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The Significance of the X-Ray in Veterinary Medicine

RUSSELL BEAMER

IN THE years between the announce­ment of their discovery by Wilhelm Konrad Roentgen, on December 28, 1895, and the present, x-rays have contributed greatly in advancing medical knowledge. In internal medicine, surgery and dentistry these rays have been of very great value in the practice of veterinary medicine as a diagnostic aid but until recently their importance and value in the practice of veterinary medicine and surgery have been little appreciated. Trained veterinary scientists, unfortunately, have made no concerted effort to apply x-rays in the study and diagnosis of animal pathology. It is the firm conviction, however, of those who have engaged in this work that its importance and value will increase as more experience is gained. The veterinary profession of recent years has become x-ray conscious and rightfully so, as there is an important, necessary, useful field for its use in veterinary medicine. However, the use of the x-ray is not entirely without its hazards.

Hazards

There are two “hazards” commonly associated with the operation of x-ray equipment, one being electrical shock, and the other the damage done as the result of cumulative effects of x-ray on the body tissues. The first danger may occur due to the necessity for high voltage at the x-ray tube for the production of x-radia­tion.

The other hazard—a very important one, especially to the small animal practitioner—arises from the absorption of x-radiation by the operator, patient, or anyone else in its field of influence; and, because its effects are not apparent immediately after exposure takes place, it becomes necessary to have a complete understanding of what it is and the precautions necessary for adequate protection.

Effects

The physiological effects of x-ray are dependent, among other things, upon the cumulative absorption over a given period. Fortunately, however, the living body is capable of throwing off these effects if the total quantity absorbed within a given time is not too great. Whether by cumulative absorption or from continuous exposure, an overdose of x-ray produces blood changes, loss of hair, mal­ignancies, malfunction of internal organs, erythemas, and the like, the latter usually referred to as “x-ray burns”. The first manifestation of too much exposure to a given part may be a loss of hair or reddening of the skin. However, all of these do not necessarily follow, for effects are tied up completely with the rate of absorption and the character of the absorbed radia­tion. As with those upon deep-seated or­gans, skin effects vary from those which time and freedom from radiation will cor­rect to those which are so gross as to re­quire surgical or other intervention, and those leading even to permanent injury or worse.

Knowledge of Radiography

In common with many other diagnostic agents, x-rays make available infor-
mation of value only to one trained to interpret the results. The best apparatus and the most skillful technic may have been employed in the production of the x-ray film or radiograph, but the best technical results are of little value unless one has knowledge of that which is observed.

A correct conception of radiography is essential if the radiograph is to be studied properly. Much confusion may be avoided if a radiograph is considered as a projection of a series of shadows of varying densities upon a photographic film. Structures composed of tissues that contain large proportions of inorganic salts offer the greatest resistance to the passage of x-rays and cast the denser shadows. The bones of a region appear as heavy white images. Other structures cast shadows of densities depending upon their depth and their resistance to the passage of x-rays. The varying grays and blacks in a radiograph form contours which are recognized by the trained observer as the outline of anatomical structures. The intelligent interpretation of a radiograph, therefore, requires a broad knowledge of animal anatomy and physiology. In addition to a knowledge of normal structure and function, interpretation requires the ability to recognize the normal radiographically so that there may be no doubt of the abnormal or pathological when it is observed. Careful study of radiographs of normal structures will facilitate the correlation of radiographic and anatomical features. After acquiring the skill necessary to recognize the normal, familiarity with the pathological must be acquired.

Practical

The extent to which x-rays may be applied to problems in veterinary medicine and surgery vary, since a greater use of this agent as a diagnostic aid is possible when the patient is a small animal than when it is a large animal. All x-ray practices that have been developed to aid in establishing diagnosis are practicable when the patient is small because of the ease with which it may be controlled and all regions can be radiographed. When the patient is a large animal radiography is limited to the extremities as it is impractical to radiograph the thicker regions because of the great tissue depth.

Today most small animal practitioners operate an x-ray or have an agreement with someone nearby to take radiographs for them. In the latter case, they resort to a physician, an x-ray laboratory, or another veterinarian. Of the three, the veterinarian is better equipped and more experienced in small-animal work and can better judge the projection, position and interpretation. If necessary, work on the animal under the x-ray can be done at the time the radiograph is taken with the aid of the attending veterinarian.

Small Animal Use

In small animal medicine its uses and applications are numerous. The x-ray may be used to find foreign bodies, or to eliminate the possibility of a foreign body being present. Either fluoroscope or plate may be used, depending on the nature of the case. Dense bodies such as needles, pins and nails will readily show with the fluoroscope. Others that are not opaque to the x-ray or only partly so would need a plate taken with exposure to show various densities; in a body cavity, media of an opaque nature may be administered to surround the object and bring out its form and location.

Foreign Bodies

Foreign bodies in the throat region are sometimes hard to palpate. Although the symptoms point to a foreign body in this region it may not be located without resorting to the x-ray. Needles are probably the most common small objects and are easily seen with the fluoroscope. Here we can further apply the use of the fluoroscope by placing the anesthetized animal under it and inserting the forceps until their shadows meet that of the needle. Quite often surgery is avoided by this method.

In a like manner foreign bodies can be removed from the stomach of small dogs and puppies without the use of special instruments of surgery. The animal is placed under the fluoroscope, and a pair of long
forceps introduced through the esophagus to the stomach. What would otherwise be blind groping and prodding changes into easy manipulation. The forceps are moved towards the foreign body, and when the two touch, it is grasped and retracted. This method will quite often save the necessity of a gastro-laparotomy and is safer, especially in an animal in a weakened condition or in an emergency case.

Fractures
One of the greatest uses of x-ray is in fracture work. This is where it works most easily and best, due to the density of bones. True enough, we can palpate and diagnose most fractures, but even in these easy cases a picture of the broken bone with its jagged ends convinces the client of the seriousness of the case and pictures the condition better than the words of the doctor. Sometimes it is a revelation even to the veterinarian.

In fracture cases the x-ray is used to diagnose the case; or, if the diagnosis is obvious, to give a picture of the same. Quite often what is difficult to picture in one's mind by palpation is perfectly clear when palpating after seeing a radiograph of the part. We may find a second fracture that would otherwise have been overlooked. This is especially true of injuries in the pelvic region. The part is quite often fluoroscoped when setting the fracture and radiographed after the cast is applied.

Dropsy
The x-ray will show hydrothorax without any special technic as the fluid present displaces the organs of the chest, and especially the lungs, by compressing them.

In cases of ascites, in which the cause is obscure, the x-ray may show a foreign body or tumor present. If the picture is taken with the animal standing, we can show the fluid level. When radiographing for either hydrothorax or ascites, the breath is held by pressure on the pharynx.

The x-ray is also used in cases of rupture or suspected rupture of the diaphragm, especially if the fluoroscope has shown an interesting picture. The heart and stomach cast a definite shadow and a rupture of the diaphragm will show the heart-beat and its effects on the abdominal contents, especially if the heart or the stomach is not in its normal position.

Anodyne
The x-ray may be used for its stimulative action in the treatment of chronic skin diseases characterized by dryness. There seems to be no doubt that this type of therapy, in some cases, exerts at least a temporary and sometimes a permanent, anodyne effect. This action is often obtained in the treatment of the early stages of eczema.

Ovaries are highly susceptible to the x-ray, and it naturally follows that their function is readily inhibited by a proper dose. It is not beyond belief that, in the course of time, this method of sterilization will become a common procedure in small animal practice.

Fungi are readily destroyed by x-rays, which are great aids in the treatment of such infections. In some cases, the fungi are destroyed directly; in others, they are eliminated indirectly when the hair falls out as a result of the treatment.

Neoplasms
As a rule, it is only on malignant or potentially malignant growths that the full destructive action of the x-ray is directed. Since such growths are composed of young cells, or cells which are about to divide, they are often so sensitive to radiation that they may be destroyed by a dose of x-ray that is only mildly destructive to the surrounding normal tissue.

One of the newer uses of the x-ray is its employment in the treatment of such infections of an acute nature as pneumonia and gas gangrene. It has been shown recently that small doses given twice daily at high voltage have an inhibiting and sometimes a curative effect on acute infections.

In preparing this paper much of the literature on x-ray therapy was reviewed and the collected material was condensed to what were thought to be some of the

(Continued on Page 134)
for his Ph. D. Dr. Rosenbusch is engaged
to Jeannette Richardson, daughter of Dr.
Richardson, of Ames, Iowa.

Dr. John Ryan is engaged in general
practice in Sapulpa, Oklahoma.

Dr. I. A. Taylor is practicing at Dorard,
Wisconsin.

Dr. Walter Venske is teaching in the
Anatomy Department at Ames, Iowa.

Dr. Yoshio Yamashiro is located in
Honolulu, Hawaii.

Dr. C. Waller is engaged in general
practice at Winnsboro, Louisiana.

X-RAY—

(Continued from Page 89)

main factors which applied to Veterinary
Medicine. Its efficacy, especially in small
animal medicine, has been proven in many
different instances, and the field for its
use is still wide and varied in its scope.

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A. Nov. 1937.

Speaker
Dr. L. E. St. Claire, Assistant Professor of
Veterinary Anatomy, was the
principal speaker at the banquet held
by the East Central Iowa Veterinary As­
sociation at Tipton, Iowa, on March 9,
1939. The subject on which Dr. St. Claire
spoke was “Applied Neuro-Anatomy”.

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