A RETROSPECTIVE STUDY OF HEPATIC ABSCESSES IN GOATS: PATHOLOGICAL AND MICROBIOLOGICAL FINDINGS


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SUMMARY

Post-mortem examination of 658 goats showed that 17 (2.5%) exhibited hepatic abscesses. The following bacteria were isolated: Corynebacterium pseudotuberculosis (58.9%), Escherichia coli (11.8%), Corynebacterium sp. (11.8%), Pasteurella haemolytica (5.9%), Proteus sp. (5.9%) and Staphylococcus aureus (5.9%). Hepatic abscesses occurred more frequently in adult animals. Eleven of the 17 goats (64.7%) were older than 12 months of age. Four goats (23.5%) were 12 months of age and only two (11.8%) were less than 1 year of age. All of the goats with hepatic abscesses were in poor nutritional condition and the abscesses were invariably associated with accompanying pathological disorders at other body sites.

INTRODUCTION

There exists very little information relative to hepatic abscesses in goats. However, hepatic abscesses occur in all species but are most commonly found in cattle, most often associated with secondary conditions such as rumenitis. Most commonly the bacteria Fusobacterium necrophorum, considered part of the normal intestinal flora, are found associated with these abscesses in cattle. Corynebacterium pyogenes, Streptococcus, Staphylococcus, Bacteroides spp. and members of the Enterobacteriaceae often accompany F. necrophorum or are found alone (Kanoe, Imagawa & Mitsuyoshi, 1976; Diskuel, Baldwin & Bromel, 1978; Kanoe, Yuji & Masayuki, 1979). Tadayon, Cheema & Muhammed (1980) studied microorganisms associated with abscesses in sheep and goats in Iran and reported that out of a total of 86 abscesses, six hepatic abscesses were found in sheep and only one in a goat. The bacteria isolated were Escherichia coli, Staphylococcus epidermidis, Pasteurella sp., Streptococcus sp., Corynebacterium sp., Moraxella osloensis and Pseudomonas aeruginosa from the sheep abscesses and Staphylococcus epidermidis from the goat abscess.

The causes of suppurative hepatitis with abscessation in sheep and goats is poorly understood. Jubb, Kennedy & Palmer (1985) reported that in lambs suppurative hepatitis is a consequence of systemic infections such as listeriosis, vibriosis, caseous lymphadenitis, pasteurellosis and umbilical infections caused by Sphaerophorus necrophorus. In goats there is no literature to support this.

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In cattle the majority of hepatic abscesses are incidental findings at necropsy but four clinical syndromes can result from these hepatic abscesses, namely weight loss, acute anaphylactic type shock after rupture of abscesses into the posterior vena cava, thrombosis of the caudal vena cava resulting in chronic diarrhoea and emaciation or epistaxis due to pulmonary thromboembolism (Deem, 1980). A description of these clinical syndromes in the goat has not been recorded in the literature.

The present study was performed to evaluate the incidence of hepatic abscesses in goats and to obtain a clearer picture of the bacteriological and pathological features associated with their occurrences.

MATERIALS AND METHODS

Six hundred and fifty-eight goats of varying ages, sexes and breeds (Anglo-nubian, Bhuj, Caninde, Moxoto, Marota, Repartida and members of the Non-Descript Type) originating from the municipality of Sobral in the State of Ceara, Brazil were necropsied over a period extending from August 1980 to November 1986 at the Brazilian National Goat Research Center.

Goats were categorized as young (day 0 to 12 months of age) or adult (animals over 12 months of age).

Post-mortem examination consisted of macroscopic and histopathological evaluation of tissues and organs using the techniques of Winter (1969) and Jacob (1981) with only minor modifications. Abscesses were classified according to anatomical location within the hepatic lobes, e.g. right, left or quadrate as well as to surface, e.g. visceral or diaphragmatic. Fragments of liver samples were subjected to histopathological evaluation in keeping with routine laboratory techniques (Luna, 1968) and stained with eosin-haematoxylin. Abscessed liver samples as well as other organs exhibiting pathology were processed for bacterial isolation and identification using standard diagnostic techniques (Carter, 1984).

RESULTS AND DISCUSSION

Out of a total of 658 goats necropsied, 17 (2.5%) exhibited hepatic abscesses with a higher incidence in adult (65%) than in young animals (35%). In adult cattle the incidence of hepatic abscesses has been reported to be as high as 5% (Runnels, Monlux & Monlux, 1968; Jubb et al., 1985) and thus our findings seem to be more or less in keeping with this species as far as adult animals are concerned.

In cattle, hepatic abscesses are commonly found in animals on a good plane of nutrition (Smith, Jones & Hunt, 1972; Jubb et al., 1985). This was not found to be the case in this study. All of the goats with hepatic abscesses were in poor nutritional condition and the abscesses were invariably associated with accompanying disorders: bronchopneumonia, gastrointestinal parasitism, visceral caseous lymphadenitis, omphaolophlebitis, multiple ruminal abscesses, peritonitis, pododermatitis, arthritis, suppurative meningoencephalitis and starvation. None of these cases was associated with penetrating foreign bodies from the forestomachs as commonly seen in cattle (Smith et al., 1972).
HEPATIC ABSCESSES IN GOATS

The following bacteria were cultured from these hepatic abscesses: *Corynebacterium pseudotuberculosis* (58·8%), *Corynebacterium* sp. (11·8%), *Escherichia coli* (11·8%), *Pasteurella haemolytica* (5·9%), *Proteus* sp. (5·9%) and *Staphylococcus aureus* (5·9%).

Abscesses caused by *C. pseudotuberculosis* were generally widespread, encompassing one to three hepatic lobes. These abscesses varied in size from 0·2 to 5 cm in diameter and from 5 to 22 in number. Macroscopically they appeared on the visceral or diaphragmatic hepatic faces. The content of these abscesses contained a purulent yellowish green material. Histologically the abscesses had central areas of caseous necrosis surrounded by numerous polymorphonuclear neutrophils and some mononuclear cells.

In eight of the ten cases caused by *C. pseudotuberculosis* abscesses were also found in one or more internal organs. The fact that we were able to isolate *C. pseudotuberculosis* from non-hepatic sites in the same animals is a strong indication that the bacteria were disseminated by lymphatic or haematogenic means but it was difficult if not impossible to establish a primary location of the lesions involved.

Abscesses from which *Corynebacterium* sp., *Pasteurella haemolytica* and *Staphylococcus aureus* were isolated were macroscopically similar to those associated with *C. pseudotuberculosis* but showed a tendency to be focally located in only one of the hepatic lobes on either the visceral or diaphragmatic faces and varied in size from 2 to 3 cm while numbering only 1 to 2. The content of the abscesses was a whitish yellow. Histologically there was a central area of coagulative necrosis with cell infiltrates similar to those seen in abscesses caused by *C. pseudotuberculosis*. In two cases, however, we observed in close proximity to the central core of necrosis clumps of bacteria with areas of mineralization.

In the single case from which *Staphylococcus aureus* was isolated the animal was only 13 days of age and had an umbilical infection. The hepatic abscess was located on the visceral hepatic face in the right liver lobe adjacent to the portal vein and it is most probable that the umbilical cord was the primary portal of entry for the bacteria.

*E. coli* and *Proteus* spp., bacteria which normally inhabit the intestinal tract, appeared to be the cause of hepatic abscesses in three goats. These bacteria could have gained access to the liver in two goats via larvae of intestinal parasites because these were present in large numbers. In the remaining case there was evidence that the source of infection was a bacteraemia associated with diarrhoea.

In most of the cases presented with generalized infection it was difficult to establish a primary localization of the lesion. Runnels et al. (1968) and Jubb et al. (1985), considered fibrinous inflammation with adhesion of the adjacent viscera, thrombophlebitis of the vena cava, endocarditis and bronchopneumonia to be the most important initiating causes of hepatic abscesses in animals. In this study we found more than 50% of the cases to be associated with pathological alterations of the lungs or abscessed lymph nodes or organs. The bacterial agents isolated from the majority of the hepatic abscesses were identical to those found at the other sites of infection in the same animals. This finding is in accordance with those of Runnels et al. (1968) in other domestic species.

This study suggests an age predilection for the occurrence of hepatic abscesses. Eleven of the 17 animals (64·7%) with hepatic abscesses were older than 12 months of age. Four animals (23·5%) were 12 months of age and only two animals (11·8%) were less than 1 month of age. It is interesting to note that nine out of the 11 animals over 12 months of age (82%) had abscesses caused by *C. pseudotuberculosis*. It would appear from these findings that *C. pseudotuberculosis*, the causative agent of caseous lymphadenitis, is a significant cause of hepatic abscesses in adult goats.
The goats necropsied in this study were all debilitated but it is unlikely that the hepatic abscesses alone would have been responsible for their physical condition. The diffuse abscessation of the liver as seen in those animals with hepatic abscesses caused by *C. pseudotuberculosis* could possibly have been a source of the systemic spread with the same organism and thus been indirectly responsible for the death of these animals.

**REFERENCES**


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