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### الأسباب البكتيرية لالتهاب مفصلي حاد في مهر حصان

حلمى تركى ، متولى الشناوى

شملت هذه الدراسة الفحص الاكلينيكي وسيتولوجيا الدم لمهر حصان مصاب بالتهاب مفصلي حاد كما تم تصنيف وعزل البكتريا المسببة لهذه الحالة حيث تبين أنها ستربتوكوكس بنيمونيا وكوريني اكواي . وقد ثبت أن هذه الميكروبات لا تتأثر اطلاقا بالبنسيلين والارثروميسين .  
وبالفحص الكيماوى لمستوى بوتسجين مصل الدم تبين حدوث ارتفاع ملحوظ فيه مع قلة مستوى الألبومين كما تأثرت أيضا خلايا الدم .



## ACUTE POLYARTHRITIS IN A FOAL DUE TO MIXED BACTERIAL INFECTION

(With Two Figures)

By

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### SUMMARY

A case of acute polyarthritis in a foal was completely investigated bacteriologically, clinically, and haematologically.

*Streptococcus pneumoniae* & *Corynebacterium equi* were found to be the causative agents. They were highly resistance to penicillin & erythromycin.

Serum protein showed a high level with hypoalbuminaemia. There was disorders in the blood picture.

### INTRODUCTION

In Animals, bacteria are often responsible for septic arthritis, as, for instance, *Corynebacterium pyogenes* and *Erysipelothrix rhusiopathiae* (WILSON *et al.*, 1975).

The exact cause of the cyclic nature of the rheumatoid like arthritis is not known (SIKES, *et al.*, 1966). (KELLOGREN *et al.*, 1958) drew attention to the association of suppurative arthritis with rheumatoid arthritis.

Joint-ill disease in a foal due to *Streptococcus equi* usually develops during the first weeks of life and acute septicaemic infections leads to sudden death. More protracted infections may show various symptoms of enteritis, pneumonia and lameness associated with infection of the hock, stifle and knee joints (BUXTON, *et al.*, 1977). Magnusson (1923, 1938) described a pyaemic disease of foals in Sweden due to *Corynebacterium equi*. As a rule the disease is characterized by a suppurative bronchopneumonia, and in some cases accompanied by intestinal ulceration.

Most species of corynebacterium are highly sensitive to penicillin, erythromycin and broad-spectrum antibiotics such as the tetracyclenes and chloramphenicol. Although penicillin is highly effective in treatment of all acute infections, penicillin resistance has not yet been observed in *Str. Pyogenes* (WILSON *et al.*, 1975). Yet (BOISSARD *et al.*, 1942) reported that when a corynebacterium associated haemolytic streptococcus infection is present it may be advisable to use pure sulphonilamide.

Tetracycline - resistant pneumococci have been observed in sporadic human infections (HANSMAN *et al.*, 1967). Erythromycin resistance, with or without resistance to lincomycin, (PARKER *et al.*, 1970), and penicillin resistance (HANSMAN *et al.*, 1971) had been reported. As mentioned by (OTAYA *et al.*, 1972), the levels of drug resistances of bacteria are different, depending on the sources of their isolations.

In our cursory review of what has been published in the literature it was noted that polyarthritis in foals was poorly discussed, a matter which promoted the author to carry out comprehensive study of the causal agents of polyarthritis in a 6 weeks old foal.

The antibiotic sensitivity of organisms isolated from the swollen joints individually or in mixed culture was also investigated.

### MATERIAL AND METHODS

In a foal 6 weeks old polyarthritis involved the large joints and migrated from one joint to another when the oldest one was opened. (Photo I).

The fetlock joint was the first one which showed swelling (one week after birth), but the knee joint was the first joint opened and subsequently drained exudative purulent haemorrhagic discharge (at 6 weeks old). This was followed by opening of the elbow joint (8 weeks old). The suppurative arthritis was accompanied with ankylosis in many areas.

No history of cough or navous infection was mentioned. This foal had body temperature of 39°C accompanied

with severe dehydration.

The foal developed arthritis to the extent that assistance had to be given when it attempted to rise. It was ambulatory when one helped to their feet. It died at 9 weeks old.

Jugular blood and discharge from the infected joints were collected & inoculated on nutrient agar, blood agar, cooked meat media and nutrient broth for bacteriological investigation. Sabouraud's dextrose agar was used for mycological examination. Inoculation of chicken embryo with antibiotics treated blood and discharge via the allantoic, chorio-allantoic membrane and the yolk routes were performed for viral investigation.

Samples were taken at weekly intervals, where they were cultured on nutrient agar, blood agar plates, cooked meat media and nutrient broth and incubated at 37°C for 48/hrs. aerobically and anaerobically. On the other hand Sabouraud's dextrose agar plates was incubated for 4 weeks at 37°C. The cultures obtained were identified by microscopical examination as well as for colonial appearance and biochemical characters (MAGNUSSON, 1938 and WILSON *et al.*, 1975).

Pathogenicity of the isolated bacteria for laboratory animals was proofed on mice. Mixed cultures of the respective isolated organisms from the joints in a dose of 0.5 ml. were injected into mice via the subcutaneous and intra-peritoneal routes respectively. In this dose each 0.25 ml. amount of the overnight individual cultures at 37°C were mixed. Three mice for each route of infection were used. A mouse was also injected with the mixed culture simultaneously at the stifle joint and intervannously in a dose of 0.2 ml. for the former and 0.3 ml. for the latter of the same culture. Controls were given sterile nutrient broth.

The blood obtained from the jugular vein was assayed for serum protein by the biuret method (WOOTEN, 1964). The total leucocytic count and differential blood picture was also determined.

Individual and mixed culture of the isolated microorganisms were tested for sensitivity to antibiotics using Bacto sensitivity discs for antibiotics (Difco-6015-32) and multodisks (Oxoid 6873 E) on nutrient agar.

## RESULTS

### I. Bacteriological Investigation:

From the purulent exudative discharge of the foal's joints Corynebacterium equi and Streptococcus Pneumoniae were isolated. The jugular blood was sterile.

The Corynebacterium equi grew freely on ordinary media. It was pleomorphic, gram-positive bacillus, showing metachromatic granules; in pus and surface colonies. Coccoid form were seen. Biochemically it failed to liquefy coagulated serum or gelatin, to lyse blood, to ferment carbohydrates, to hydrolyse arginine. Nitrates were reduced to nitrites. Catalase was formed.

The Str. pneumoniae grew well on blood agar forming raised, circular, colonies, about 1 mm. in diameter with steeply shelving sides, smooth surface and an entire edge. In microscopic examination, they were ovoid or lanceolated cocci, arranged in pairs or short chains. Some very long chains of cocci were also seen.

Biochemically they formed hydrogen peroxide and fermented inulin, lactose, sucrose, raffinose, but not arabinose and manitol.

No virus, fungi or yeast could be detected either from the joints or from the jugular blood.

### II. Animal Inoculation:

In mice fatal bacteraemia and a spreading inflammatory congestion of all internal organs and acute peritonitis occurred within 24 hrs. after interaperitoneal injection. In mice injected intravenously a fatal bacteraemic infection occurred accompanied with a congestion of all internal organs except the lung after 72 hrs. The mice injected subcutaneously showed localized suppuration followed by generalization after 12 days.

### III. Examination of blood:

The blood serum of the affected foal had a high average of total protein of 7.2 gm/100 ml. blood, when compared with the normal control (6.72 gm.). Hypoalbuminemia occurred whose average value was 1.53 gm. compared with that of 2.60 gm. in the controls. (KAO *et al.*, 1954).

## POLYARTHRITIS IN A FOAL

The blood changes in the foal were represented by neutrophilic leukocytosis, where the number of white blood cells varied from 22000 to 30000/C.mm. The differential count demonstrated particularly neutrophilia (80%) with shift to left.

Furthermore, the lymphocytes give a 15%, eosinophils 3% and monocytes 2% where a respective normal of 20-40% 4-10% 3-10% was recorded.

The respective percentages for lymphocytes, eosinophils and monocytes were 15, 3 & 2.

IV. Antibiotic Sensitivity Test:

In spite of the significant sensitivity of Corynebacterium equi to nalidran (30 Mg) and both bacteria (C. equi and Str. pneumoniae) were sensitive to neomycin (30 Mg), Garamycin (10 mg) and chloromycetin (30 mcg) as expressed by the inhibitory zone of growth 0.4 - 0.5 cm in diameter, the Str. pneumoniae showed no sensitivity to nalidran. The individual microorganisms demonstrated moderate sensitivity to neomycin (30 mg) and streptomycin (10 mcg) as expressed by the inhibitory zone of growth (average 0.2 - 0.3 cm in diameter), low sensitivity to tetracyclin (30 mcg), Kanamycin (5-30 mcg) and Oxytetrin (50 mg) as expressed by the inhibitory zone of growth averaging 0.1 - 0.2 cm in diameter and high significant resistance to Septrin (25 mg), Mycostan (100 mg), Erythromycin (2-15 mg), Novobiocin (5-30 mcg) and Penicillin (2-10 units).

The mixed cultures showed the aforementioned result of individual microorganism but the Corynebacterium equi become resistant to nalidran, and grow well with the Str. pneumoniae.

During serial subculture of our Corynebacterium equi isolant we noticed that the resistance to novobiocin is lost discontinuously.

## DISCUSSION

Corynebacterium equi and Str. pneumoniae were associated with acute suppurative polyarthritis in a newly-born foal and led to its death within 9 weeks. A reduction in albumin associated with neutrophilic leukocytosis seen in this case is consistent with reports for rheumatoid like arthritis in swine. (SHETLAR, et al., 1958 and PAPP, et al., 1964). The disease is probably explained on account of neonatal infection with the highly significant resistant strains of C. equi and Str. pneumoniae to penicillin, and other common antibiotics, following prolonged labour after early rupture of the foetal membranes.

The strains of Corynebacterium equi and Str. pneumoniae isolated from the foal showed very highly significant resistance to penicillin, erythromycin, and moderate resistance to tetracyclines. This agrees with reports by other authors (HANSMAN et al., 1967; PARKER et al., 1970; HANSMAN et al., 1971 and WILSON et al., 1975).

Although Str. pneumoniae has significant resistance to Nalidran, but C. equi have'nt, yet the later microorganism acquired this resistance (to nalidran) when associated with the former microorganism in the sensitivity test. This fact is of great significant interest and dependant upon the antibiotic used as well as the associated microorganisms. Indeed, the mechanism of acquiring such resistance are not completely understood.

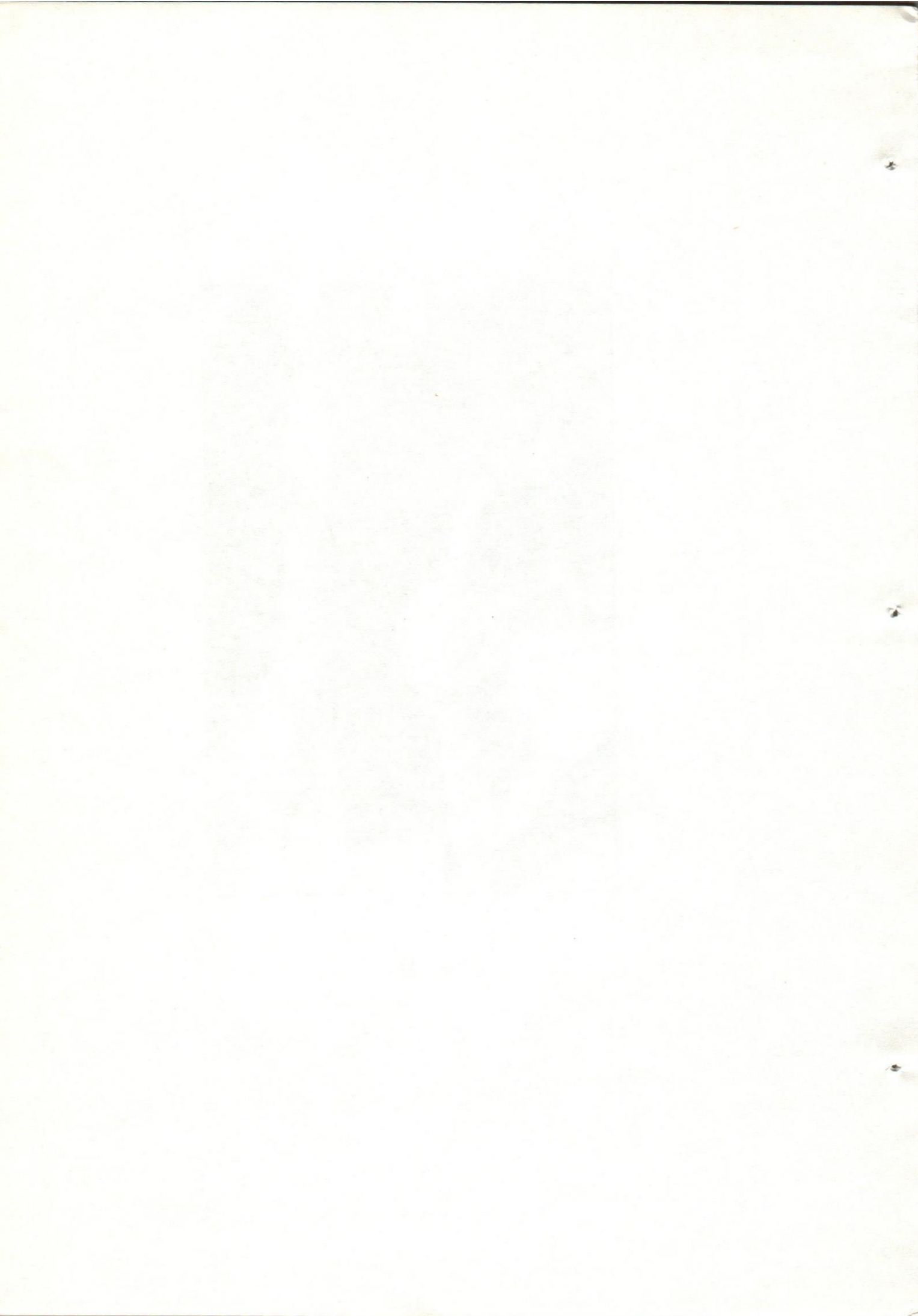
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Fig. (1)





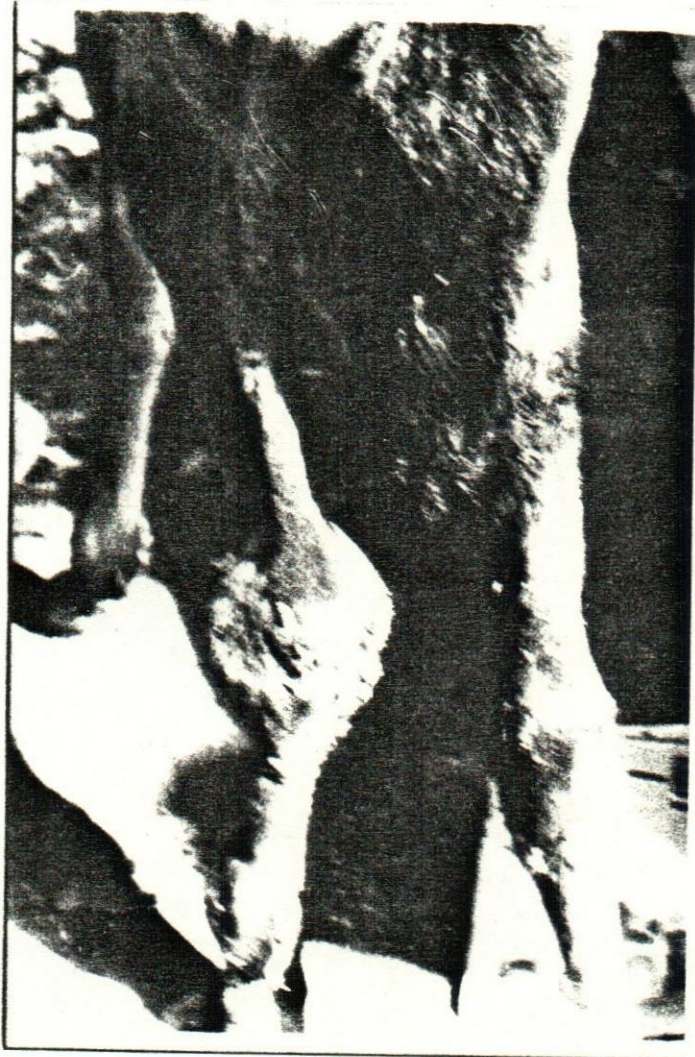


Fig. (2)

