

ASSOCIATION BETWEEN RETAINED PLACENTA AND IMPAIRED NEUTROPHIL FUNCTION IN DAIRY COWS

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Introduction

No single factor explains why cows develop retained placentas (RP). Gunnink (Vet. Quarterly, 1984) proposed the theory that the fetal placenta had to be recognized as foreign by the maternal immune system and "rejected" for normal expulsion of the placenta to occur. We examined the relationship between RP and neutrophil function in periparturient dairy cows.

Materials and Methods

The ability of the neutrophils to recognize fetal tissue was assessed by a chemotaxis assay (CHEM). In this assay fetal placenta homogenate from a normally expelled placenta is placed in the bottom of a Boyden chamber. A porous polycarbonate membrane is placed over the homogenate and whole blood is placed in the top portion of the chamber. The polycarbonate membrane allows placental chemoattractants to pass into the upper chamber and attract neutrophils to bind to the membrane. After 30 min incubation the number of neutrophils attached to the polycarbonate membrane were counted under the microscope. Typically in cows that responded well to the placental chemoattractants around 400 neutrophils were counted in 5 microscope fields. Neutrophil killing abilities were estimated by determining myeloperoxidase activity in a protein iodination assay (IOD) and these results are expressed as a % of lab. controls. Blood samples were obtained periodically prior to calving and for the first day after calving from 39 cows (7 cows developed RP) on one farm and 103 cows (13 cows developed RP) at another.

Results

Neutrophil chemotaxis toward placental homogenate and IOD index was consistently lower in RP cows than in non-RP cows at calving ($p < .05$). This difference also was observed prior to calving. In addition a radioimmunoassay for interleukin-8 (IL-8), a cytokine critical to neutrophil chemotaxis and activation, was performed. IL-8 concentration at calving in plasma of No RP cows (125 ± 14 pg/ml) was significantly higher than in RP cows (61 ± 15 pg/ml). It remained higher throughout the first 2 weeks of lactation as well. Fetal cotyledons were collected within 4 h of calving in a subset of 3 RP cows and 14 No RP cows for histologic evaluation. Binucleate giant cells, thought to produce placental lactogen, are reported to be present in "retained" placenta and absent in placenta that are expelled normally. Binucleate giant cells comprised 14.7% of the total epithelial cells in retained placenta and 14.2% of epithelial cells in placenta expelled normally.

Conclusion

We are unable to confirm previous reports suggesting retention of binucleate giant cells is a cause of RP. These data support the theory that the presence of a functional neutrophil is critical to normal expulsion of the fetal membranes.