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A CLINICAL APPROACH TO ASCITES

The rise of Point Of Care UltraSound (POCUS) in ECC led to an increased identification of patients with ascites. After abdominocentesis and some basic tests, Starling's law helps identifying the underlying cause. Where do transudates, modified transudates and exudates come from? What additional tests can we perform on these effusions?

POCUS is an easy technique to screen for free abdominal fluid, in trauma and other emergency patients, such as acute distended abdomen, suspected cardiac tamponade, coumadin intoxications etcetera. As ultrasound machines are currently readily available to most general practitoiners, it would be a shame not to use them in our emergency patients. Moreover, when fluid is identified, ultrasound also allows for focused sampling of small pockets of lfuids, tather than a blind tap in the umbilical region or at the four quadrants. Evidently, veterinarians must remain aware of normal anatomy and be confident to perform blind abdominocentesis and cystocentesis, but it has been a while since the last blind centesis at our faculty or in my wife's practice…

As soon as abdominal effusion has been identified, a sample should be taken and placed it in an edta, fluoride and culture tube, allowing you to perform most required analyses afterwards. Abdominal fluid is divided into pure transudates, modified transudates, and exudates (Table 1). The rationale behind the artificial division in between the transudates and exudates is to obtain a better insight into the underlying cause of the abdominal effusion.

Table 1

	T-pro	USG	Cells/µL	Pathophysiology
Transudate	<25g/L	<1018	<1500/µL	Ponc ↓
Modified Transudate	25-50g/L	1018-1030	1000-7000/µL	Phydr ↑
Exudate	>30g/L	>1020	>7000/µL	Permeability ↑

In physiological states, only a very limited amount of free abdominal fluid is to be expected in the abdominal cavity. Fluid remains in circulation according to the net factors implied in Starling's law on fluid movements across capillaries. Hydrostatic pressure pushes fluid into the abdomen, while oncotic pressure pulls water back in. Having a tube system full of holes will evidently result in easier loss of fluids. Consequently, the three main factors provoking ascites are increased post capillary hydrostatic pressure, decreased oncotic pressure and increased vascular permeability. Decreased oncotic pressure results in 'pure transudates'. In larger sized dogs, peripheral (pitting) oedema is usually seen, while smaller dogs often merely present with ascites (owing to lower hydrostatic pressures in the limbs). Increased hydrostatic pressures results in the accumulation of modified transudates, as small amounts of proteins also leave the circulation at the level of the fenestrated hepatic sinusoids. Causes of increased post capillary (venous) hydrostatic pressure are right sided congestive heart failure, pericardial tamponade, venous thrombi, neoplastic or granulomatous masses impeding venous return, and cirrhotic liver disease and torsion or strangulation of organs leading to impeded blood flow.

Increased permeability leads to the accumulation of exudates, which are rich in proteins and cells. Often this is the consequence of severe vasculitis, indicating severe inflammation such as in feline infectious peritonitis, pancreatitis and septic peritonitis. Whenever there is no active diapedesis of inflammatory cells towards an inflammatory niche in the abdominal cavity, these fluids can also be a strongly modified transudate.

Determining the type of fluid therefore helps to orient complementary exams. At our institution we always perform these simple and inexpensive analyses before spending more money of our clients. Whenever an exudate or body fluid is identified, further analysis of the fluid is warranted. As neoplastic processes can be associated with all types of fluids and masses may exfoliate into the abdominal fluid, a direct smear and cytospin cytological examination is mandatory. Not every veterinarian will feel comfortable to diagnose a mesothelioma, but finding intracellular bacteria or lymphoblasts and mitotic figures has a major impact on your approach…

ABDOMEN

Several investigators examined easier ways than cytology to diagnose an infectious exudate. A decreased intraabdominal glucose level (difference >20mg/dL) and increased intraabdominal lactate level (difference >2mmol/L) compared to blood levels is strongly indicative of a septic process. At our institution we routinely assess all three parameters (glucose, lactate and cytology and compare these findings and take into account the history and clinical examinations and results of other complementary examinations prior to making decisions). Other fluids can also accumulate in the abdominal cavity, such as chylous effusions in severe pancreatitis, biliary effusion in case of a ruptured gallbladder secondary to a mucocoele or traumatic event and urine leakage after urinary tract ruptures. An overview of diagnostic criteria of these fluids is given in table 2.

A special consideration is made regarding hemoabdomens and the evaluation of the activity of the abdominal bleeding. A first approach to the monitoring of a hemoabdomen is the serial performance of abdominal FAST scans and scoring the presence and subjective quantity of identified abdominal fluid. Finding fluid at multiple sites in increasing quantities strongly suggests ongoing haemorrhage. Platelets on cytological preparations also indicate active bleeding (or sample contamination). Another technique, although never scientifically substantiated, is the follow-up of abdominal and blood PCVs. In severe abdominal bleeding, hypovolemia provokes a water shift from the interstitium to the circulation, decreasing PCV. The result is a decreasing blood PCV, and in case of ongoing haemorrhage, also a decreasing PCV in the ascites. Inversely, whenever the abdominal bleading ceases, water reabsorption results in a decreased blood PCV, with a simultaneous increase in abdominal PCV.

Table 2

	Parameter	**Cut-off**
Infectious effusion	Lactate	+2mmol/L
	Glucose	-20mg/dL
Urine	Creatinine	x2
Biliary fluid	Bilirubine	x2
Chylous effusion	Triglycerides	increased
Hemoabdomen	PCV	>6%