

# Postmortem Examination

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Each of the methods that are to be or have been discussed this morning deal with the methods and approaches to provide a pool of information which, when accurately interpreted, really indicate one of three or four things. First, a list of diagnoses to be considered. And if you have a list, then obviously you need to find out more before you can decide which one on the list is the diagnosis. Secondly, it may indicate a provisional diagnosis, which most of us operate by. You know, we make a judgment decision and then go. Third, the diagnosis, or the right one or the right two or however many things are involved. Actually a diagnosis in clinical practice is truly an intermediate goal. The ultimate goal, it seems to me in clinical practice, is to use the diagnostic decision to determine a rational and economically feasible management or therapeutic scheme to solve whatever the diagnostic problem is.

My exposure to your problems has come about through my job as a diagnostic pathologist and also, I suppose, in my job as a respondent to many phone calls from practitioners who, it seems to me, when they have a problem, frequently call and they want you to hold their hand. Which is okay, we all need that. But one of the big problems that I find over the phone has been alluded to a few times already this morning and that is people tend to get in a hurry. People commit themselves to an opinion too soon. They are looking at trees instead of forests. So I thought I would sort of go through my general approach to a diagnostic problem.

First I try to introduce myself to the case. I try to get familiar with the territory. Dr. Allenstein mentioned environment—you have got to know where the problem is and the setting of the problem. Does it involve one animal? Several? If it involves several, are they in the same group, same age group, different age groups? Is the family dog also sick? Things like that. But first I try to get broadly but not deeply familiar with that sort of information. I get that information, it depends on what the situation is, from the history, somebody's account of a physical exam, even necropsy. My first early look at an autopsy is sort of an introduction to the case. That preliminary information allows me to make a very broad list of possible diagnoses. I really try not to get enough information that I get narrow-minded too soon in the game. You know, many of us are vain. We place great value on our opinion and we hate to turn loose of them once we have committed ourselves to one. I think that is a

major problem. I am like that, too, so I try and take my time getting committed.

The list that I make is a very broad one. Actually it is so broad that it frequently includes a number of absurd possibilities. But I soon dispense with them. Armed then with an overall view and maybe a list of differential possibilities, I then expand my pool of information and, as I go along, eliminate the obvious misfits in my list. I try to narrow it down until my list becomes manageable, mentally manageable, and then I focus my attention, not exclusively, but sure not to miss those observations that strongly support or negate items on my short list. When that pool is of sufficient size and particularly of sufficient quality, then I get down to the business of interpretation and I wind up at that point with what I call a provisional diagnosis. At that point I usually engage in one additional exercise. I sort of have an internal debate. I say to myself, "Hey, you may be full of beans," and I take the negative side of the debate and defend myself or attack myself and if I survive that attack I feel pretty good about my opinion. If I do not, then I must strengthen it.

Dr. Allenstein and Dr. Williams both alluded to the importance of history. It is interesting that Blood and Henderson say it is about 60% of the diagnostic process. It is probably more than that sometimes and sometimes less. I have a couple of behaviors in taking histories and, again, you must realize that most of my practice has been with dead animals and most of them have been hauled to me. So history is particularly important to me. I find it useful to take command of history-taking. I try not to let the owner compose his own tale of woe. If he insists on it, I let him run down. I let him talk and talk and talk and when he is all done, then I take the history. I want a mental picture of the situation. The environment, pattern of disease and, finally, I want to know what he thinks is wrong with the animal and I want that in a certain order, in my order. I need to build that picture according to my scheme, otherwise I am all messed up.

Then, Dr. Allenstein mentioned the farmer's kids and his wife and the hired man and so on. You can either talk to them or, what I do, I cross-examine essentially the history-giver, to be sure that the points that I am going to base an opinion on are valid. A lot of people like to tell you what you want to hear, not necessarily the truth. I want to find out what the truth is. So I go through this cross-examination. Dr. Allenstein mentioned the client and he is certainly

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right. My job does not depend on not offending people, though! So, if it comes to that point I do not mind doing it. But I am sure most of you have got to watch out for that and probably I should too.

Well, in the time remaining I am going to quickly take you through a necropsy technique and then briefly discuss a few gross lesions that are signposts, if you will, in gross necropsy diagnosis.

As I prepared myself to visit with you today, I wondered whether to simply point out the strategic location of two or three six-inch incisions in a cadaver so that you can do your normal post, or to bore you with a technique which would take me three hours. I have chosen then to briefly illustrate a technique that is a compromise between the ideal and the practical. I have been out to help some of you guys and if I had to use a knife as dull as yours, I would give up autopsies too. You know, that is a critical point right there.

So, armed with a sharp knife and maybe some preliminary or even more than preliminary observations on a case—in other words an informed but certainly an open mind—this is sort of how we do it. A postmortem examination should be as systematic and disciplined as a good surgical procedure. It should sort of be an inside job type of comprehensive physical exam, with each system receiving attention.

Our ruminant is a sheep, obviously. The first thing we do is lay him on his left side and sometimes you have to turn them over if they are not there. We make an incision from the chin to the anus in the skin. Reflect the skin, loosen the limbs, break the coxofemoral joint. Note the color, blood, muscle, fat cover and locate lymph nodes that are incised. I start at the costal arch and go down the midline, reflect the body wall and expose the abdominal viscera. I do not do much after that until I remove the rib cage and there is the animal, ready to look at.

It is at this point that I sharpen my knife for a couple of minutes with a steel, which is simply an excuse to look around. Makes me look busy, but I am buying time to look. It is very important that you look very early for displacements of viscera. This is the time. If you wait longer, there will surely be displacements that you just created.

We strip guts out. I toss the intestinal mass over the back onto the skin and you could at least look around there and see what is there. Look at the cecum—well, look at everything. Now we are back in the abdomen. We are between the legs of this animal. The rumen is staring us in the face. I grasp the rumen and throw it out over the back. I do not look at that stuff until I am almost done with the autopsy. It is too messy. I look at the mess last.

The liver is removed. I look at things as I remove them. I have grasped the kidney and the adrenal which I routinely make three or four incisions in. I cut the kidney free and tilt it back toward the bladder. I palpate the bladder, incise the kidney and look at it. I look at the bladder. I also look at the iliac lymph nodes. And I even frequently incise the aorta and go part way down the legs with it. That is more impor-

tant in small animals and in horses where there are strongyle lesions.

Then we go to the front end of the animal. I cut the suspensory muscle of the tongue, and pull the tongue out ventrally. I cut the hyoids and with a lot of traction pull out the trachea and cut it a little. We incise the pericardium and look at its content before we spill it all over the place. Then cut the mediastinum dorsally, cranially and ventrally and pull the viscera out. Get them out and look at the lungs, the heart and the thyroid. Then cut the head off and strongly extend the head. Look for the atlanto-occipital joint. Extend and keep cutting and before you know it, the head is off.

Joints are very important and the focus of your attention in dead animals. They frequently contain evidences of septicemic disease.

For removing the brain, we make lines of incision wide at the top and narrow down to the foramen magnum. The cuts are made with a saw and the skull cap removed. The dura is cut. The head is tapped on the ground and that loosens up the brain and the cranial nerves are cut and the brain removed. I look for a pituitary abscess.

The next part of my talk has to do with a few lesions. There are very few single lesions observable at necropsy that are pathognomonic. Very few. Most lesions exist as members of a set or group of lesions that represent a process. So the finding of a given lesion should usually remind the veterinarian to be particularly alert to recognizing or maybe even searching for related lesions. So the next few lesions are in this category.

There is a clinically observable lesion. If we tap this cornea, this duct down here would float around and it is an example of hypopion. This happens to be a calf. To me that lesion either represents septicemic disease, meningitis, or local ocular disease. Here is an example of meningitis. Very cloudy basilar meninges. This combination is a frequent combination in young calves, regardless of the origin of the septicemia. Here is the abomasum of a cow, with thickened folds. These happen to be edematous. And, edematous abomasal folds are a product of several other items, acid congestion, due to heart disease, or diffuse lung disease, parasitism, ostertagiosis, or some hypoproteinemic state. Again, possibly parasitic disease, protein-losing GI diseases, renal disease, diet, liver disease. The next category of thick abomasal folds is neoplastic. We cut through these and we get the solid homogeneous gray stuff, lymphosarcoma. This abomasum also happens to have a few ulcers in it. The animal might have lymphosarcoma, bloody stools or black stools, be anemic and the fundamental issue is really not GI bleeding. The fundamental issue in terms of the big picture is lymphosarcoma.

The edematous lung may also have several potential causes. It may represent heart failure, usually left-side failure, and it may experience usually aortic valve failure. A lot of you do not ever look at the aortic valve and you are wondering what is the deal here.

Well, if you look at an aortic valve, sometimes you will find out what the deal is. In a broad sense this might be atypical interstitial pneumonia or pulmonary edema emphysema complex, as many of you have seen. There may be specific lung toxins that do this. There are some herbicides and defoliants. The isohemolytic disease or other hemolytic processes can produce severe pulmonary edema, particularly interstitial. In those instances the edema fluid is frequently pink.

Pale kidneys are most often caused by postmortem autolysis. However, there are a number of kidney diseases, particularly tubular diseases. Things that are caused by ethylene glycol poisoning, oak, red-rooted pigweed poisoning, probably overdoses of neomycin and other nephrotoxic substances that cause pale kidneys. A key observation in deciding whether a pale kidney is diseased or not might be in the abomasum. The stomach of most animals with renal functional failure has a perceptibly ammoniacal odor. If you sniff, you may get your eyes close enough that they will water, you may even sniff ammonia. A really neat and useful, inexpensive diagnostic test using readily available resources is your nose.

What about a lung with a bunch of dots on it? Those dots are firm. They are inflammatory foci. The distribution is obviously embolic, blood-borne. Where did it come from? One of the common places that leads into the lungs like that came from is the

liver. An abscess had burst into the hepatic vein and showered the lung. Spleen abscesses can do the same thing. Actually, a lot of lesions throughout the body that get into the venous return do the same thing.

A necrophorus lesion in the liver, most of you know, almost always follows a rumenitis that is dietary in origin—lactic acidosis. The same lesion may arise from umbilical contamination in the neonate.

If there is a lot of fibrin in the thorax and the peritoneal cavity, it is probably a case of polyserositis and the animal is very likely to have joint disease. He may have meningitis. He may have peritonitis and pleuritis as part of a septicemic illness. If you see a thromboembolic brain with discreet hemorrhagic infarcts here and there, you had better look at the joints.

Joint disease, with an extra amount of fluid with plaques of fibrin adherent to the synovial membranes, especially in more than one joint, is almost certain evidence of a septicemic illness. It also is likely to be associated with cerebral disease, meningitis, maybe even polyserositis and, in the young animal, umbilical infections. Remnants of the umbilical vasculature, which has not regressed or involuted to the usual extent for an animal of a given age, I regard as evidence of navel infection. Even though there is not an abscess at the umbilicus, this to me is evidence of umbilical infection.