et al.*, 1997).

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Fig. A: A 14-month-old buffalo showing cosmopolitan cutaneous skin lesion



Fig. B: The multiple abscesses are circumscribed or semi-spherical in shape.

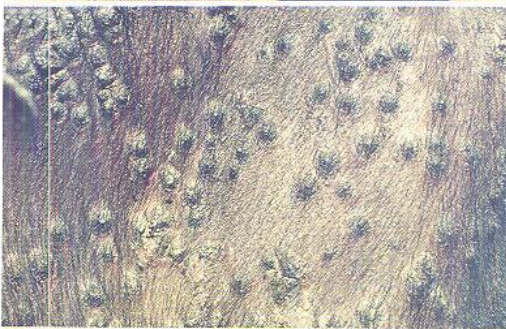


Fig. C: Close-up photograph on the abscesses, showing that they are varies in its sizes and they appear like plmples with elevated nipples, and the closely surrounding areas are slightly edematous and hairless.