

General Session II

The Art and Science of Making an Effective Diagnosis

Mike Brunner, *Presiding*

The Art of Physical Diagnosis

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By way of introduction and definition of this subject, it would seem appropriate to borrow quotations from the classical text on the subject, *Clinical Diagnostics* as written by B. Malkmus and revised by TH. Opperman¹ 52 years ago:

“The only safe foundation for the treatment of animal disease is a correct diagnosis of the malady. In therapeutics as well as in forensic veterinary medicine everything depends on a correct recognition of the disease. This is the most difficult part of veterinary medicine, and methodical training alone will enable the student to develop into a practicing veterinarian who can do justice to his demand....Thus the art of making a correct diagnosis is not only the foundation upon which practical veterinary medicine rests, but it is pre-eminently that which elevated medicine to the dignity of a science.”

And later on in the text, we find a specific definition: “Physical diagnosis may be defined as the art of determining internal changes of the body by utilizing available facilities, and properly interpreting the findings.”

While newer laboratory and mechanical methods for establishing or confirming certain diagnoses are important and often essential, there is no substitute for the careful use of physical diagnostic procedures. Superfluous or unnecessary use of the laboratory not only lessens the acuity of the clinician’s powers of clinical observation—it also leads to delays in diagnosis and, consequently, costly delays in the institution of effective therapy and control measures. Moreover, too great a reliance on the laboratory or on mechanical aids often leads to inexcusable failure to establish a correct diagnosis. The purpose of this article is to review some of the methods of physical diagnosis and to emphasize their importance and utilization with examples and applications in the field.

A method of examination obviously is required lest points of particular significance in each individual case be

overlooked. The importance of this point, well-illustrated in Malkmus’ textbook, was instilled in me by the late Dr. W. J. Gibbons,* my professor and instructor in clinical diagnosis as a student at Cornell.

Examination

I. Anamnesis (history)

The better we know the owner, herdsman, or groom, the more accurate we can evaluate the history. With experience, we learn to recognize the individual who either is prone to prevaricate, or to cover up or exaggerate particular points, and to discount the value of the history he gives accordingly. On the other hand, inexperienced clinicians, or those to whom these traits in a particular individual are an unknown quantity, may be led astray by the history.

From the history we should learn how many animals in the herd are affected, or what the owner believes may have caused the condition. For example, if a door had been left open or a window had been blown out during the night two days before signs of a severe pneumonia appear, this information from the owner, which obviously cannot be determined independently at the time of the examination, can reasonably account for a single case of pneumonia that suddenly appears in an otherwise healthy herd.

II. Determining the Present State

A. *Inspection* – Inspection may be defined as the observation of the patient in its normal habitat and environment. The old adage that one may not be able to see the woods for the trees applies, and I am a firm believer that inspection should be done from a reasonable distance before

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the patient is approached too closely. The senses of hearing, sight, and smell are used. We can obtain such important diagnostic information as the undisturbed attitude of the patient while lying or standing, obvious swellings, and the expression (eyes, carriage of the ears, and so forth). Many experienced clinicians are able to recognize, with relative accuracy, the characteristic odors of acetonemia, metritis, white scours in calves, and many others. Abnormal respirations can be recognized, and frequently indicate whether an upper or lower respiratory involvement is present in a particular case.

B. *Palpation* – The most important use of palpation is in the rectal examination of the mature bovine or equine. Careful rectal examination often reveals important information that otherwise would be undetectable or overlooked; for example, many pathologic conditions of the uterus, fat necrosis, emboli, enlarged sublumbar lymph glands, fractures in the pelvic and lumbosacral region, abscesses, tumors, and many others.

C. *Percussion* – That percussion is rapidly becoming a lost art with many practitioners is due, in my opinion, to the fact that the stethoscope makes possible the detection of many conditions that previously were determined by percussion alone. Examples are consolidation of the lower third of the lung, activity of the rumen and consistency of its contents, and enlargement of the heart.

D. *Auscultation* – I believe that the stethoscope or phonedoscope are among the most valuable aids to our physical senses for the examination of certain organs. The particular type of instrument is less important than the fact that one should be accustomed to his own instrument and, by repeated use, develop skill in the interpretation of sounds that can be heard over various parts of the body.

E. *X-ray* – Radiography has become an important part of field examination, particularly in lamenesses of the horse. With the availability of the portable X-ray machines, their use has become almost a must in many types of practice.

III. General Examination

A. *Signalment* – Signalment simply means noting the breed, age, weight, size, color, and function of the animal, information that, of course, is obtained automatically as one views the patient. It should be listed in detail simply for the purpose of making case reports or maintaining adequate records.

B. *Habitus* – Habitus is the general or external aspect or characteristic appearance of the patient. It includes such things as attitude, condition, conformation, and temperament.

C. *Skin* – The skin is observed for condition, pliability, the condition of the hair coat, sweating, external parasitism and various forms of dermatitis and other lesions.

D. *Temperature* – I do not attach the significance to the thermometer that many clinicians do. Normal variations are wide, and the influence of such factors as environmental

temperature, relative humidity, exercise, excitement, and anxiety on the body temperature are, and correctly should be classified as physiological rather than pathological. The temperature reading also can be extremely misleading when a temperature in the normal range is not interpreted in the light of other facts. For example, the temperature of a mature bovine simultaneously affected with postparturient paresis and septic metritis or mastitis may be in the normal range—the hypocalcemia tending toward a hypothermia and the infections towards a fever. When a normal temperature is found after a long persistent fever, one should always consider whether this may not indicate that the hypothermia preceding death is developing.

E. *The Eye* – The eye should be examined for any variation in brightness and clearness. The normal transparent bulbar conjunctiva, a thin membrane spread across the usually white background of the sclera, is an excellent index to the status of the entire vascular system. Various degrees of anemia, congestion, injection, and icterus can be judged by an examination of the conjunctiva. From the position of the eye (normal or sunken) the state of dehydration or debility may be judged quite accurately.

IV. Special Examination

A. *Circulatory Apparatus* – The circulatory apparatus should be examined to determine the character and rate of the pulse, the softness or distension of veins, and normal or abnormal heart sounds.

B. *Respiratory Apparatus* – The breath should be examined for normal or abnormal odor and to determine whether the air currents from the nostrils are approximately equal. The various methods of inspection, palpation, and auscultation should be applied to the other parts of the respiratory system, including the nasal cavities and adjacent sinuses, the submaxillary lymph glands, the pharynx, larynx, trachea, bronchi, and lungs. Particularly in the horse, pressure applied with the hand to the upper tracheal rings to force the animal to cough provides information of diagnostic significance.

C. *Digestive Apparatus* – The examination and consideration of the state of the digestive apparatus may be outlined as follows:

1. Appetite and method of prehending food and drink
2. Oral cavity
3. Pharynx and esophagus
4. Rumination
5. Presence of nausea or vomiting
6. The abdomen (external appearance, gastrointestinal motility and sounds, rectal examination)
7. Intestinal evacuations

Intestinal evacuation frequently are correctly considered as mirror images of the digestive tract of the animal. Consistency of the feces in comparison with other animals in the same barn and on the same diet may indicate a great deal concerning the presence of any inflammation or intestinal

infections. Any influence of the diet should, of course, be taken into account, such as the difference in consistency of the feces when an animal is on an artificial dry diet as opposed to a lush pasture. In horses, the consistency of the feces frequently serves to indicate faulty mastication which, in turn, should lead to a careful examination of the mouth and teeth.

D. *Urinary Apparatus* – Gross examination of the urine reveals a great deal about concentration and other characteristics. The presence of hemoglobinuria or hematuria may provide significant information for specific interpretation. For example, in New York state, almost the only cause of a true hematuria in the bovine is pyelonephritis, usually caused by *Corynebacterium renale* and its accompanying cystitis. In this case, the urine is actually bloody, the degree depending upon the amount of frank hemorrhage. On the other hand, in hemoglobinuria, which indicates red cell destruction in other parts of the body, such as the spleen and liver, the color may range from a light lavender to a deep beet or port wine shade, and suggests such conditions as leptospirosis. It is best to obtain the sample in a glass vial and examine it by good daylight.

E. *Nervous System* – Obviously the nervous system is the least accessible for physical examination, and diagnosis of nervous disorders must be made largely through interpretation of observable signs, such as motor functions, balance, and actions.

V. Specific Examination

Examples of specific diagnostic examinations and tests include the following:

A. Locomotion (especially important in lameness of horses)

B. Diagnostic inoculations, e.g. tuberculin test and mallein test

C. Lymph glands

D. Blood collection of sample for later laboratory examination.

Interpretation (Diagnosis)

After the animal has been examined systematically and meticulously as outlined, combinations of signs or “key signs” that may have special significance should be evaluated. Frequently a logical tentative diagnosis can be reached with the aid of certain suggestive symptoms as illustrated by the following examples from experience in bovine practice.

Protruding tongue – Many times I have observed that when the approach of a stranger (the veterinarian) causes a cow that is recently fresh to open her mouth, protrude her tongue, and shake her head and ears; this is one of the earliest symptoms suggestive of the onset of milk fever. Naturally, there are exceptions to this, inasmuch as some cows show this nervous habit at all times—a fact that should be brought out in taking the history.

Rabies – A slight knuckling of the rear fetlocks when being walked is frequently the earliest sign of rabies in the bovine. This, combined with a beginning flaccidity of the tail, frequently has suggested rabies strongly enough that unnecessary exposure of the veterinarian or owner has been averted.

Chills – Though there are occasional exceptions, a report by the owner that a mature cow is trembling, with hair standing on end, frequently is the earliest indication of septic mastitis.

Torsion of the uterus – Early colicky symptoms accompanied by a wrinkling of the perineal region around the vulva and rectum suggest, on casual examination, a torsion of the uterus.

Cow standing with both hind legs back – In 99% of such cases, this symptom accompanies either a bilateral soreness of the heels, or the condition known as “stretches,” or spastic syndrome.

Cow standing with hind leg abducted, or held slightly away from the normal stance – In most cases, this indicates either a sore lateral digit or a hip lameness.

Differential Diagnosis

For differential diagnosis, further examinations and consideration of various signs of specific significance sometimes are necessary, as indicated in the following examples:

Displaced Abomasum versus acetonemia –

1. Feces: in acetonemia, usually abnormally firm; in displaced abomasum usually soft or putty-like

2. Rothera modification of the Ross test: in acetonemia, usually strongly positive, in displaced abomasum, usually moderately positive

3. Rumen: in acetonemia, usually firmer or more doughy than normal; in displaced abomasum, frequently and typically difficult to palpate with the fingers in the customary place (left paralumbar fossa), obviously because of the medial displacement of the rumen caused by the displacement of the abomasum between the left wall of the rumen and the left abdominal wall

4. The final differential diagnosis usually can be established by simultaneous percussion and auscultation on a line drawn from the center of the left paralumbar fossa in a slightly downward curve to the point of the elbow. If the abomasum is in normal position, rumenal sounds may be heard the entire length of this distance. If, on the other hand, the abomasum is in this location, typical “tinkling” sound may be heard.

Abomasal ulcer versus traumatic gastritis – The signs produced by a small, perforating ulcer may be identical to those in traumatic gastritis except for the exact spot of soreness as determined by careful deep palpation from without. In the typical case of traumatic gastritis, this spot is found in the xiphoid region, left of the median line; in abomasal ulcer, the pain is most acute at the right of the midline and 6 to 18” posterior to the xiphoid region.

Blood in the feces – Three fairly common conditions in which blood may be observed in the feces are coccidiosis, intussusception, and ulcers of the abomasum. In coccidiosis, the blood is usually relatively fresh in appearance and normal in color because its source is the posterior part of the intestine. In intussusception, the blood usually is scanty, black, or tar-colored and is also accompanied by a thick mucilaginous material. In ulcer of the abomasum, the blood will be very dark, but typically is fairly well intermingled with fecal material.

Nervous acetoneemia, versus lead poisoning, versus grass tetany, versus atypical milk fever – When nervousness is the outstanding sign, the history must be primarily considered; including such information as the stage of lactation, the production of the animal, the diet, and whether a possible source of lead is available. Other signs to be considered include the reaction to the Rothera test of the urine, the characteristic bellow present in many cases of lead poisoning and the subnormal temperature in hypocalcemia.

Bloat – When a mature ruminant is bloated, the cause is usually a digestive upset. However, two other possible causes should not be overlooked: (1) choke, and (2) tetanus. Again, the history may play an important part; if the animal has been eating tubers or apples, the possibility of choke should be investigated and either proved or eliminated. In tetanus, which is admittedly rare in the bovine, it is nevertheless embarrassing to miss a case. Tetanus can be identified easily by the characteristic gait and the fact that the animal's jaws cannot be forced open at the time of a sharp stimulus, such as a slap across the face.

Mastitis – While laboratory diagnosis for the positive identification of the mastitis-producing organisms in a given case is highly desirable, practitioners should become familiar with clinical characteristics that strongly suggest a specific infectious agent at the time of the initial treatment—for example, the flakes and clots characteristic of mastitis due to *Streptococcus agalactiae*; the yellow, uniform pus characteristic of hemolytic staphylococcus; the clear, serum-like secretion in coliform mastitis, and the very firm enlarged quarter typically seen in *Pseudomonas* and yeast infections.

Bovine Pulmonary Adenomatosis versus pneumonia in hemorrhagic septicemia – Present knowledge leaves much to be desired with regard to positive differential symptoms between pneumonia of hemorrhagic septicemia and the group of conditions variously known as pulmonary adenomatosis, proliferative pneumonia, bronchiolitis obliterans, and virus pneumonia. But, generally speaking, two clinical characteristics are suggestive: (1) Lung sounds in proliferative pneumonia or bronchiolitis obliterans or virus pneumonia usually are limited to an increased vesicular murmur, whereas rales are varied and widespread in the shipping fever type of bronchopneumonia. (2) The newer types of pneumonia do not respond to antibiotic or sulfonamide therapy, whereas the hemorrhagic septicemia type of pneumonia usually responds rather dramatically.

Abortions – Laboratory tests are indispensable for positive

determination of the specific cause of many abortions, particularly those due to such infectious causes as brucellosis or vibriosis, or to the febrile reaction in leptospirosis, and other infections. On the other hand, abortions caused by molds frequently can be rather conclusively recognized by the mold-like plaques formed on the placenta or the skin of the fetus. In abortions that some authorities believe may be caused by subclinical nitrate poisoning, the history regarding the diet of the individual frequently is helpful, both in diagnosis and in the prevention of further abortions in the herd by means of dietary changes.

Conclusion

An attempt has been made to discuss the relative importance of laboratory diagnostic methods and physical diagnostic procedures in proper perspective. Both, in their place, are essential. But physical examination has been emphasized because, while it is basic and indispensable for accurate diagnosis, it has become a neglected art with many clinicians.

There are two pitfalls in diagnostic work that, unless the clinician is sufficiently alert, lead to inexcusable failures in diagnosis:

1. The patients must be re-examined completely whenever the response to treatment based on initial diagnosis is unexpectedly slow or unfavorable. An example is the persistent "downer" cow that initially appeared to have a typical case of milk fever; failure to rise after treatment for postparturient hypocalcemia may be due to any of a number of other causes that can be determined only by means of a thorough re-examination. Such possibilities include fractures of the limbs or pelvis, coxo-femoral luxation or subluxation, ruptured gastrocnemius tendon, injuries to muscles or nerves, and many others.
2. Too strong a preconception of the diagnosis may lead to failure to make a complete examination needed to establish the correct diagnosis. A few examples include: displacement of the abomasum, missed because time is not taken for careful auscultation over the left rib cage; septic metritis, not looked for because the owner reported that the cow cleaned quick and completely; and the early case of mastitis, missed because the farmer reported a negative strip cup examination.

While failure to make the fullest practical use of the diagnostic laboratory, whenever this is indicated, may be considered a dereliction of duty, the practitioner needs to resist a strong current tendency to downgrade clinical in favor of "scientific" methods of diagnosis. It takes rare courage nowadays to present a case report that is not backed up by findings of the clinical pathology laboratory. Yet common sense would tell us that evidence obtained by the systematic use of our physical senses, coupled with the ability of the human mind to correlate such evidence with other facts and previous experience has not lost its value.

Among the simplest of possible examples is the well-

known fact that milk fever typically is accompanied by a hypocalcemia. It is not necessary, practical, or economically sound to determine blood calcium levels routinely in such cases, though the clinician would be well advised to do so if he has any idea that the particular case may prove to be of some special interest. Unfortunately, this usually is not evident in the beginning.

In its work, which includes gross and microscopic necropsy studies, the clinical pathology laboratory serves a number of important functions. For the clinician, the more important ones include confirmation of a clinical diagnosis or uncovering of a mistake in diagnosis, and the demonstration of evidence that cannot be determined through physical examination, such as inaccessible internal lesions, histopathologic changes, and the presence of specific infectious agents.

Those concerned should always bear in mind that the evidence obtained by the clinical pathologist represents only a part of the total picture and often is inconclusive or negative (that is, no abnormalities of significance are found).

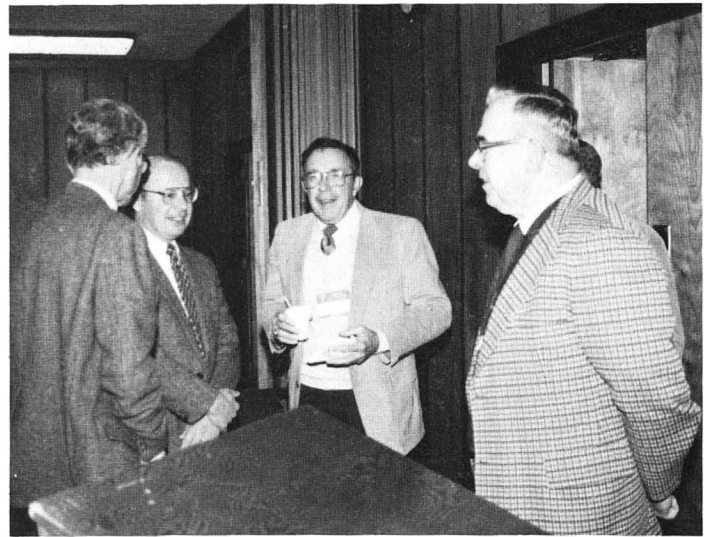
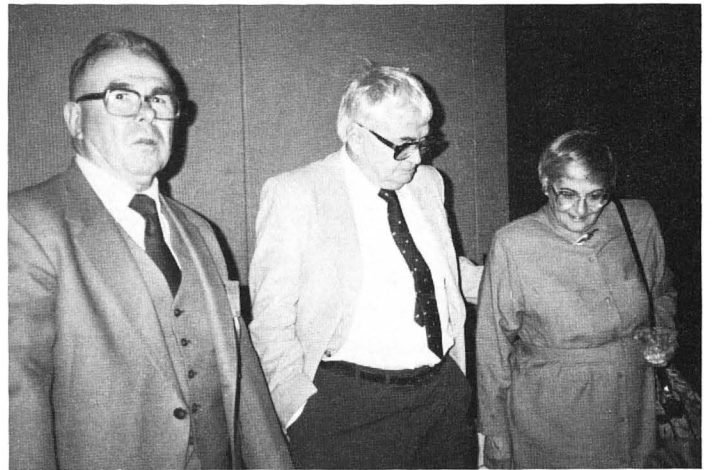
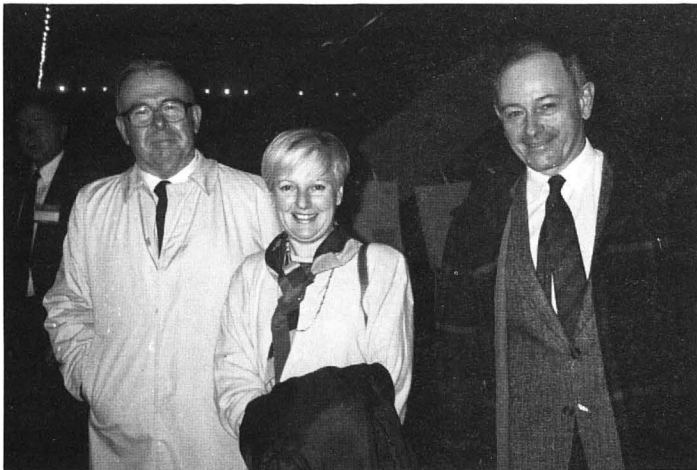
Essentially normal findings on post mortem examination of course are significant and may be entirely consistent with the suspected cause of death as, for example, acute indigestion, acute enterotoxemia, some cases of nutritional deficiency, electric shock, and epilepsy.

Thus, as clinical pathologists will freely admit, a competent clinician who knows the history, the patient, the herd, and the management factors involved is in the best position to correlate the clinical pathologist's findings with other evidence and evaluate their significance as far as the case at hand is concerned.

Finally, the experienced and competent clinician can feel confident on occasion that an animal he treats recovers only because a correct diagnosis was made and effective treatment given, often with no necessity for laboratory examinations.

Bibliography

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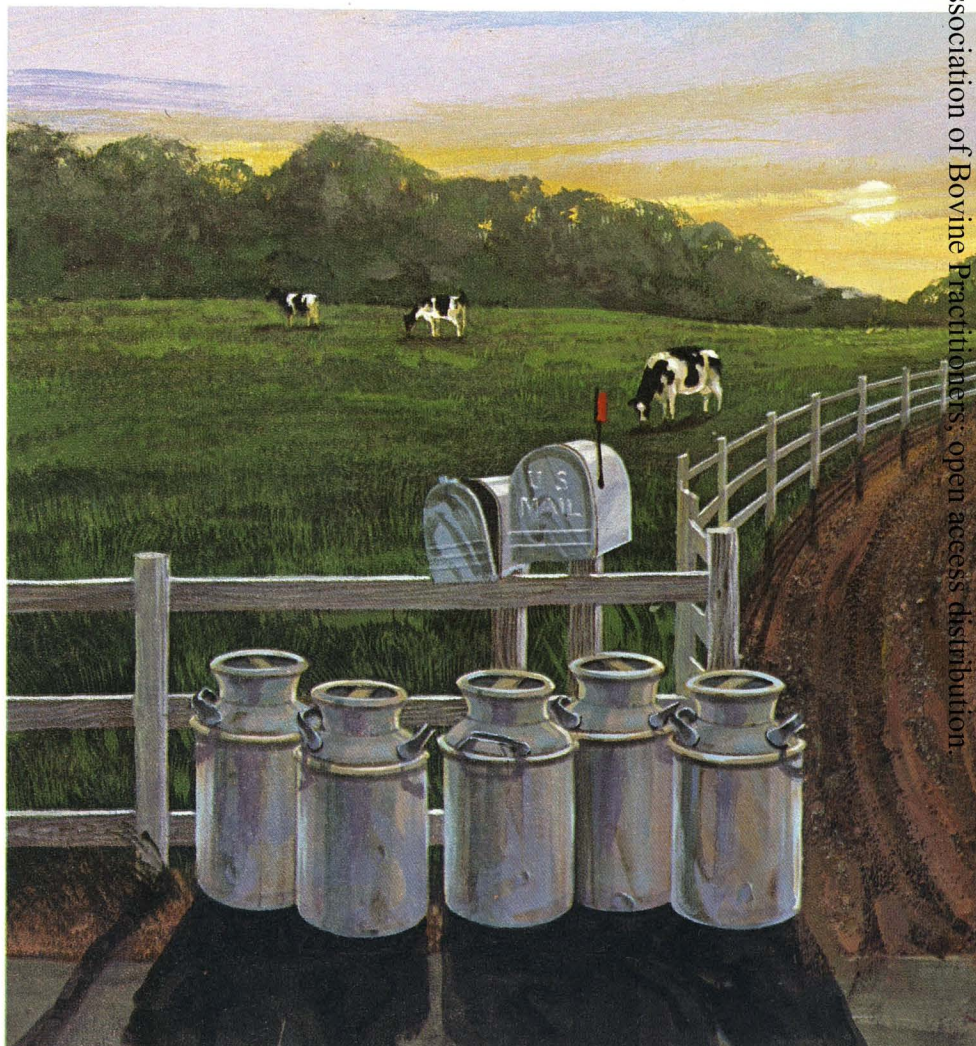
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