

Left Abomasal Displacement in Calves

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Summary

Left abomasal displacement was diagnosed in 5 calves among the in-patients of the II Medizinische Tierklinik of the University of Munich during the course of one year. The calves were between 8 and 14 weeks of age, 4 were males, 4 were German Fleckvieh and one a German Fleckvieh x German Black and White.

Reduced appetite, poor weight gain, recurrent tympany and episodes of diarrhoea were mentioned in the clinical histories. Clinical examination revealed an upward arching of the left abdominal ribs and distension of the left flank. As in adults the most important diagnostic clue in calves is the metallic tinkle and splashing sounds which are heard on auscultation of the left abdominal wall during precussion and ballottement. In these 5 cases, however, ruminal contractions were not evident simultaneously with the abomasal sounds on auscultation and these sounds could not therefore be considered as pathognomonic.

Spontaneous recovery occurred in one calf. Surgical reposition of the abomasum via laparotomy was performed in 2 calves and 2 calves were destroyed as a result of chronic sequelae (adhesions and abscesses following perforation of abomasal ulcers). Left abomasal displacement seems to occur more frequently in young cattle than it is diagnosed and should be considered in the differential diagnosis of recurrent tympany.

Since the first description of left abomasal displacement in cattle in the literature of the fifties, the frequency of this disease has so increased that today it is a familiar concept worldwide. Abomasal displacement usually is seen in cows more than three years of age around the time of parturition. As reported in earlier communications (Jones, 1952; Dirksen, 1962), it can also occur in males as well as in young animals. However such cases have been considered a rarity. It is thus surprising that, among the patients seen at the II. Medizinische Tierklinik of the University of Munich in the course of one year, five left abomasal displacements in calves were observed. These cases and consideration of the interesting differential diagnosis are discussed in this paper.

Observations

Since left abomasal displacement in calves was noted as an exception, each case truly merited individual description and discussion. On the other hand, a summarized, ordered presentation, with pertinent data and results, gives a better overview of these cases. Table 1 presents some of the important data about the history of each patient.

Clinical Signs and Diagnosis

With the exception of the acutely ill animal (No. 1) the patients were in moderate to poor nutritional condition. Attitudes ranged from quiet to sluggish, and while 3 were in a near normal physiological state, two others exhibited slightly arched backs and taut abdominal walls. Their appetite was very clearly reduced, but they still consumed some milk and solid food. Body temperatures remained within normal range. The examination of the hair coat, the dermis and hypodermis as well as the lymph nodes revealed no unusual findings. The heart rate of two of the animals was found to be 56 beats per minute. The bradycardia in such cases arises from increased vagus tone which was confirmed in one of the two cases by the atropine test. Irritation of the vagus presumably is caused by the displaced abomasum. Two cases suffered respiratory problems, a rhinitis and a light bronchopneumonia. The respiratory system was undisturbed in the other three animals. With regard to the findings of the digestive system, the question arises whether left abomasal displacement in calves presents the same signs as in adult cattle and therefore can be diagnosed in the same way. Some important findings of the digestive system are presented in table 2.

The first difference was that in the calves the left paralumbar fossa was either distended with tympany or even bulging outwards. With abomasal displacement in an adult, because of the displacement of the rumen from the left abdominal wall, this area is often sunken. In patient 2 the distension, which disappeared after the gas was released by tube, was certainly caused by gas in the rumen. In calf No. 1 the distension was caused by gas filled abomasum, and this is presumed to be true in the other cases. Furthermore, in all these calves when carefully observed from behind, an asymmetry of the abdomen with an outward arching of the left abdominal ribs was found (Fig. 1).

The most important diagnostic sign in calves, as in adults, is the metallic tinkle (ping poing) and the splashing sounds heard by auscultation of the left abdominal wall with precussion and ballottement. In the five patients, the rumen sounds were either rare or weak, or not audible, so that the ruminal sounds were not evident simultaneously with the abomasal sounds. Therefore these could not be considered pathognomonic. Since similar tinkling and splashing sounds (with few exceptions) can occur in the rumen when almost empty and containing little fluids, lateral and ventral palpation of the rumen can be of diagnostic help. If solid contents can be palpated as was possible with three of the patients, the rumen as site of origin of the tinkle and splashing sounds can

Table 1: Significant data on the history of 5 cases of LDA in calves

No.	Age Weeks	Sex	Breed	History
1	8	M	SFV x GBW	Tympany 3 ds, diarrhea
2	12	M	SFV	Sick for 2 weeks: reduced appetite; recurring tympany for 1 week
3	14	M	SFV	Sick for 1 week; reduced appetite
4	12	F	SFV	Slow weight gain, periodic diarrhea
5	9	M	SFV	Reduced appetite for two weeks

SFV = Simmental Fleckvieh
GBW = German Black-White

Table 2: Special findings of the digestive system in 5 cases of LDA in calves

No.	Rumen	Abomasum	Faeces
1	Tympany , liquid contents (?) movements ↓; rumen fluid: grey, pH 6.5	Metallic and splashing sounds inducible at auscultation on the left abdominal wall	Yellow, liquid, acidulous odour, pH 6.5
2	Moderate tympany , firm contents ventrally, 1 contraction/ 2 min	Not specially examined	Brownish, pasty, foul-smelling, uncompletely digested
3	Contents firm and clumped together, 1 contr./ 2 min, rum. fl.: pH 7.2, MB red. 8 min	Metallic and splashing sounds inducible at auscultation on the left abdominal wall	Yellow-greenish, odour inconspicuous, well digested
4	Slight tympany , no firm contents palpable	as above	Grey-greenish, semi-liquid, foul-smelling
5	Slight tympany , no movements, firm contents ventrally; rum. fl.: brownish, pH 7.0, MB red. 6 min	as above Puncture through 11th intercostal space: grey fluid, pH < 4.0	Yellow, pulpy, slightly foul-smelling

**Figure 1.** Calf, No. 5, with left abomasal displacement.

be largely excluded. Also helpful, as in case 5, is the diagnostic puncture and comparison of the pH value of the aspirated material and the withdrawn rumen contents. At present, the number of tests of the rumen fluids and fecal material is still insufficient in number to systematically compare their values with values for healthy animals of the same age on similar rations. It is worthy of note that the feces of these calves were not seen to have the dark green color observed in adults with this disease. The milky grey-green color of the withdrawn rumen contents, seen in two cases, could have been caused by abomasal reflux of milk.

Unfortunately chloride content and buffer capacity of the rumen fluids were not determined before surgical replacement; after treatment the values (calf 2) were within normal range (based on normal findings in adult cattle). The clinical urine examination (Nos. 2,4,5) of albumin, glucose, ketone bodies, nitrite, hemoglobin, bilirubin, urobilinogen (Combur-8-Test/Boehringer) showed no conspicuous deviations; the pH was slightly acid (5-7). There were no peculiarities detected in the red and white blood counts with the exception of patient No. 4, which presented a distinct anemia. The serum-electrolyte concentrations, determined in two patients (Nos. 1, 5), were within the physiological norm.

Treatment and Results

As table 3 states, a spontaneous repositioning of the abomasum occurred in calf No. 3 without any treatment. These kinds of spontaneous recovery have also been observed in adult cattle. Laparotomies in standing position were performed on the remaining three patients, two of the cases in the right flank and one in the left flank. The reason for the left flank approach was to find out the cause of the conglomeration of the rumen contents and the co-existing tympany.

With a positive diagnosis, a right-sided laparotomy and omentopexy may be preferred. Whether a pyloromyotomy (after deMoor, performed on adult cattle with left abomasal displacement) may also be of advantage in young cattle with a dislocation on the left (case No. 4), is still open to question. Besides, one must take into consideration that young animals

Fig. 2: LDA in a 10 weeks old calf: Necropsy findings on the left side of the abdomen.

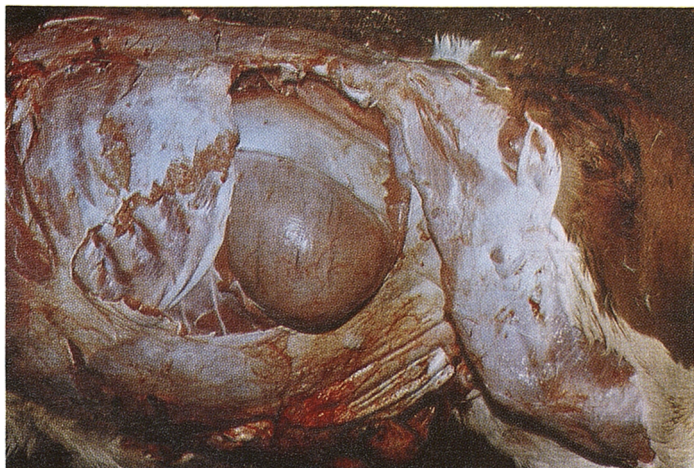


Fig. 2a: The displaced abomasum is bulging beyond the left costal arch after removal of the abdominal wall in the left flank.

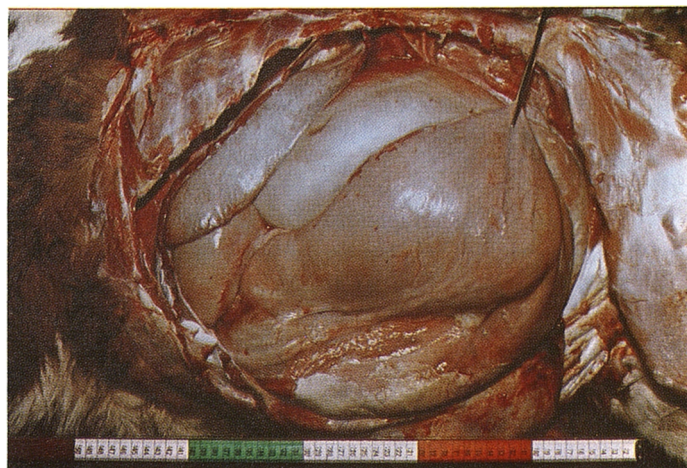


Fig. 2b: Left abdominal wall completely removed. Fundic and pyloric portion of the displaced abomasum can be seen, the pyloric portion covered by fibrinous exudate. In the background: reticulum and rumen and cranio-dorsally the spleen.

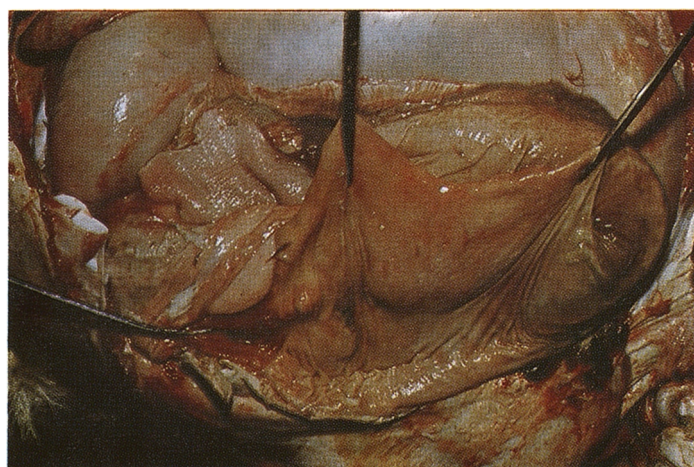


Fig. 2c: After section of the pyloric portion a perforating ulcer becomes visible.

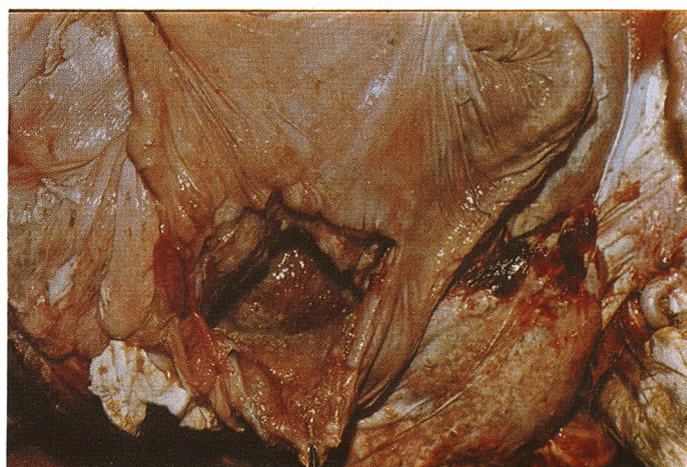


Fig. 2d: Further section reveals an abscess between the displaced abomasum and the ventral sac of the rumen.

have the tendency to lie down during an operation. Therefore one must try to "sling" the calf or be prepared to continue operating on a prostrate animal. However, because of the possibility of better orientation in the abdominal cavity, at least during the first phase of the operation, it may be advisable to operate in a standing position. The aftercare consisted of feeding a mixed ration, transfusion of rumen fluid with propionate added, injection of vitamins and trace

element preparation as well as infection prophylaxis with appropriate antibiotics. It has yet to be tested, whether when diagnosis is certain, the abomasum can be repositioned by the rolling method. With young animals one may accomplish such manipulations with relative ease. The proportional sizes of the organs in the abdominal cavity are, however, much different than in an adult (see Discussion) so that complications (torsion) may occur.

Table 3: Treatment, course and results of 5 cases of LDA in calves

No.	Treatment and course	Results
1	Buff's trocar falsely inserted into the abomasum; after transient improvement emaciation	Euthanasia; abomasum with trocar in it adhered to the left abdominal wall
2	Laparotomy in the left flank: puncture and reposition of the abomasum; temporary rumen fistula	Discharged after 18 days: recovery
3	Abomasal sounds disappeared after hospitalization	Discharged after spontaneous recovery
4	Laparotomy in the right flank: puncture and reposition of the abomasum, pyloromyotomy, omentopexy	Discharged after 9 days: recovery
5	Laparotomy in the right flank: fibrous adhesions between the left ruminal wall and abomasum; greater omentum caudally adhered to the left abdominal wall	Euthanasia: abscess between the dorsal sac of the rumen and the abomasum after ulcer-perforation

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Discussion

Our first case of left abomasal displacement in a calf was, surprisingly, discovered on the dissection table. It could be assumed that this was a great rarity and therefore the misdiagnosis was both understandable and excusable. Nevertheless this case gave the impetus to systematically consider the diagnosis of abomasal displacement in calves with similar manifestations. When within a six months period, four additional cases were discovered in the in-patient clinic, the question was raised, whether this illness in young cattle is actually as rare as was once believed. The observations led to the conclusion that with the appearance of a disturbed appetite, decreased growth and emaciation as well as recurrent tympany in calves, left abomasal displacement should be considered in making a diagnosis. The occurrence of the disease does not seem to depend on the sex of the animal or whether it is a fattening or breeding animal.

One should consider that the abomasum is first able to displace when the animal takes in sufficient roughage and has reached a certain age. With newborn calves, the abomasum is recognized as the largest abdominal organ and thus takes up a great part of the volume of the abdominal cavity (Figs. 3, 4). Lagerlof (1930) presented the abomasum as an elongated, pear-shaped sac, located on the abdominal floor from the diaphragm to a plane through the sixth lumbar vertebrae, almost to the pelvis (Illus. 3). Immediately after birth, the abomasum begins to diminish in size relative to the other abdominal organs. How long it takes to complete this change seems essentially to depend on the kind and abundance of the food ingested. Lagerlof (1930), who presented the most exact description of the abdominal cavity thus far, made similar observations (1 animal).

His presentation was based mainly on calves placed on roughage early. Under these conditions the abomasum of a 4 week old calf is nearly twice as large as the rumen (abomasum : rumen = 1 : 0,5); at 8 weeks both stomachs are almost equally large (1 : 1); and at 3 months the rumen is double the size of the abomasum (abomasum : rumen = 0,5 : 1); in adult cattle 1 : 9.

This reversal of the proportions in size is connected with a remarkable change of form and position of the abomasum (Illus. 3, 4). These changes concern mainly the caudal part of the abomasum whose size in relation to the fundus is

Fig. 3: Position and size of the abomasum at various ages. Ventral view (Lagerlöff 1930).

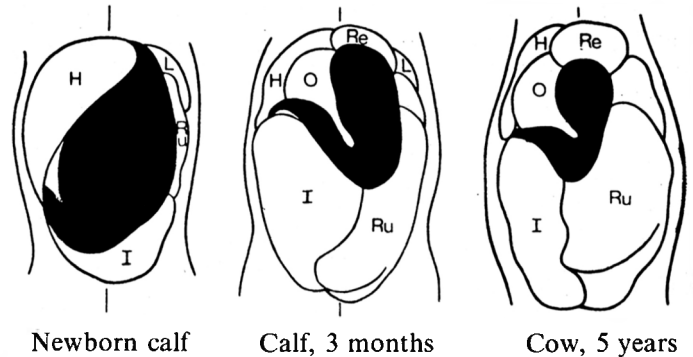
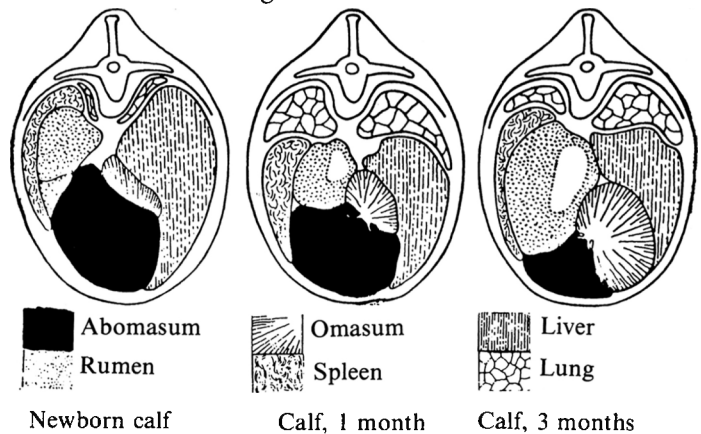


Fig. 4: Position and size of the abomasum at different ages.



substantially reduced and thus the abomasum displaces cranially. Therefore the abomasum, at four weeks, reaches only to the level of the third lumbar vertebrae and at four months to the first or second lumbar vertebrae. A simultaneously occurring lateral displacement, as reconstructed by Lagerlof, continues from birth to the third month during which the abomasum lies more and more to the left of the median, and in the following months (presumably through the pressure of the rumen which is increasingly filled with roughage) slides again somewhat to the right.

At the present time it has not been determined which factors with regard to the size, weight and type of ingesta in the individual parts of the stomach must be present in order for abomasal displacement to occur in the young animal. By mechanical rules the displacement should only occur if the size and weight of the rumen exceeds that of the abomasum. According to earlier data the possibility of a left abomasal displacement should be considered after a calf is eight weeks old. This conjecture would, as table No. 1 shows, be confirmed through practical observation. The development of the rumen, as already mentioned, depends on the time when roughage is offered, and the amount eaten. Thus these influential factors differ from animal to animal and area to area, and should be of concern when considering the development of each compartment of the stomach in the individual animal.

With regard to etiology and pathogenesis of left abomasal displacement in calves, there is still much that is not clear. Nevertheless, we are fairly sure that in calves as in adult cattle, increasing gas accumulation in the fundus draws the organ upward between the rumen and abdominal wall. The question of etiology thus concerns the origin of the accumulation of gas. Possibly the answer lies, even in these calves, as in the older animals, in dilation detrimental to the tone and motility of the abomasum. The young animal maintained in part on a milk substitute could also be swallowing an increased

amount of air. This possibility, however, could be ruled out in the two cases, where gas, released from the abomasum was inflammable, as this demonstrated presence of methane, a fermentation product of the rumen. A detailed discussion of production and accumulation of gas in the abomasum has been published earlier (Dirksen, 1962, 1967).

The ultimate cause of left abomasal displacement in calves probably lies in feeding influences and is connected with the change to roughage in early weaning. Left abomasal displacement thus presents a new and interesting aspect in the area of digestive disturbances in calves.

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References

1. Dirksen, G. (1962): Die Erweiterung, Verlagerung und Drehung des Labmagens beim Rind. Parey, Berlin-Hamburg.
2. Dirksen, G. (1967): Gegenwärtiger Stand der Diagnostik, Therapie und Prophylaxe der Dislocatio abomasi sinistra des Rindes. Dtsch. Tierärztl. Wschr. 74, 625-633.
3. Dirksen, G. (1977): Nicht infektiionsbedingte Magen-Darmkrankheiten des Kalbes und des Jungrindes. Prakt. Tierarzt 58, Sonderheft Collegium Veterinarium 1976, 86-92.
4. Jones, E.W. (1952): Abomasum displacement in cattle. Cornell Vet. 42, 53-55.
5. Lagerlöf, N. (1930): Untersuchungen über die Topographie der Bauchorgane beim Rind. G. Fischer, Jena.
6. Rosenberger, G. und G. Dirksen (1957): Über die Labmagenverlagerung des Rindes. Dtsch. Tierärztl. Wschr. 64, 2-7.