Abdominal mass and abdominal effusion in a dog

Contributors: Pierre L Deshuillers, Edouard Reyes Gomez, Marine Le Dudal, Nathalie Cordonnier

Département des Sciences Biologiques et Pharmaceutiques, Ecole Nationale Vétérinaire d'Alfort, Maisons-Alfort, France

Signalment: 3 years-old, intact female Husky

Specimen:

- Abdominal effusion
- Cytological sample from an abdominal mass of unknown origin

History:

Macha was referred to the veterinary hospital of the Ecole Nationale Vétérinarie d'Alfort (ChuvA) following the detection of an abdominal effusion upon ultrasound examination and palpation of an abdominal mass. For the past 10 ten days, Macha had been vomiting and presented with dysorexia and tenesmus. The owners had also noted a distended abdomen.

Clinical findings:

Despite Macha initial aggressiveness, a physical examination was performed and was unremarkable except for a distended abdomen and the presence of a palpable abdominal mass. A serum biochemistry profile including urea, creatinine, ALP, ALT, glycemia, total proteins and albumin was unremarkable. Sodium, chloride, potassium, ionized calcium, blood pH and pCO_2 were all within the reference intervals. A CBC revealed a minimal leukocytosis (21940 cells/mm^3; RI: 5600-20400 cells/mm^3) characterized by a minimal neutrophilia (18868 cells/mm^3; RI: 2900-13600 cells/mm^3). An abdominal ultrasound demonstrated the presence of a voluminous peritoneal effusion, 2 liters of which were removed and submitted for cytological examination **(table 1; figure 1)**. A 10cm, heterogeneous mass was also observed; however, it was not possible to determine its origin and fine needle aspirates were submitted to the clinical pathology laboratory for cytological evaluation **(figure 2)**.

Table 1: Abdominal effusion results

Analytes	**Observed value**
Total nucleated cell count	6100 /mm^3
Total proteins	19 g/L
Neutrophils	56 %
Macrophages	39 %
Lymphocytes	3 %
Mast cells	2 %

Figure 1: Cytocentrifuged preparation from the peritoneal effusion (May-Grünwald Giemsa staining)

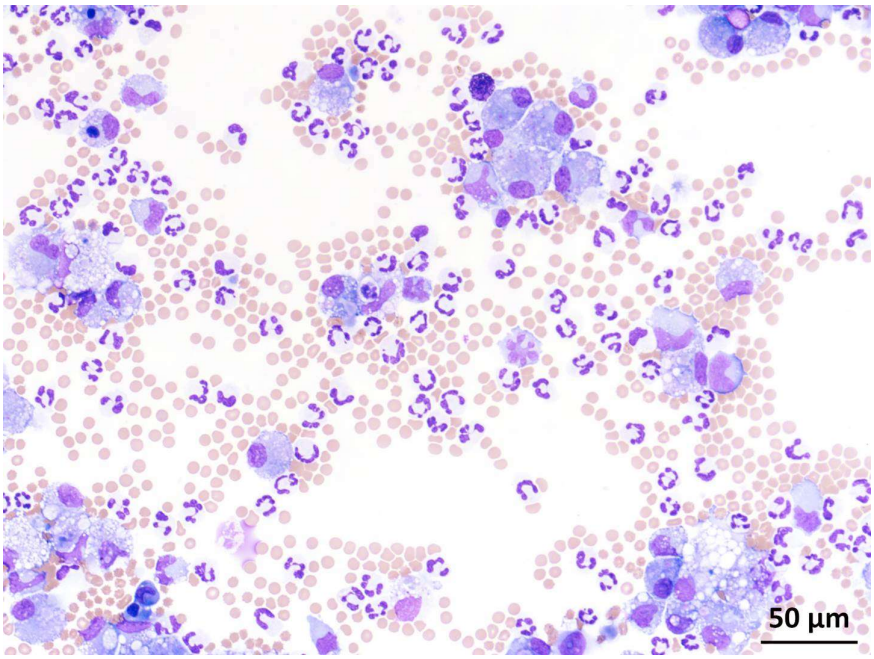
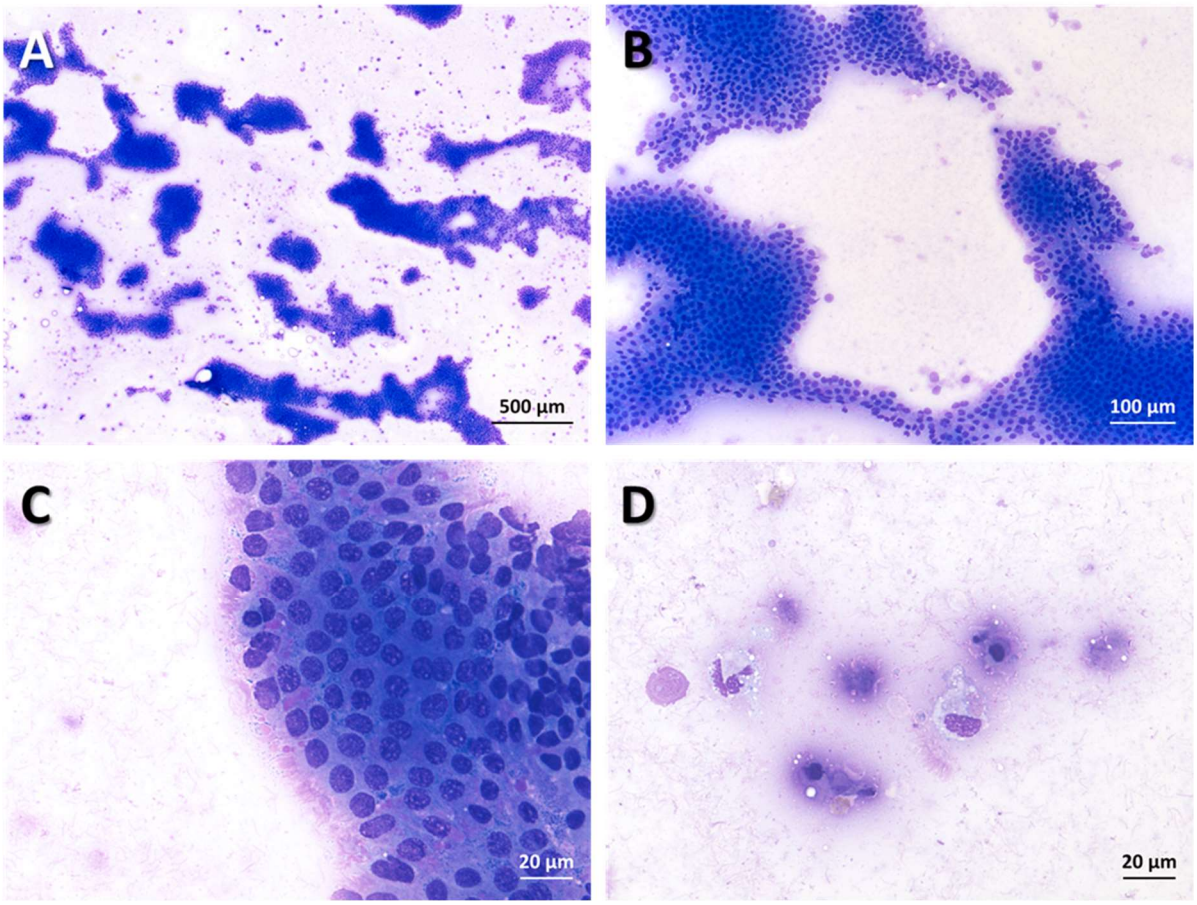


Figure 2: Fine needle aspirates from the abdominal mass (May-Grünwald Giemsa staining)



Questions:

- What is your cytological diagnosis and interpretation for the abdominal effusion?
- How would you characterize the cells present on the FNA cytology from the abdominal mass?
- What is your differential diagnosis or diagnosis for the abdominal mass?

Cytologic description and interpretation:

Peritoneal effusion (figure 1):

Cytocentrifugation preparations revealed a moderate number of non-degenerate neutrophils and macrophages with few small lymphocytes and mast cells in a clear background with a moderate number of red blood cells. No neoplastic cells or infectious agents were identified in this effusion fluid.

Probable modified transudate with mild neutrophilic inflammation

Abdominal mass (figure 2):

Preparations were highly cellular, containing many large tightly cohesive clusters **(2A and B)** of cuboidal to columnar and ciliated epithelial cells **(2C)** forming papilla, in a lightly eosinophilic proteinaceous background with rare red blood cells, few non-degenerate neutrophils and vacuolated macrophages **(2D)**. Large numbers of individualized cilia, and occasional ciliated membrane fragments were also seen free in the background **(2D)**. Pink material, presumptively secretory material, was embedded between the cells and was also found on the surface of the clusters **(2C)**. Neoplastic cells measured 10-20 microns, had a medium N:C ratio, and a deeply basophilic cytoplasm. Nuclei were round, 5-7 microns in diameter, with a clumped chromatin pattern and often had a single small basophilic nucleolus. Anisocytosis and anisokaryosis were minimal.

Most consistent with a cystadenoma or cystadenocarcinoma.

A cystadenocarcinoma was considered possible given the large size of the mass. The origin of the mass was uncertain. Differentials included ovarian cyst, paraovarian cyst, uterine duct cyst and uterine cyst. Consideration was also given to a metastasis from a bronchoalveolar neoplasm or a teratoma, although the absence of criteria of malignancy and of cellular components from the three germ layers made these hypotheses less likely.

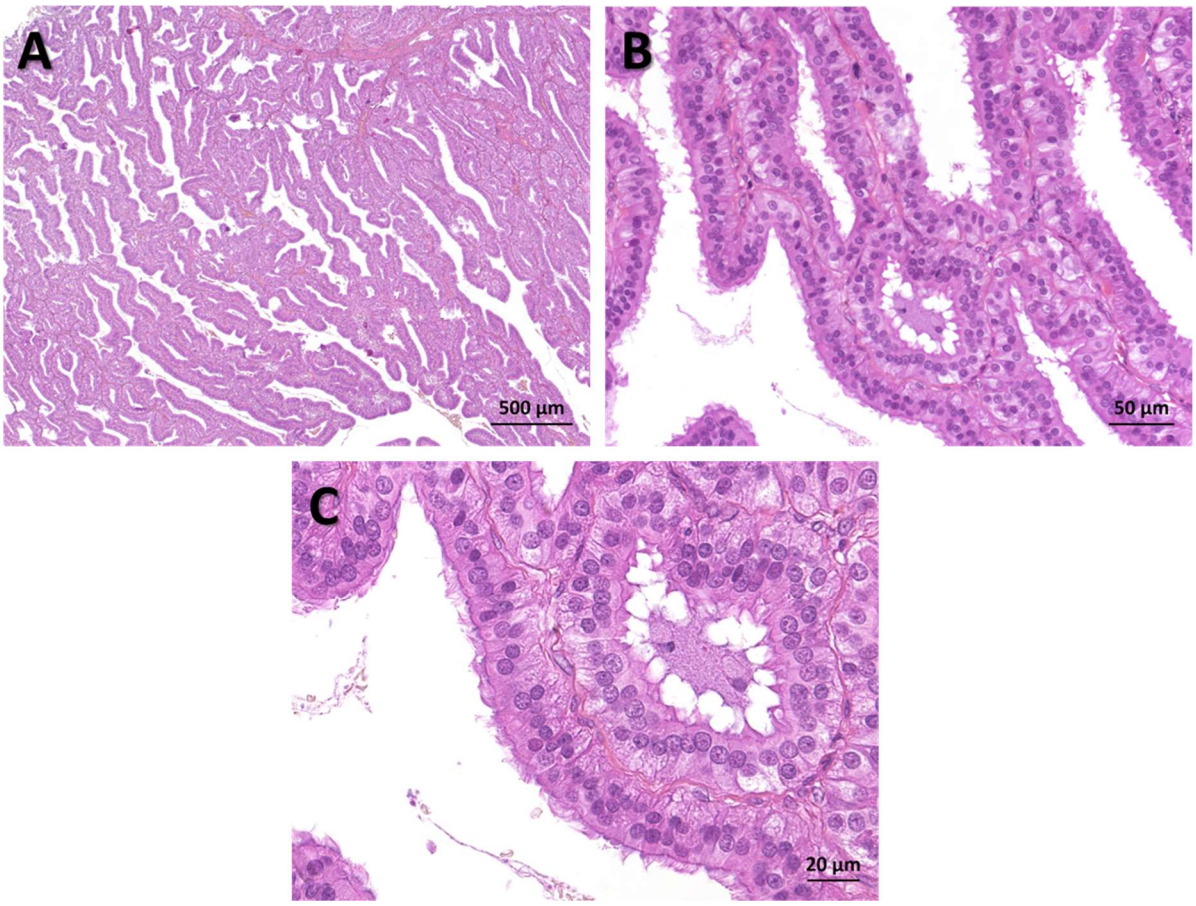
Case conclusion:

Following the cytological diagnosis, a thoracic and abdominal CT-scan were performed. No abnormalities were detected in the thorax. An ovarian origin to the abdominal mass was suspected. No evidence of metastasis was found.

Coeliotomy, performed two days after, confirmed a large ovarian mass in contact with the abdominal wall. In this location a small raised lesion was seen. The ovarian mass was removed by ovariohysterectomy and fixed in 10% buffered formalin for histological evaluation. The abdominal wall lesion was surgically excised and submitted for histological evaluation.

Evaluation of the abdominal mass **(figure 3)** revealed a papillary proliferation of neoplastic, ciliated, columnar, epithelial cells lining thin connective tissue stalks. Their cytoplasm was eosinophilic with a round and often basal nucleus. Anisocytosis and anisokaryosis were minimal. Few cystic structures lined by a ciliated cuboidal to columnar epithelium and containing a dense eosinophilic proteinaceous material were seen. No evidence of metastasis was seen. These findings were consistent with an ovarian adenoma most likely from rete ovarii with cystic regions (cystadenoma).

Figure 3: Sections of the abdominal mass (HES staining)



The lesion on the abdominal wall consisted of granulation tissue associated with a moderate neutrophilic infiltrate consistent with a focal suppurative peritonitis.

Macha went home the next day. Follow up at the referring veterinarian has been unremarkable to this day, three months after the initial presentation to the ChuvA.

Discussion:

The identification of mechanisms resulting in a cavitary effusion and classification of the effusions is essential to the clinicians, as it gives information regarding potential causes. However, classification of effusion is regularly debated as criteria differ between sources[1-3], terminology is not widely accepted (especially the term "modified transudate") and causes encompassed by the terms vary (especially between modified transudate and exudate). A recent retrospective study has shown that modified transudate can represent up to approximately 50% of all effusions included in the study[4]. In the present case, we concluded to a modified transudate based on the low protein content, modified by neutrophilic inflammation elicited by a possible extended duration between transudation and collection of the fluid for cytological evaluation. A possible mechanism responsible for transudation in this case was pre-hepatic portal hypertension resulting from extraluminal compression of the portal vein by the ovarian mass leading to leakage of fluid from the vascular to the interstitial compartment. When leakage into the interstitial space accedes the drainage capacity of lymphatics, ascites develops. Decreased lymphatics capacity could not be totally ruled out since obstruction by metastases is

possible[5]. Thus, Macha likely had a low protein transudate, modified by inflammation because of chronicity and/or focal inflammation from contact between the mass and the abdominal wall.

Finding ciliated epithelium in an abdominal mass fine needle aspirate is uncommon. One can suppose that a metastasis from a malignant neoplasm arising from ciliated epithelium such as the respiratory epithelium can be found in the abdominal cavity. Other more common origins to consider, for ciliated epithelium, include reproductive system structures derived from the mesonephric and paramesonephric duct (uterine tube, uterus)[6], the rete ovarii[7-9] and teratomas[10, 11]. A teratoma was considered unlikely because of the presence of only one type of cellular elements. Here, we suspected an ovarian or paraovarian cyst or a cyst from Mullerian duct-derived structures. Histologically, these cysts can all be lined by a ciliated epithelium, even if cilia are not always present. Contrary to rete ovarii cysts which are deprived of an underlying smooth muscle layer, paraovarian cysts and cysts of the uterine tube and uterus have a smooth muscle layer[7-9, 14]. One would not expect to identify smooth muscle on an FNA. Proximity of the cyst with the ovary was consistent with an ovarian or paraovarian cyst, however the large size of the mass precluded a more precise localization. Smooth muscle was not observed on the histology section.

Few research articles have been published on ovarian cysts. Ovarian and paraovarian cysts are common in bitches and most are incidental findings since most do not produce hormones [12-14] and are clinically insignificant unless they compress nearby ovarian structures or cause discomfort in dogs[7-9, 14]. Regardless of cyst type, these cysts usually do not produce hormones contrary to other ovarian cysts, even if few cases of hormone producing rete ovarii cysts have been described. Ovariohysterectomy is usually curative and Macha's recovery was uneventful.

References:

1. Stockham SL, Scott MA. Cavitary effusions. In: Stockham SL, Scott MA., ed *Fundamentals of veterinary clinical pathology*. 2nd ed. Ames: Blackwell Publishing; 2008:831-868.
2. Valenciano AC, Arndt TP, Rizzi TE. Effusions: abdominal, thoracic and pericardial. In: Valenciano AC, Cowell RL., ed. *Cowell and Tyler's diagnostic cytology and hematology of the dog and cat*. 4th ed. Saint Louis: Elsevier Mosby; 2014:244-265.
3. Thompson CA, Rebar AH. Body cavity fluids. In: Raskin RE, Meyer DJ., ed. *Canine and feline cytology. A color atlas and interpretation guide*. 3rd ed. Saint Louis: Elsevier; 2016:191-219.
4. Nunez K, Thompson C. Abdominal effusions in dogs and cats: a retrospective study over a 10-year period (January 2004 – January 2014) examining fluid characteristics. *Vet Clin Pathol.* 2014; 43:E8-E21.
5. Buob S, Johnston AN, Webster CRL. Portal hypertension: pathophysiology, diagnosis, and treatment. *J Vet Intern Med*. 2011; 25:169-186.
6. Fry MM, DeCock HEV, Greeley MA, Vernau W. Abdominal fluid from a dog. Vet Clin Pathol. 2003; 32:77-80.
7. Foster RA. Female reproductive system and Mammae. In: Zachary JF, ed. *Pathologic basis of veterinary disease.* 6th ed. Saint Louis: Elsevier; 2017:1147-1193.
8. Agnew DW, MacLachlan NJ. Tumors of genital systems. In: Meuten DJ, ed. *Tumors of domestic animals*. 5th ed. Ames: John Wiley and Sons Inc; 2017:689-722.
9. Schlafer DH, Foster RA. Female genital system. In: Maxie G. *Jubb, Kennedy and Palmer's Pathology of Domestic Animals*. 6th ed. Saint Louis: Elsevier; 2016:vol 3;358-464.
10. Bertazollo W, Dell'Orco M, Bonfanti U. et al. Cytological features of canine ovarian tumours: a retrospective study of 19 cases. *J Small Anim Pract.* 2004; 45:539-545.

11. Gruys E, van Dijk JE. Four canine ovarian teratomas and a nonovarian feline teratoma. Vet Pathol. 1976; 13:455-459.
12. Knauf Y, Bostedt H, Failing K, Knauf S, Wehrend A. Gross pathology and endocrinology of ovarian cysts in bitches. *Reprod Domest Anim.* 2014; 49:463-468.
13. Knauf Y, Köhler K, Knauf S, Wehrend A. Histological classification of canine ovarian cyst types with reference to ;edical history. *J Vet Sci*. 2018; 19:725-734.
14. Arlt SP, Haimerl P. Cystic ovaries and ovarian neoplasia in the female dog – a systematic review. Reprod Domest Anim. 2016; 51(S1):3-11.