Gas gangrene in the dog

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ABSTRACT

Three cases of gas gangrene in the dog are described. Symptoms followed fracture of a femur in two cases and amputation of a hindlimb in the third. Clostridium welchii was isolated in each case. Two animals recovered following drainage of the lesion together with local and parenteral administration of the appropriate antibiotics.

INTRODUCTION

Gas gangrene is well recognized in domestic animals, particularly in ruminants, horses and pigs, but there have been few reports of the condition in the dog. Inzelm (1944) reviewed the literature and described a case in which Cl. welchii type A was isolated. At that time only ten naturally occurring cases of gas gangrene had been recorded in the dog. The authors have traced only two further reports of the condition since then (Cautley & Baldwin, 1946; Thompson & Basson, 1958). The purpose of this paper is to record three further cases.

Case 1

An Alsatian dog aged 8 months was referred for treatment of a compound fracture of the left femur. The animal was kept on a farm and had sustained the injury when it fell from a Landrover 2 days previously. The owner had noticed a minor wound over the fracture site through which a small fragment of bone had been extruded. On admission the animal was found to be fairly bright and interested in its surroundings, but reluctant to stand. The mucous membranes were pale, and the temperature was 105.8°F. The left hind leg was grossly enlarged; on manipulation, crepitus, emphysematous crackling, and abnormal movement were evident, particularly over the midshaft of the femur. Routine haematological examination revealed a leucocytosis, with an absolute eosinophilia and an absolute lymphopenia. Radiographs of the femur confirmed the presence of an oblique,
slightly comminuted fracture of the distal third of the shaft with pockets of gas in the surrounding soft tissues (Fig. 1). A tentative diagnosis was made of clostridial infection following the compound fracture. The dog was anaesthetized and surgical drainage of the fracture site. A lateral incision directly over the fracture revealed a large quantity of pink, foul-smelling, purulent fluid immediately under the skin surface, extending through the muscles to the fracture. Pus, necrotic muscle and fragments of bone were removed. Samples were taken for bacteriological examination and Clostridium welchii was cultured. The wound was liberally dressed with crystalline penicillin and a drainage tube inserted prior to closure of the wound. During surgery 500 cc of 5% glucose saline were given intravenously. The fracture site was irrigated with a solution of crystalline penicillin in saline.
ce daily for 5 days post-operatively and antibiotic cover with streptomycin 1 penicillin (Streptopen—Glaxo) was given during this period. Four hours after surgery the dog was alert, drank a little water and the temperature had fallen to 103.2°F. The animal rapidly improved, food and water were dily taken on the day after surgery, urine and faeces were passed and the temperature fell to normal within 3 days. On the 5th day a swab was taken from contents of the drainage tube and submitted for culture. The initial culture s sterile, but sub-culture at 3 days revealed the presence of Pseudomonas aeruguosa, s was not thought to be of any significance and was probably a contaminant. On the 6th day the drainage tube was removed and the fracture treated by open luction and fixation with a Burns bone plate. Results of culture at this stage were identical to that on day 5. Seven days after fixation of the fracture the dog was using the affected leg, and sutures were removed. Some fluid was aspirated from the fracture site and was ind to be sterile on culture. The dog was reported sound 6 weeks later and nained so during an 18 month follow-up period.

se 2
An Alsatian bitch aged 13 months sustained a fracture of the left femur when was run over by a tractor. The dog was referred 3 days later for treatment. inical findings were similar to, but not as marked as those in Case 1. The fracture is not compound. Radiographs confirmed the presence of a comminuted fracture the proximal third of the shaft. The fracture was treated by open reduction and fixation with a Burns bone plate. On exposure of the fracture the haematoma had a slightly foetid odour and abs taken for bacteriological examination revealed the presence of Cl. welchii d streptococci. Crystalline penicillin was liberally sprinkled in the wound prior closure. Streptomycin and penicillin (Streptopen—Glaxo) were given intra-vascularly for the next 5 days and antibiotic therapy with oral ampicillin (Pen- tin—Beecham) continued for a further 2 weeks. Post-operatively the dog made a rapid recovery, with first intention wound aling, and the sutures were removed on the 8th day. The dog was using the fected leg at this stage, but was reported to be slightly lame 4 months later.

se 3
An 8-year-old Greyhound dog was referred for investigation of a hard painful elling at the distal end of the left femur. A diagnosis of a bone tumour was made 1 radiographic examination (the tumour was later found to be an osteo- rcoma on histological examination). There was no evidence of metastases on diographs of the chest. The leg was amputated through the proximal third of the femur. Crystalline penicillin was applied to the stump prior to closure, and further antibiotic over given post-operatively with streptomycin and penicillin.
Two hours after surgery the animal was in severe pain, not alleviated by administration of pethidine hydrochloride. 40 mg of Droperidol (Drolep Janssen Pharmaceutical Ltd) and 0.8 mg of Fentanyl (Sublimaze—Janssen Pharmaceutical Ltd) were given intravenously to control the pain but it was necessary to give 9 further doses of 20 mg of Droperidol and 0.8 mg of Fentanyl over the next 5 hours to produce satisfactory analgesia. During this period the temperature rose from 101.5°F. to 106.4°F. and the pulse from 132/minute to 172/minute and the dog panted. The animal died 9 hours post-operatively.

Post-mortem examination revealed severe haemorrhage and slight emphysema in the subcutaneous tissues of the ventral abdomen on the left side, extending from the amputation site. There was extensive degeneration of muscle adjacent to the remainder of the femoral shaft with less severe changes in the subcutaneous musculature. There was passive congestion of the spleen, lungs and liver. The kidneys were swollen and there was moderate toxic hepatic degeneration. The lungs were swollen and there was severe distension of the right ventricle of the heart and some petechial haemorrhage on the endothelium of the aorta.

Microscopic examination of smears from the degenerate muscle showed a moderate number of clostridial organisms and on cultural examination Clostridium welchii was isolated in large numbers. The post-mortem findings were consistent with Clostridium welchii toxæmia.

**DISCUSSION**

Clostridium welchii Type A has been recovered from the livers of apparently healthy dogs (Wolbach & Saiki, 1909; Berg et al., 1927; Schweinburg & Sylvester, 1928; Schatten (1954) presented evidence that C. welchii may pass from the gastrointestinal tract to the liver via the portal vein. C. welchii has also been isolated from the muscles of normal dogs (Pope et al., 1945); however they found the organism to be a frequent contaminant of dog's skin even after surgical preparation and concluded that although C. welchii may be a normal inhabitant of dog muscle it is more likely that it is introduced during operative procedure. They also investigated the bacterial flora of ischaemic canine muscle exudate and were able to recover C. welchii and Staphylococcus albus in varying quantities. Clostridia were found to multiply and produce toxin as soon as the ischaemic conditions were provided satisfactory anaerobic conditions.

However, the dog appears to be fairly resistant to the organism judging by the paucity of recorded cases. Gas gangrene has been produced experimentally (Favata et al., 1944) by intramuscular inoculation with either C. welchii septicum, C. novyi, or C. sordellii alone, or with a mixture of these four organisms plus Staphylococcus aureus. The authors described the pathology of clostridial infection in the dog, and the results of treatment with either sodium suxamethonium, penicillin or polyvalent gas gangrene antitoxin. Most of the treated dogs recovered, and it was found that although the inoculated muscles sh
irked disintegration, oedema, and areas of necrosis before recovery, they were placed not by masses of scar tissue but by muscle.

The recorded clinical cases of gas gangrene in the dog have all resulted from und infection; this was the probable cause in Case 1. The cause of infection in cases 2 and 3 was not obvious; either the damaged muscles provided a suitable medium for clostridial multiplication or the infection was surgically introduced. view of the latter possibility swabs were taken from damaged muscle in ten consecutive fracture cases treated by open reduction; these were all sterile on culture.

It is interesting to note that infection developed in Case 3 despite the local application of crystalline penicillin and parenteral administration of streptomycin and penicillin. Cases 1 and 2 responded rapidly to surgical drainage and antibiotic therapy.

ACKNOWLEDGMENTS

he authors are indebted to Professor A. Messervy for providing the facilities for is work. They wish to thank Dr B. M. Q. Weaver and Mrs A. Waterman for anaesthetizing the dogs, Miss C. Gibbs for radiological interpretation, Mrs E. Longstaff who took the radiographs, and laboratory staff who carried out the bacteriological examinations.

REFERENCES


Résumé. On décrit trois cas de gangrène gazeuse chez le chien. Des symptômes ont suivi une fracture du fémur dans deux cas et une amputation dans le troisième. On a isolé un Clostridium welchii dans chaque cas. Deux animaux se sont rétablis après drainage de la lésion avec à la fois une administration locale et parentérale des antibiotiques appropriés.
