the Vet's Corner

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DISEASES OF THE RESPIRATORY TRACT
A Tale Of Three Sites – Part I

Anatomically, this system may be divided into 3 sections based on obvious tissue differences – upper respiratory, middle, and terminal sections. The pathologic conditions afflicting these areas, however, are no respectors of boundaries and freely move back and forth as they invade one area, are defeated, retract to another to increase their strength, and reinvade to continue the fight. The invading forces take many forms, from the almost invisible viruses which must enter a cell to reproduce, to the prolific bacteria which multiply their numbers and swell their ranks by dividing their bodies to form two perfect individuals every few hours. The fungi and molds (another nemesis) extend invading tentacles of vegetative branches to cover an area and then send up fruiting fronds which burst into thousands of air borne spores to continue an air borne assault on distant tissues. Armored foot soldiers – the eight-legged mites, penetrate to the furthest reaches of air saces and pneumatic bones to create pathology and irritation, sneezing and gasping.

In this issue I will attempt to give the reader a superficial familiarity with the anatomy of the regions involved, continuing in the next issue with the specific disease conditions of these areas.

The external nares or nostrils constitute the one of two portals of entry of air into the head. Immediately posterior are the turbinates, boney plates approximating the thickness of paper and covered with a thin layer of tissue impregnated with blood vessels and nerve endings. Entering this labyrinth of the turbinates is a connecting duct from the eye called the nasolachrymal duct which drains eye secretions into the nostrils. Incoming air must now go into the throat area through a slot in the soft palate where it can mix with air inhaled through the open mouth.

Our second arbitrary division, the middle respiratory section, begins with the glottis, the opening to the trachea or wind pipe. This trachea is a tube of soft tissue which has horizontal parallel bonds of rigid cartilage imbedded in it to prevent its collapse when the lungs create a negative air pressure. The trachea extends to the area immediately in front of the heart and divides into two bronchi which then enter the lungs. This division is the location of the vocal cords, i.e., the syrinx. The two bronchi, each going to its respective lung, then divide into smaller tubes and these into even smaller tubes which ultimately end in a tiny terminal sac of one or two celled thickness called the alveolus. This alveolar sac contains minute veins and arteries, and it is through the walls of these blood vessels that oxygen, carbon dioxide, invading pathogens and toxins enter the blood stream.

Not all of the extensions of the bronchi terminate into smaller ones, a few, the mesobronchi, continue through the lung and open into the air sacs.

These air sacs and their extensions into the pneumatic bones constitute the third or terminal section.

Air sacs may be thought of as transparent plastic-like sacs made of tissues, the cells of which are so thin, newsprint can be read through them when they are in a healthy state. They fill all the space not occupied by organs in the abdominal cavity and have branching ramifications which extend through openings into the bones making the air filled bones continuous with the lungs.

A classical demonstration of this was done many years ago, when a chicken with an open broken wing bone was submerged with its nostrils closed under water with only the open wing bone protruding and it was able to breathe through the fracture for an extended period of time.

The function of the air sacs is primarily to act as a reservoir for oxygen rich air, however, it also serves as a means of temperature regulation, i.e., the air absorbs heat from the organs by conduction and is expelled, filling the body cavity with cooler air.

Buoyancy, very important in an air borne species, is also increased by the large volume of air in the abdominal cavity and long bones in contrast to solid body mass.

Unfortunately, these air sacs are not well supplied with veins and arteries, making it very difficult to transport medicine via the blood into these areas should they become infected and therein lies the problem of treating air sac infection ■

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