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A Case Report: Hydrops Allantois in the bovine

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Hydrops Allantois in the Bovine

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INTRODUCTION

Hydrops allantois condition is the abnormal enlargement of the allantoic sac, while hydrops amnii should be restricted to fetal dropsy and enlargement of the amnionic sac. Excessive amounts of the respective fluids are responsible for these conditions. Hydrops allantois is the most common condition, but occasionally a simultaneous hydrops allantois and hydrops amnii occur in the same animal. Hydrops occurs most often in bovine, both beef and dairy, but hydrops amnii has been reported in the goat.[3]

Age of the cow is of little importance in the incidence of hydrops allantois. Hydrops has occurred in first-calf heifers and in four-year-old cows.[2] It has been reported that hydrops has occurred in the same cow at a later pregnancy.[10] In another case,[7] the cow was bred three months after she had hydrops and was diagnosed pregnant three months later.

The mortality rate of the calves is quite high in cases reported. Even though a cesarotomy is performed, the calves usually die within five minutes of removal from the uterus, but one calf lived for two days.[7] The most common lesion in these calves is cystic kidneys, although this is observed in less than half of the cases.[7]

If the cesarean section isn't performed, the death of the dam is likely, so surgical treatment is used and usually the dam is saved. Since the placental membranes are commonly retained, removal and treatment of metritis is also important.

The diagnosis of hydrops allantois may be difficult, especially if seen in the middle third of pregnancy. To differentiate the condition from multiple foeti, skillful rectal palpation is necessary. The main sign observed is the abdominal distension. The cows otherwise retain their appetites and behave normally. Once the cows become sick, they become depressed, have an increased temperature, and an increased heart rate; surgical treatment is indicated as soon as possible. If this condition is suspected, close observation is required; for in one case[2] the cow was due to calve in 14 days and she appeared bright and alert. Her abdomen had become quite distended in the past month. However, she was found dead ten days later. Ausculation of the abdomen to detect fluid sounds is helpful in making a diagnosis. Possibly laboratory tests on the fetal fluids may be of significant value.

HISTORY

A two-year-old Holstein cow was admitted to the Stange Memorial Clinic on December 7, 1966. She had been sick for about one month and had lost much weight in the past two weeks. On January 4, 1967, this cow was due to freshen. Her abdomen was quite enlarged.

Two weeks previous to admittance this cow was on a timber pasture and had a fever. The local veterinarian treated her.

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CLINICAL OBSERVATIONS

When admitted, her estimated weight was 1100 pounds. Her behavior was normal and appetite was good. The heart rate was 96/minute and the respiratory rate was 24/minute. Her temperature was 102.1 degrees. On ausculation of the abdomen, fluid sounds were evident on both the left and right side.

Rectal palpation results were: left kidney was normal, rumen normal, and she was approximately eight months pregnant. The foetus was alive and very active. There was excess fluid in the uterus.

On the following day, the uterus was more enlarged than previously.

On December 10 the greatest abdominal circumference was 105 inches and it was 108½ inches on the 16th of this month. Her appetite and temperature remained normal during this time and drugs were not used.

Since her abdomen was gradually enlarging, the calf was alive, and she was close to the expected calving date, a cesarotomy was performed on the 19th of December. The surgical site was the right paralumbar fossa and an inverted L-block anesthetized the area. Much fluid was in the abdominal cavity and the uterus was greatly distended. A live bull calf was delivered. He did not act normally. He behaved like a dummy, for his swallowing reflex was poor and he wouldn't nurse for several days. The day after the surgery the cow was depressed and her milk wasn't "let down". She appeared thin and in very poor condition.

By the 23rd of December this cow had a poor appetite and a temperature of 102.2 degrees. She appeared dull and weak. The placenta was retained. Antibiotics, an estrogen preparation, and posterior pituitary extract were administered. Antibiotics were continued the following day and she had regained her appetite at this time.

The calf had a diarrhea and was treated with electrolytes, amino acids, and antibiotics for two days. On the second day of treatment the calf was very depressed and dehydrated. When he died he was four days old.

On post mortem the only gross pathology was a peritonitis characterized by excessive peritoneal fluid and large clumps of fibrin dispersed in the fluid. *A Pasteurella sp.* was isolated from the peritoneal fluid.

The cow still had retained fetal membranes on December 26th. Manual removal was attempted, but they were still firmly adhered. An antibacterial drug was placed in the uterus. On December 28th the placenta was manually removed. At this time her appetite was depressed, but it gradually improved and was normal by the first of the year. On January fourth the uterus was quite large and a discharge persisted. On the following day the uterus was massaged per rectum and a reddish purulent exudate was expressed externally. The previous treatment was repeated. The cow was discharged from the clinic on January sixth.

CASE NUMBER TWO

A four-year-old Hereford cow with a greatly distended abdomen was admitted to the clinic in the middle of December. She had calved normally the spring of 1966. She was six months pregnant. An embryotomy was performed on December

TABLE I—HEMOGRAM FOR THE 1ST CASE

	12/9/66	12/10/66	12/20/66	1/3/67
Hemoglobin (gm/100cc)	9.22	9.96	8.86	9.22
Hematocrit (P.C.V.)	30	32	27.5	32
RBC's (million/cu.mm.)		8,170,000		
WBC's (thous./cu.mm)	4900	5900	5700	8600
Eosinophils	300 (9%)	1000 (15%)	60 (1%)	700 (9%)
Band neutrophils	50 (1%)	400 (6%)	60 (1%)	600 (7%)
Segmented neutrophils	1700 (26%)	2000 (32%)	3200 (57%)	1500 (17%)
Monocytes	200 (4%)	800 (10%)	0 ()	500 (5%)
Lymphocytes	2700 (59%)	1700 (37%)	2300 (41%)	5300 (62%)

TABLE II—URINALYSIS FOR THE 1ST CASE

	12/9/66
Specific gravity	1.025
pH	9
Albumin	Trace
Sugar	Negative
Acetone	Negative
Blood	Negative
Sediment	2–4 WBC's/high power field with an occasional epithelial cell.

19th. The fetal membranes were edematous. She became depressed and was sacrificed on January fifth. Gross pathology revealed a portion of the uterus had herniated into the body wall and was adhered.

Laboratory data on these two cows and on a control cow is presented in Tables I, II, III, IV, and V. The control cow was due to calve near the first of the year.

CLINICAL LABORATORY DATA

Blood, urine, and fetal fluids were examined. The fetal fluid probably represented the allantoic fluid since this compartment was greatly enlarged. There is always the possibility of entering the amnion when doing an abdominal puncture.

DISCUSSION

The cause of hydrops is unknown, but several factors appear to be involved. A deficiency of placentomes and uterine compensation for this fault by accessory placentation is mentioned in the literature.[5]

In early fetal life, before the mesonephros is developed, the allantoic fluid resembles plasma.[11] Later, when the metanephric kidney is functioning, creatinine accumulates in the allantoic fluid. However, the fetal urine in the bladder isn't identical with the allantoic fluid.[1]

Electric potentials across the allantoic fluid and maternal blood in normal pregnant cows indicated a distribution of sodium maintained against its electrochemical gradient, a higher concentration of sodium in the maternal blood than in the allantoic fluid.[9] This is suggestive of an active transport mechanism from the allantoic fluid to maternal blood.[9] The placental membranes appear to be quite impermeable to the potassium ion, and the chloride ion is passively transported from the allantois to the maternal blood.[9]

The preponderance of either normal amnionic or allantoic fluid varies with the term of pregnancy. Fluids rapidly increase between 40 and 65 days, at three and one-half to four months, and again from six and one-half to seven and one-half months.[2] The first increase is from allantoic fluid, the second due to the increase in amnionic fluid, and the latter is from allantoic fluid.[2] The first third of pregnancy and the last third is when the allantoic fluid exceeds the amnionic fluid.[2]

Hydrops amnii or foetal ansacarca is initially seen at three and one-half months to four months.[4] Hydrops allantois is seen later in the gestation period, six to seven months.[2] So it appears that the pathological conditions occur at a time when foetal

TABLE III—BLOOD CHEMISTRY

	First Case			Control	Case two	
	12/13/66	12/20/66	1/3/66	12/11/66	12/19/66	1/3/66
Calcium (mg.%)	9.0	10.65	12.75		9.72	10.75
Phosphorus (mg%)	9.5	8.9	6.0		11.1	5.83
Magnesium (mg%)	3.1	2.85	2.75		1.95	1.5
Sodium (meq./L)		141.4	147.0		141.4	138.0
Potassium (meq./L)		4.86	7.42		5.12	6.5
Creatinine (mg%)	1.27	3.0	0.8	1.36	5.6	1.4
SGOT (units)	56	85	84		330	168
SGPT (units)		50			50	

TABLE IV—FOETAL FLUID ANALYSIS

	First case 12/10/66	Case two 12/19/66	Control 12/10/66
Specific gravity	1.008	—	1.019
ph	7.0	8.0	6.0
Albumin	100mg%	—	100mg%
Sugar	Negative	Negative	Small amount
Acetone	Negative	Negative	Negative
Occult Blood	Small amount	—	Moderate
Total Protein	Very low (less than 1gm/100ml)	—	2.6gm/100ml
Sediment	RBC's, WBC's	None	RBC's, WBC's, and Triple Phosphate crystals

fluids normally increase, but the control mechanism is faulty.

The allantoic fluid, both in composition and amount depends on fetal kidney function and transport across the allantochorion with hydroallantois due to at least three factors.[8] One factor is a tubular dysfunction of the fetal kidney; reabsorption of ions may be minimal. A decreased active sodium transport would result in an accumulation of sodium, chloride, and water in the allantoic cavity. Increased permeability of the placental membranes would result in an equilibrium between blood plasma and allantoic fluid. Then the electrolyte concentrations of the foetal fluids of a hydrops case would be similar to maternal levels. In normal allantoic fluid, sodium concentration is lower than its concentration in hydrops, while potassium levels are opposite of the sodium levels. Sodium and potassium have an inverse relationship. As sodium increases, potassium decreases in body fluids. If sodium decreases, then potassium has a higher concentration. Creatinine, like potassium, has a higher concentration in normal allantois than in hydrops allantois.[8]

From Table V the values reported for the first case closely approximate previous findings.[8] The sodium had a higher concentration, while potassium and creatinine levels were lower in the hydrops allantois case. But ten days later, sodium concentration dropped while potassium increased; this may be indictative of increased active transport possibly from a sodium deficiency of the dam. It has been reported that in some cases of hydrops, the dams had a craving for salt.[7] In case two the sodium level was very low; this could be from the dilution of sodium since this cow was greatly distended. It may be from an increased active transport of sodium, but it is interesting to note that the potassium value was twice the value of the control. This is again indicative of the relationship between sodium and potassium.

Regarding blood chemistry values, the calcium values were normal, but on the low end, while phosphorus levels were quite high in both cases. But in the second case, phosphorus exceeded the calcium concentration. Magnesium levels were low in the second case. Creatinine blood levels in the dam appear to increase as pregnancy progresses in the two cases. This may be from the allantoic fluid or it may originate from tissues other than the uterus.

TABLE V—FETAL FLUID CHEMISTRY

	First Case 12/10	12/20	Case two 12/17	Control 12/10
Sodium (MEq./L)	139.2	113.1	65.3	134.8
Potassium (MEq.L)	6.02	9.73	25.3	11.14
Creatinine (mg%)	42.2	48	8.0	64.2
Calcium (mg%)			13.7	
Phoisphorus (mg%)			11.1	
Magnesium (mg%)			1.95	

Serum glutamic oxaloacetic transaminase (SGOT) was elevated in both cases, but greater in the second case. This would likely be from the adhesions of the uterus seen on post mortem, since skeletal muscle has quite a high concentration of SGOT compared to smooth muscle. The blood creatinine was also elevated in the second case. The normal creatinine level is 1.39mg% $\pm$ .18(6).

SUMMARY

With hydrops allantois cases one must consider the value of the cow and the probable value of the calf. If the calf has excellent bloodlines, and is near term, daily observation of the dam is required to save both the dam and possibly the calf. But the health of the dam is diminished by waiting too long. So, if the health of the dam is of utmost importance then a cesarean section should be performed as soon as the diagnosis is made. There is a possibility that both the dam and foetus will survive, but this is quite low at the present. There are no simple laboratory tests for diagnosis, so observation and examination of the dam is important.*

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Book Review

The authors of this text have assumed the revision of the widely used second edition of Miller's *Meat Hygiene*. It is only natural that a hard-bound edition of this subject suffers from the intrinsic inability to stay current with all the changes in legislation. Yet, the foundations of meat inspection and sanitation expressed within make this a valuable book for the student and valuable for the practicing veterinarian who may now be facing food inspection supervision as a result of new local or state laws.

This revision includes a new chapter on *humane slaughter* and expands the chapters on *ante-mortem* and *post-mortem inspections*. There are major revisions in the topics trichinosis and food-borne illness.

The book is well documented with examples, tables, and high quality photographs. The chapter on *post mortem inspection* is especially enriched by photographs of both gross and histopathological lesions.

The appendix will serve to provide useful guidelines for the meat inspector with respect to plant sanitation, inspection legislation and food wholesomeness.

—Robert E. Froehlich, D.V.M.

(*Meat Hygiene*, 3rd. edition, April, 1966, by Paul Brandley, George Migaki, and Kenneth E. Taylor, 789 pages, illustrated, Lea and Febiger, 600 S. Washington Square, Philadelphia, Pa. Price: $15.00)