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Report and Opinion

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Sudden death with perirenal hemorrhage in Turkey

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Abstract: Turkeys in good physical condition may suddenly die without preceding clinical signs of illness. A condition known as "sudden death with perirenal hemorrhage" needs to be considered as a possible cause. Diagnosis of this condition is based on characteristic internal lesions in the birds, this condition occurs mainly in meat-type or breeder turkeys.

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Review

In almost any flock of meat-type or breeder turkeys, birds in good physical condition may die suddenly without preceding clinical signs of illness. While some turkey growers refer to these birds as dying of heart attack, many of these birds have probably died suddenly from a condition known as "sudden death with perirenal hemorrhage" (hemorrhage around the kidneys) (SD-PRH) **(Larochelle et al., 1992).** The condition has also been called sudden death syndrome, hypertensive angiopathy and hemorrhagic angiopathy. It affects mainly fast-growing male turkeys and can be an important cause of sporadic, daily mortality in flocks of heavy male turkeys. The mortality from this condition may start as early as 7 weeks of age but is more prominent at 10-18 weeks. It also occurs in hens but at a lower incidence. SD-PRH is unrelated to the rupture of the aorta or renal arteries **(Stenzel et al., 2008).**

Internal lesions and characteristic gross (macroscopic) lesions in birds that died from SD-PRH include congestion (engorgement of blood vessels with blood) of the viscera, severe edema and congestion of the lungs, enlargement and severe congestion of the spleen, enlargement of the liver, and presence of blood clot (hemorrhage) under the capsule of the kidneys **(Frank et al., 1991)**. The lungs of affected birds are moderately to markedly enlarged, heavier than normal, reddened (due to severe congestion), and excessively wet with serous fluid exudes from the surface (edema). The spleen is moderately to markedly enlarged and has a hemorrhagic appearance. The liver generally is moderately enlarged and congested. The blood vessels in the wall of the intestine are very obvious due to congestion, and the gonads (testes or ovary) and pancreas may be severely congested or even have hemorrhagic appearance. one or more divisions of the kidneys or both kidneys appear dark red due to the presence of blood clot under its capsule following hemorrhages within the kidney tissue **(Crespo and Shivaprasad,2003)**. The hemorrhage (and hence the size of the clot) under the capsule kidneys varies in extent and severity; it may be limited to a division of one kidney, or it may be extensive and involve all divisions of one or both kidneys. Another significant gross lesion in most of the birds that died from SD-PRH is the thickening (hypertrophy) of wall of the left ventricle and the septum between the two ventricles of the heart.

Cause still unclear, as the cause and the mechanism of SD-PRH are still unclear and speculative **(Schmidt, 2006)**. The macroscopic and microscopic lesions in affected birds reflect generalized passive congestion (engorgement of the veins of organs and tissues with blood). The changes in the heart, together with the generalized passive congestion, strongly suggest the presence of hypertrophic cardiomyopathy, which implies enlargement and thickening of the heart muscle that interferes with the normal function of the heart. In other words, the abnormal thickening of the heart muscle makes it harder for the blood to flow into and out of the heart and thus results in engorgement of vessels in tissues and organs with blood. The sudden death is most likely due to acute congestive heart failure (sudden failure of the heart) as a consequence

of hypertrophic cardiomyopathy (**Crespo and Shivaprasad,2003)**.

It has been suggested that congestion and edema of the lungs may be an important cause of death due to asphyxia (lack of oxygen in the body). The cause of myocardial myocardial hypertrophy is unknown, but it is possible that it occurs spontaneously in some heavy turkeys. Turkeys with hypertrophic cardiomyopathy will have limited cardiovascular functional capacity to tolerate physical stress, which imposes an increased workload on the heart. Renal portal circulation Birds, like fish, reptiles and amphibia, have a renal portal circulation. It has been suggested that the haemorrhage under the capsule of the kidneys results from the rupture of branches of the renal portal veins within the kidney tissue **(Larochelle et al., 1992).**

Since, it is possible that the renal portal circulation plays a role in the mechanism of SD-PRH, it appropriate to elaborate on this circulation. The kidneys in birds receive blood from the leg through the external iliac vein and sciatic vein as follows: The external iliac vein, which is the main drainage of the leg, empties into the common iliac vein, which gives off the anterior and posterior renal portal veins. Moreover, the posterior renal portal vein also receives blood directly from the leg through the sciatic vein, which is a relatively minor vessel. The anterior and posterior renal portal veins give off branches to the kidneys (**Schmidt,2006)**.

Some of the blood that enters the common iliac vein from the external iliac vein bypasses the anterior and posterior renal portal veins and flow to the posterior vena cava (a major vein that empties directly into the heart) and other veins. The common iliac vein has a valve (renal portal valve) that regulates the amount of blood that passes from it to the posterior vena cava. It is possible that because of the generalized congestion (and possibly because of narrowing or closure of the portal valve), most of the blood in the common iliac vein does not enter the vena cava but rather passes directly to the anterior and posterior renal portal veins. Furthermore, and again because of the generalized congestion, most of the blood that enters the anterior and posterior renal portal veins does not bypasses the kidney to other veins but rather enters the branches of the renal portal veins within the kidneys because of all of these events, the branches of the renal portal vein become overloaded with venous blood and possibly ruptured, thus leading to renal haemorrhage. **(Swayne, Saif,1990*)***.

Diagnosis is complicated as SD-PRH diagnosis is based on the presence of characteristic gross lesions, especially the perirenal haemorrhage, in birds that died suddenly. SD-PRH is the most appropriate “disease diagnosis”

When there is perirenal haemorrhage. one has to remember that if kidneys are not examined carefully during necropsy, it is easy to overlook a small subcapsular blood clot especially if blood accumulates in the abdominal cavity during necropsy.

Sudden death syndrome (SDS) may be considered as another manifestation of SD-PRH. SDS can be used as a “disease diagnosis” in birds that also died suddenly and had some or all of the gross lesions described above with the exception of perirenal haemorrhage. Hypertensive angiopathy is not an appropriate disease diagnosis since there is no evidence to support the notion that SD-PRH is caused by hypertension. One must exclude infectious diseases as the possible cause of mortality and lesions, especially in the absence of perirenal haemorrhage. SDPRH is probably unavoidable in any turkey flocks, especially in males. Good management and minimizing physical stress on the birds may be helpful in reducing the incidence of the condition **(Crespo and Shivaprasad,2003).**

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