

Diagnostic Exercise

From the CL Davis/SW Thompson Foundation

Case # **127**; Month: **July**; Year: **2023**

Answer Sheet

Title: Prostate cystic hyperplasia in a woolly monkey

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Clinical history: A 21-year-old woolly monkey (*Lagothrix lagotricha*) from a zoological collection was autopsied after being found dead in the enclosure without previous clinical signs of disease being observed.

Necropsy findings: the prostate was bilaterally firm and diffusely increased in volume; it measured 6.0 cm x 3.5 cm x 2.0 cm (Fig. 1). The cut surface was firm and had multifocal cavities filled with fluid to slightly gelatinous and translucent material.

Gross Images:

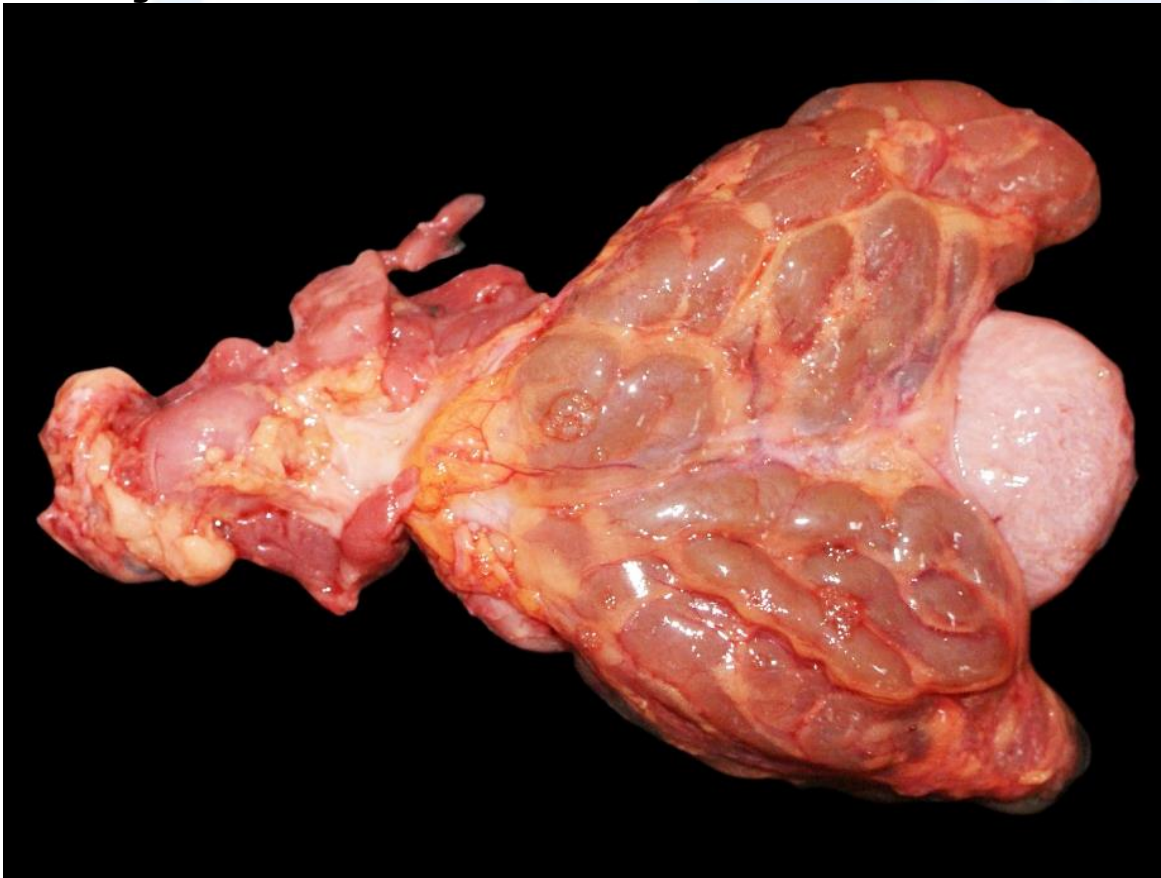


Figure 1.

Microscopic Images:

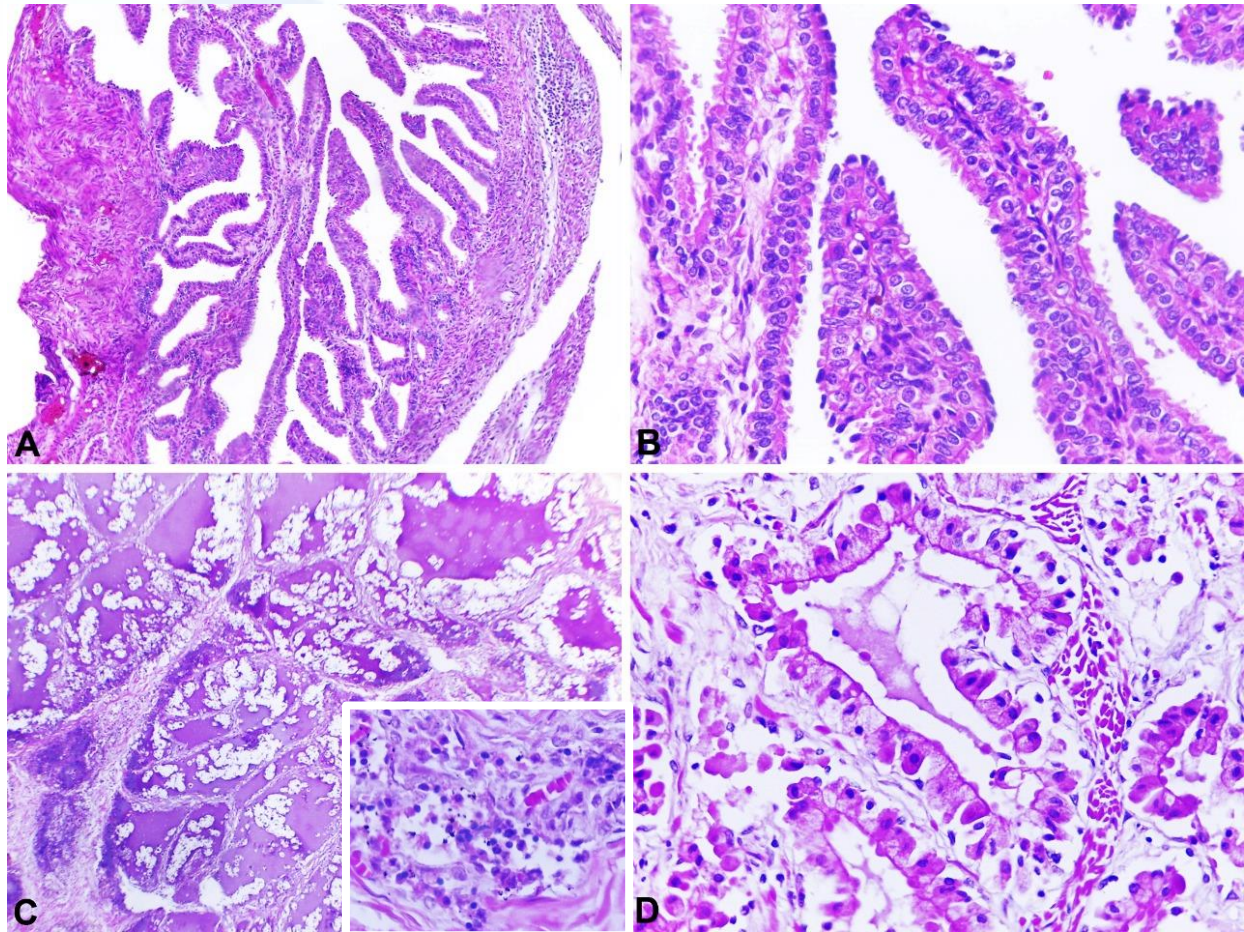


Figure 2.

Follow-up questions:

- *Histologic description*
- *Morphologic diagnosis*
- *Differential diagnosis*

Microscopic Description: the tissue is organized in papillary projections, with marked cyst formation, and is supported by a well-defined fibrovascular stroma (Fig. 2A). In the papillae, the epithelium is organized in one or two layers of well-defined columnar cells, which have round to oval nuclei with one to three nucleoli (Fig. 2B). The lumen of these cysts is markedly distended and contains homogenous magenta fluid and, multifocally there are areas with small clusters of lymphocytes and plasma cells observed mainly in the supportive stroma (Fig. 2C). Especially in the cystic areas, the cytoplasm of epithelial cells is abundant, eosinophilic and vacuolated (Fig. 2D).

Morphologic Diagnosis: Prostate, cystic hyperplasia with mild, multifocal lymphocytic prostatitis.

Name the condition: Benign prostatic hyperplasia.

Differential diagnosis: Prostatic cysts, fibromuscular hyperplasia and prostatic carcinoma.

Comments: Benign prostatic hyperplasia (BPH) is a non-neoplastic alteration of the prostate that is an age-related change in human and non-human primates. This condition is also commonly reported in dogs (5,9) and experimentally in rats (2,3). BPH can cause complications to the rest of the urinary tract (9), and also predisposes to cancer (8). Recent studies indicate that BPH is a multifactorial condition, associated with disorders that favor chronic inflammation of the prostate parenchyma. Diseases that are associated with low levels of testosterone and high levels of estrogen, such as metabolic syndrome, can predispose BPH (5).

Amongst non-human primates, BPH has been reported in squirrel monkey (*Saimiri sciureus*) (1), cynomolgus monkey (*Macaca fascicularis*), rhesus monkeys (*Macaca mulatta*) and chimpanzees (4). The condition is, however, considered rare in New World non-human primates (7).

Cynomolgus monkeys are frequently used to study BPH, because the prostate of this species is more similar to the human prostate. In most cases, BPH is seen in elderly individuals, due to its slow and progressive development. This is probably associated with the increase concentration of dihydrotestosterone that acts on the prostatic epithelium inducing its proliferation. In older individuals, there is also an increase in estrogen levels, which, in turn, acts by stimulating the receptors for dihydrotestosterone, increasing the hormone availability to the organ (5).

Prostatic cysts, a common consequence of prostatitis and hyperplasia, occur due to blockage of the ducts, coursing with the accumulation of secretion in their interior. Fibromuscular hyperplasia is characterized by the proliferation of smooth muscle fibers, which can replace the glandular epithelium (10). Prostatic carcinomas can be seen as irregular clusters of malignant epithelial cells and glands with abundant connective tissue stroma; epithelial cells may exhibit uniform appearance in size and shape, large, round, hyperchromatic or vesicular nuclei, and moderate amounts of cytoplasm; mitotic figures are often common, and these neoplasms may metastasize (6).

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