

A Pathologic and Microbiologic Study on Bovine Arthritis Associated with *Mycoplasma* spp.

Short Communication

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Summary

3450 bovine from different breeds and ages were clinically examined for the presence of arthritis. 120 cases showed macroscopic evidences of arthritis. *Mycoplasma* spp were isolated from synovial fluid of 21 affected animals. In addition to *Mycoplasma* spp. *Arcanobacterium pyogenes* and *Staphylococcus epidermidis* were isolated from 2 cases. The synovial fluid was markedly increased, straw color, turbid and mostly contained thick confluent fibrin. Thickening of the synovial membrane, villus hyperplasia, loss of the synovial cells, infiltration of leukocytes, hyperemia and edema of synovial membrane and periarticular tissues were seen. Isolation of *Mycoplasma* from the bovine with arthritis indicates the importance of the organism as causative agent of the disease.

Keywords: arthritis, bovine, *Mycoplasma* spp.

Introduction

Mycoplasma is a causative agent of contagious pleuropneumonia (Radostits *et al* 2000, Cetinkaya *et al* 2003), pericarditis (Bigland 1969), mastitis and various reproductive disorders (Jasper *et al* 1966, Radostits *et al* 2000), meningitis (Stipkovits *et al* 1993), keratoconjunctivitis (Radostits *et al* 2000), arthritis and synovitis (Adegboye *et al* 1996, Carlton & McGavin 1995, Jones *et al* 1997) in bovine species. Arthritis caused by *Mycoplasma* primarily reported in the United

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States (Moulton *et al* 1956) and later observed in Australia (Simmons & Johnston 1963). Gain access of the organism to the blood stream and localization in synovial surface resulted in an inflammatory reaction in affected joints and adjacent tissues (Jones *et al* 1997, Radostits *et al* 2000). Mycoplasmal arthritis is more common in young cattle but adults including dairy cows are also susceptible to the disease. Long transportation and mixing of cattle at different ages may predispose factors to the disease production (Gillespie & Timoney 1988, Radostits *et al* 2000). Bovine arthritis can be caused by several of *Mycoplasma* spp. such as *M.bovis*, *M.canadense*, *M.alkalenscens* and *M.bovigenitalium* (Jones *et al* 1997, Radostits *et al* 2000). *M.bovis* has been the most common isolate from bovine arthritis (Adegboye *et al* 1996, Kondraki *et al* 1992, Stipkovits *et al* 1993). Review of literature indicates the importance of *Mycoplasma* organisms as causative agents of bovine arthritis and synovitis.

In the present study *Mycoplasma* organism as causative agent of naturally occurring bovine arthritis was isolated and identified.

Materials and Methods

Animals. Approximately 3450 bovine (beef cattle, steer, milking cows and cattle) from different breeds including Holstein Frisian, cross breed and native, mostly male and aged 12-48 months were clinically examined for the presence of arthritis and then were slaughtered at abattoirs located around the cities of Tehran and Karaj.

Pathology. Fixed synovial tissues in 10% formalin were processed in an Autotechnicon tissue processor (Autotechnicon, USA), and embedded in paraffin wax. 5 μ thick tissue sections were cut from the paraffin blocks and stained routinely with Harris Haematoxylin and Eosin method for histopathological examination.

Microbiology. Synovial fluid of the affected joints was taken aseptically for microbiological examination. Samples were cultures on PPLO broth and PPLO agar

(Difco) for *Mycoplasma* and, on blood agar and MacConkey agar for other bacteria according to the standard procedures (Carter 1975, Gillespie & Timoney 1988). In the case of positive cultures, the morphology and purity of the colonies were considered. Identification of *Mycoplasma* isolate was based on typical growth on *Mycoplasma* agar sterol requiring and Dienes staining method. The species of the isolates were not determined.

Results and Discussion

120 out of 3450 bovine showed clinical signs of lameness, had one or more swollen joints. The synovial fluid was markedly increased, straw color, transparent or turbid and contained thick confluent fibrin. The synovial tissues were thickened, reddened, edematous, and in severe case was covered with purulent exudates. In some cases, the articular surfaces were eroded. Microscopically, hyperemia, edema villus hyperplasia, necrosis and desquamation of synovial cells and infiltration of mononuclear cells chiefly lymphocytes were evident (Figure 1).

Figure 1. *Inflamed bovine synovial tissue from which Mycoplasma spp. isolated. Tissue edema, infiltration of lymphocytes and loss of synovial cells are present (H&E×400)*

In cases from which *Mycoplasma* spp. and other bacteria were isolated, inflammatory exudates were purulent in nature, tissue changes were more severe

(Figure 2) and synovial fluid was turbid and purulent. The pathological changes found in the arthritic joints were in accordance with changes described by others (Hewicker-Trautwein *et al* 2002, Hjerpe & Knight 1972, Huches *et al* 1966, Jones *et al* 1997, Kondraki *et al* 1992, Singh *et al* 1971). Microbiological examination of synovial fluid of the affected joints resulted in isolation of *Mycoplasma* spp., *Arcanobacterium pyogenes* and *Staphylococcus epidermidis* (Figure 3 and Table 1).

Figure 2. A tissue section of synovium from joint with severe arthritis-synovitis. Destruction of synovial tissue and infiltration of neutrophils are seen. Both *Mycoplasma* spp. and *Arcannobacterium pyogenes* were isolated from the lesion (H&E×400)

Figure 3. Colonies of *Mycoplasma* spp. on PPLO agar isolated from bovine arthritis

Table 1. General characteristics of the bovine arthritis caused by *Mycoplasma* spp. and other bacteria

Case no.	Sex	Age (months)	Breed	Sampling site
1	M	16	H.F	Right tarsus
2	M	24	H.F	Left tarsus
3	M	16	N	Right tarsus
4 ^a	M	18	H.F	Right tarsus
5	M	12	H.F	Right tarsus
6	M	13	N	Right tarsus
7	M	16	H.F	Left tarsus
8	M	16	N	Right tarsus
9	M	18	CB	Right tarsus
10 ^b	M	24	N	Left tarsus
11	M	14	H.F	Left tarsus
12	M	12	H.F	Right tarsus
13	M	16	H.F	Right tarsus
14	M	18	N	Right tarsus
15	M	16	N	Right tarsus
16	M	14	H.F	Right tarsus
17	M	17	N	Left tarsus
18	M	28	CB	Right tarsus
19	M	16	CB	Right tarsus
20	F	36	H.F	Right and Left
21	M	18	H.F	Left tarsus
22	F	24	H.F	Right tarsus
23	F	48	H.F	Multiple joints

H.F:Holstein-Frisian, C.B:crossed breed, N:native, a:*Mycoplasma* spp. and *Arcanobacterium pyogenes*, b:*Mycoplasma* spp. and *Staphylococcus epidermidis*

As shown in table 1, from 23 cases out of 120 bovine with arthritis, *Mycoplasma* spp. were isolated. In two cases, in addition to *Mycoplasma*, *Arcanobacterium pyogenes* and *Staphylococcus epidermidis* were also isolated. Other causative agents may be responsible for arthritis in rest the animals, but it has to be stressed that, failure to isolate *Mycoplasma* from the affected joints, does not preclude a diagnosis

of *Mycoplasma* arthritis, since the organisms may have been eliminated from joints (Radostits et al 2000).

Animals of all ages were susceptible to mycoplasmal arthritis, but calves, steers and young cattle are more susceptible to the infection (Adegboye et al 1996, Kondraki et al 1992, Radostits et al 2000). In our study the affected animals were mostly steer or young cattle ranging 12-24 months old. From 23 cases, three Holstein-Frisian culled cows from the flocks showed the disease. The milking cows with or without *Mycoplasma* mastitis could also condemn by arthritis (Radostits et al 2000). In the present study most animals aged between 12-48 months and they were mostly young cattle and steer. The affected milking cows and calves rarely culled from the flocks since they were treated for arthritis.

It could be concluded that *Mycoplasma* organisms may have an important role in bovine arthritis in Iran and need to be taken into consideration in therapeutic strategies for arthritic diseases in cattle.

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References

- Adegboye, D.S., Halbur, P.G., Nutsch, R.G., Kadlec, R.G. and Rosenbusch, R.F. (1996). *Mycoplasma* bovis-associated pneumonia and arthritis complicated with pyogranulomatous tenosynovitis in calves. *Journal of the American Veterinary Medical Association* 209: 647-649.
- Bigland, C.H. (1969). *Mycoplasma* infections with emphasis on the control of *M.gallisepticum*. *Canadian Veterinary Journal* 10: 91-97.
- Carter, G.R. (1975). *Diagnostic Procedures in Veterinary Microbiology*. Pp: 362, Charles C. Thomas, Spring field, IL

- Carlton, W.W., McGavin, M.D. (1995) *Thomson's Special Veterinary Pathology* (2nd edn), Pp: 454-541. Mosby, St. Louis.
- Cetinkaya, B., Ongor, H., Karahan, M. Kalender, H., Lorenzon, S. and Thiaucourt, F. (2003). Abattoir-based survey of contagious bovine pleuropneumonia in cattle in Turkey. *The Veterinary Record*. March 1:254-258.
- Gillespie, J.H., Timoney, J.F. (1988). *Hagan and Brunner's Infectious Diseases of Domestic Animals*. (8th edn), Pp:295-298. Comstoc, USA.
- Hewicker-Trautwein, M., Feldmann, M., Kehler, W., Schmidt, R., Thiede, S., Seeliger, F., Wohlsein, P., Ball, H.J., Buchenau, I., Spergser, J. and Rosengarten, R. (2002). Outbreak of pneumonia and arthritis in beef calves associated with *Mycoplasma bovis* and *Mycoplasma californicum*. *The Veterinary Record* 7:699-705.
- Hjerpe, C.A., Knight, H.D. (1972). Polyarthritis and synovitis associated with *Mycoplasma bovimastitis* in feedlot cattle. *Journal of the American Veterinary Medical Association*. 160:1414-1417.
- Huches, K.L., Edwards, M.J., Harteley, W.J. and Murphy, S. (1966). Polyarthritis in calves caused by *Mycoplasma* spp. *The Veterinary Record*. 78:276-281.
- Jasper, D.E., Jain, N.C. and Brazil, L.H. (1966). Clinical and laboratory observations on bovine mastitis due to *Mycoplasma*. *Journal of the American Veterinary Medical Association*. 145:1017-1029.
- Jones, T.C., Hunt, R.D., and King, N.W. (1997). *Veterinary Pathology*. (6th edn), Pp:372-376, Williams and Wilkins, A, Waverly. Company. Baltimore.
- Kondraki, M., Pilaszek, J. and Cakale, S. (1992). Polyarthritis in beef cattle due to *Mycoplasma bovis*. *Medycyna-Weterynaryjna*. 48:359-360.
- Moulton, J.E., Boidin, A.G. and Rhode, E.A. (1956). A pathogenic pleuropneumonia like organism from a calf. *Journal of the American Veterinary Medical Association* 129:364-367.

- Radostits, O.M., Gay, C.C., Blood, D.C. and Hinchliff, K.W. (2000). *Veterinary Medicine* (7th edn). Pp:106-107, 604, 625, 639, 893. WB. Saunders, London.
- Simmons, G.C., Johnston, L.A.Y. (1963). Arthritis in calves caused by *Mycoplasma* sp. *Australian Veterinary Journal* 39:11-14.
- Singh, U.M., Doig P.A. and Ruhnke H.L. (1971). Mycoplasma arthritis in calves. *Canadian Veterinary Journal* 12:183-185.
- Stipkovits, L., Rady, M. and Glavits, R. (1993). Mycoplasmal arthritis and meningitis in calves. *Acta Veterinaria Hungarica* 41:73-88.

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