

AFAST and Its Fluid Scoring System for the Bleeding Patient

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Gregory R. Lisciandro, DVM, Dipl. ABVP, Dipl. ACVECC

Hill Country Veterinary Specialists & FASTVet.com, Spicewood, Texas USA

Email LearnGlobalFAST@gmail.com

Cell 210.260.5576

Website FASTVet.com

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Learning Objectives

- Understand the AFAST[®] abdominal fluid scoring system and its small volume versus large volume bleeder/effusion concept
- Understand how the small volume vs. large volume bleeder concept can help with decision-making in different patient subsets (trauma, non-trauma, and post-interventional cases)
- Understand how a 3-minute AFAST[®] examination can provide a large amount of clinical information of the abdomen and thorax
- Understand AFAST[®] advantages over physical exam, laboratory testing, and radiography

Introduction

The clinical utility of AFAST[®], its target-organ approach and its applied fluid scoring system in virtually all subsets of patients including trauma, triage (non-trauma) and tracking (monitoring) cases in the emergent and critical care settings will be reviewed. The previously published T³ designation encompasses these 3 subsets, Trauma, Triage (non-trauma), and Tracking (monitoring) and avoids the onslaught of confusing acronyms in human and now veterinary medicine in which similar abbreviated formats are given different acronyms when applied to different subsets of patients. However, AFAST[®] is in reality "an extension of the physical examination" and the T³ designation is unnecessary as more and more veterinarians understand its applications. Thus, AFAST[®] becomes a universal term that has *exact* clarity of its 5-acoustic windows or views.

The AFAST[®] examination carries greater potential to positively guide clinical course and improve patient outcome by detecting conditions and complications otherwise missed or delayed based on traditional first line evaluation of physical examination, laboratory testing, and radiographic finding. AFAST[®] findings are made more clinically relevant for the clinician, client, and referring veterinarian by using its standardized ultrasound format, and by recording AFAST[®] findings on standardized goal-directed templates for medical records (see below).

The mindset for those using AFAST[®] is one of a *ruling in* and *ruling out* test (highly specific and highly sensitive) for the presence or absence of free fluid, and a *ruling in* test for soft tissue abnormalities of its target-organ (highly specific and variably sensitive being user-dependent). In other words, AFAST[®] serves as a screening test for obvious abnormalities of its target-organs, meaning if you see the abnormality it's likely real, however, if you don't see an abnormality, then it may have been missed, being user dependent. Importantly, the AFAST[®] does not replace a complete detailed abdominal ultrasound.

Moreover, AFAST[®] serves as a means to better survey veterinary patients and to better keep alive for gold standard testing and treatment. Along with its AFAST[®]-applied abdominal fluid scoring system, AFAST[®] helps decision-making regarding medical versus surgical cases including the need for blood

transfusion(s), exploratory surgery, and other interventions in bleeding and non-hemorrhaging patients. Finally, the Global FAST[®] approach better ensures that more traditional complete ultrasound studies are ordered for the *correct* cavity and that it is safe to restrain the patient, especially for dorsal recumbency.

The standardization and clarity of Global FAST[®], the term used for combining AFAST[®], TFAST[®] and Vet BLUE[®], is the author's recommended approach for using FAST and point-of-care ultrasound (POCUS) because it avoids "selective imaging" and "satisfaction of search error." "Selective imaging" leads to "confirmation bias error", searching for evidence to fulfill the clinician's preconceived bias for the diagnosis. "Satisfaction of search error" is common in radiology and occurs when the evaluator stops at the first abnormality carrying the potential to miss other important findings. Advantageously, the Global FAST[®] approach provides exact clarity to an unbiased set of 15 data imaging points of the abdomen and thorax, including heart and lung; and should preempt all other point-of-care ultrasound examinations. *The bottom line, POCUS examinations should be considered as an add-on to Global FAST[®], or the 2 approaches should be used together to avoid such errors.* In summary, the Global FAST[®] Approach is a 3rd standardized veterinary ultrasound examination for patient imaging and should be a first line extension of the physical exam in most if not all patients.

Distinguishing Global FAST[®] from Flashing and POCUS

Global FAST[®]. Global FAST[®] is the combination of AFAST[®] and its target-organ approach and its Abdominal Fluid/Hemorrhage Scoring System, TFAST[®] for the detection of pleural and pericardial effusion, pneumothorax, and its 4 TFAST[®] echo views, and Vet BLUE[®], the veterinary brief lung ultrasound exam, a regional, pattern-based approach with its B-line Scoring System, and its Visual Lung Language. Each of these 3 ultrasound formats has exact clarity to its respective acoustic windows (views) and findings (patient data) are recorded in goal-directed templates. Without this disciplined approach, accurate tracking patients and measuring overall program quality is impossible. Moreover, the veterinary radiologist and cardiologist perform their studies in the exact same manner every time for good reasons, to better know where to expect anatomy, and better recognize deviations from what is expected, and to not miss abnormalities.

Flash exams. The "Flash Approach" is a term applied to a desultory sweep (no organized direction, no defined acoustic windows, lack of clarity) of the abdomen, thorax, and now lung answering a simple binary question of fluid positive or fluid negative within the abdomen and thorax; and the presence or absence of B-lines (also called lung rockets). The "Flash mentality" should be likened to performing an incomplete physical examination and for most veterinarians we know the risk of missing important clinical information by doing so. *The Global FAST[®] approach is not a "Flash exam." AFAST[®], TFAST[®], Vet BLUE[®], and Global FAST[®] should never be used interchangeably with the "Flash approach." These terms are erroneously and misleadingly used by our colleagues.*

Point-of-care Ultrasound (POCUS). Point-of-care ultrasound (POCUS), which includes FAST (focused assessment with sonography for trauma, triage and tracking) examinations, is defined by the author as a goal-directed ultrasound examination(s) performed by a healthcare provider point-of-care (cageside) to answer a specific diagnostic question(s) or guide performance of an invasive procedure(s). *The Global FAST[®] approach should be used as a baseline set of unbiased data imaging points surveying both cavities and then POCUS or Focused Exams as add-on evaluations to prevent "selective imaging", "satisfaction of search error", and for increasing the probability of an accurate assessment through integration of clinical findings.*

Patient Positioning, Preparation, Probe Type, Preset, Probe Maneuver

See Proceedings “Introduction to Abdominal FAST[®] and Its Target Organ Approach”.

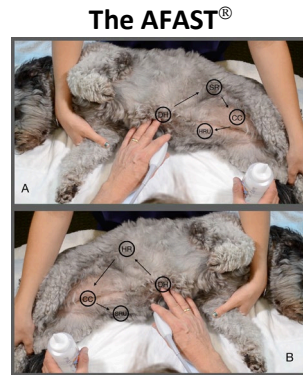
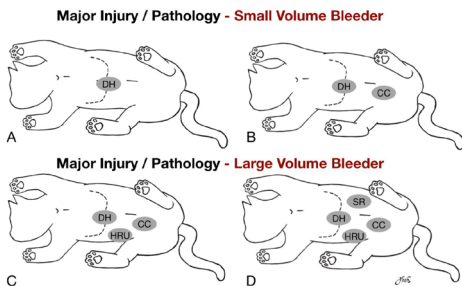


Figure. The AFAST[®] views used for abdominal fluid scoring are shown on a dog and analogous for cats (and non-human primates and exotic companion mammals). The Hepato-Renal Umbilical (HRU) view has been now renamed as the Spleno-Intestino Umbilical (SIU) view. Note not shown is the Hepato-Renal 5th Bonus view when in right lateral and the Spleno-Renal 5th Bonus view when in left lateral recumbency. *This material is reproduced with permission of John Wiley & Sons, Inc., Point-of-Care Ultrasound Techniques for the Small Animal Practitioner, 2nd Edition, Wiley ©2020 and Greg Lisciandro, Hill Country Veterinary Specialists, FASTVet.com ©2014, 2020.*

AFAST[®] Order. The AFAST[®], regardless of positioning (standing/sternal, right lateral recumbency), is always performed in the same order beginning at the Diaphragmatico-Hepatic (DH) view, followed by the least gravity dependent Spleno-Renal (SR) view, then the Cysto-Colic (CC) view, completing the AFAST[®] at the most gravity dependent Spleno-Intestino Umbilical (SIU) view, where abdominocentesis is performed in most fluid-positive patients. The spleen is generally identified in this region (SIU) and then followed by performing a Focused Spleen. In left lateral recumbency the order is analogous with the Hepato-Renal (HR) view replacing the Spleno-Renal view. As with right lateral recumbency, a Focused Spleen is performed *after* completing these 4 views of the AFAST[®] fluid scoring system; however, in left lateral recumbency the Focused Spleen is more problematic as it courses *underneath* the patient to the left kidney.

See more detail on the AFAST[®] Views and their target-organ approach in the “Introduction to Abdominal FAST[®] and Its Target Organ Approach” Proceedings.

AFAST[®]-Applied Fluid Scoring System



The AFAST[®]-applied fluid scoring system is defined as follows (4-point scale): abdominal fluid score (AFS) of 0 (AFS 0) means negative at all 4 views to a maximum score of AFS 4 means positive at all 4 views.

*Low-scoring AFS1 and 2 (<3) are considered major injury/pathology, small volume bleeders.
 *High-scoring AFS 3 and 4 (≥ 3) are considered major injury/pathology, large volume bleeders.
 Modified from Lisciandro, et al. JVECC 2009; 19(5): 426-437, JVECC 2011;20(2); 104-122. Gregory Lisciandro, FASTVet.com, Wiley ©2020.

Note the HRU view has been renamed as the Spleno-Intestino Umbilical (SIU) view. *This material is reproduced with permission of John Wiley & Sons, Inc., Point-of-Care Ultrasound Techniques for the*

The AFAST[®]-applied is hugely impactful and should be assigned and recorded in every patient. It's a simple 0-4 scoring system and has significant advantages over subjective terms of trivial mild, moderate and severe as well as designating positive and negative AFAST views. Recording positive and negative views may help with origin of bleeding or effusion (peritonitis) in lower-scoring patients. For example, in a bleeding trauma patient that has an AFS of 1 and positive at the DH view, that over time becomes a large volume bleeder with an AFS ≥ 3 , logic would dictate the source of bleeding is likely the liver and/or its associated vasculature.

Small versus Large Volume Bleeder/Effusion. The abdominal fluid score (AFS) helps rapidly categorize the patient as a small volume (AFS 1 and 2, or < 3) versus large volume bleeder (AFS 3 and 4, or ≥ 3). AFS 1 and 2 (< 3) do not have enough blood intra-abdominal to directly result in anemia. Thus, if an AFS 1 or 2 is anemic, then there are the following 4 major rule outs: 1) preexisting anemia, 2) bleeding somewhere else - always do Global FAST[®] and a good physical exam, 3) hemodilution (less common with graduated fluid therapy strategies), or 4) lab error. The AFS allows tracking of worsening (increasing AFS), resolving (decreasing AFS), or static (no change in AFS) conditions. Patients also become volume depleted from effusions and thus small versus large volume effusion works for anticipating hypovolemia from fluid loss (without the need for hemoglobin).

Modification of the Abdominal Fluid Scoring System - 0 or 1/2 or 1

Scoring as 0, 1/2, or 1. The author for several years has been categorizing positives as "soft" if the maximum pocket is < 1 cm (< 5 mm in cats) scoring as a "1/2" versus a hard positive if > 1 cm (> 5 mm in cats) making the score a full "1." The small vs. large volume bleeding concept remains as AFS 1 and 2 small volume (< 3), and AFS 3 and 4 (≥ 3), large volume bleeders. Clinical judgment always should be considered; however, this modification provides an option to better assess and semi-quantitate volume in bleeding patients and those with other forms of ascites and peritonitis. The modification of our original scoring system is based on a recently accepted study and an ongoing project.

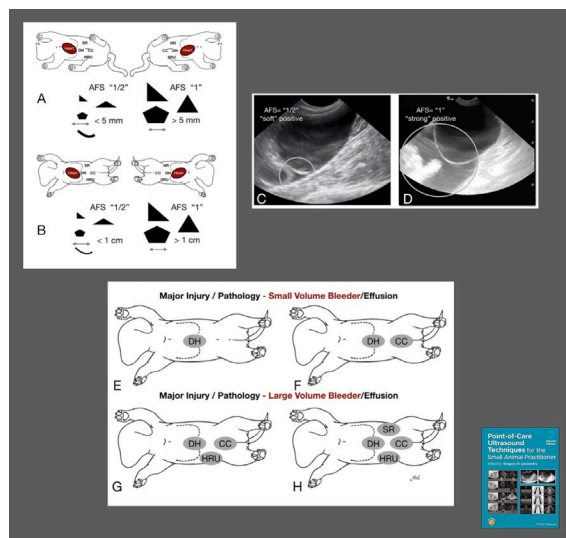


Figure. A cartoon of a cat and dog in lateral recumbency showing the modification of the abdominal fluid score (AFS) to better differentiate between small volume versus large volume bleeding/effusion by

assigning a score of "1/2" or "1" for positive views. For example, a dog may have small pockets at the DH, CC, and HRU (now the SIU view) views of < 1 cm, that would now be considered more accurately a small volume bleeder/effusion with a score of "1 1/2" rather than a "3." This approach may also be translated to non-human primates and exotic companion mammals. *This material is reproduced with permission of John Wiley & Sons, Inc., Point-of-Care Ultrasound Techniques for the Small Animal Practitioner, 2nd Edition, Wiley ©2020 and Greg Lisciandro, Hill Country Veterinary Specialists, FASTVet.com ©2014, 2021.*

Use of Serial AFAST® and Determining the AFS

The use of serial AFAST® and serial application of the abdominal fluid score are imperative to maximize information and improve sensitivity of the exam including searching for fluid, assessing the abdominal fluid score (0-4), and evaluating the presence or absence (and measuring and calculating volume) of the urinary bladder. Perform one more 4-hour post-admission serial AFAST® (better--Global FAST®) in all stable patients and sooner if the patient is unstable or of questionable status. Then continue serial AFAST® (better--Global FAST®) as needed and as part of patient rounds and recheck exams.

Hemoabdomen

***Trauma.** Use small versus large volume bleeder concept. Most dogs and cats are treated medically with titrated fluid therapy, blood transfusions, and correction of coagulopathy when present, with surgery uncommonly needed.

***Non-trauma.** Use small versus large volume bleeder concept. Transfusion needs may be anticipated for a component of supportive care (and correcting coagulopathy when present) in coordination with surgical treatment and other possible interventions for stopping bleeding masses. Canine anaphylactic hemoabdomen is a species-unique medically-treated complication of dogs, and its coagulopathy treated when present. See Canine Anaphylactic Webinar off our website FASTVet.com and our most updated Canine Anaphylactic Proceedings.

***Post-interventional.** Use small versus large volume bleeder concept. As a general rule, large volume bleeders should be surgically (interventionally) treated when, if present, coagulopathy is first corrected.

*Blood may be harvested from clean cavities in both dogs and cats and re-administered to the patient without anticoagulant but with a mandatory blood filter to catch clots from entering circulation.

Expectations for Resolution of Hemoabdomen and Lavage Fluid

FASTVet 48-hour Rule. Expect cavitory bleeding to be resolved or nearly resolved within 48-hours with near negative abdominal fluid scores (resorption of blood by the patient) once bleeding has stopped and coagulopathy, when present, is corrected. When fluid scores persist, especially with large volume bleeders, the cause must be investigated because a major problem is present until proven otherwise. Of note, post-interventional cases should have their abdominal cavity free of fluid at closure when possible, so that positive post-interventional fluid scores may be better interpreted. From author experience and most interestingly, lavage fluid lasts much longer than 48-hours, in contrast to blood, and also inhibits neutrophil function in fighting peritonitis. *Thus, lavage fluid should always be completely removed before laparotomy closure because it persists for several days, unlike blood, in many patients.*

Clinical Indications for AFAST®

The use of AFAST® should be simply stated as an “extension of the physical exam”; in other words everyday applications for nearly every patient. *Global FAST® should be your first line “free fluid and soft tissue screening test” because it exceeds the yield radiographically in the great majority of our patients and part of a work-up as blood and urine testing are.* Think about long list of effusive and soft tissue conditions missed or only suspected by radiography that are detected using the AFAST® target-organ approach.

In summary, AFAST® is an extension of the physical exam and used for triaged trauma, non-trauma and post-interventional cases, your pre-anesthetic test, your geriatric screening test, part of patient rounds and recheck exams, for surveying patients with shock, and part of basic and advanced life support in cardiopulmonary resuscitation.

GOAL-DIRECTED TEMPLATE FOR AFAST®

Patient positioning: right or left lateral recumbency or standing or sternal
Gallbladder: present or absent, contour, wall, content, unremarkable or abnormal
Urinary bladder: present or absent, contour, wall, content, unremarkable or abnormal

Positive of negative at the 4-views (0 negative, 1 positive)

Diaphragmatico-Hepatic (DH) site:	0 or 1/2 or 1
Spleno-Renal (SR) site:	0 or 1/2 or 1
Cysto-Colic (CC) site:	0 or 1/2 or 1
Spleno-Intestino Umbilical (SIU) site:	0 or 1/2 or 1

Total Abdominal Fluid Score (0-4): _____

HR5th Bonus View: 0 or 1/2 or 1 or indeterminate or not assessed (NA)

Focused Spleen (add-on after completing the AFAST® HR Umbilical View): _____

DH View:

Pleural effusion: absent, present (mild, moderate, severe) or indeterminate or NA

Pericardial effusion: absent, present (mild, moderate, severe) or indeterminate or NA

§Hepatic venous distension: unremarkable or present (Tree Trunk Sign) or indeterminate or NA

&Caudal vena cava characterization: bounce (unremarkable) or FAT or flat or indeterminate or NA

#Vet BLUE: B-lines: 0, 1, 2, 3, >3, or ∞ and if Shred __cm, Tissue __cm, Nodule __cm, Wedge __cm

Comments: _____

Note: The AFAST® is a rapid ultrasound examination used to detect the presence of free abdominal fluid and obvious soft tissue abnormalities as a screening test in order to better direct resuscitation efforts and diagnostics, detect complications, and manage patients. AFAST® is not intended to replace a complete detailed abdominal ultrasound exam.

§The hepatic veins should *not* be apparent in both dogs and cats placed in lateral recumbency. When imaged the branching has been referred to by the author as the "Tree Trunk Sign."

&The caudal vena cava can be alternatively referred to as a bounce = fluid responsive cava (~35-50% diameter change); FAT = fluid intolerant cava (distended with maximum height > 1 cm in dogs < 9kg and

> 1.5 cm in dogs > 9kg with little height change [$< 10\%$]); flat = hypovolemic cava (small with maximum height < 3 mm in dogs < 9 kg, < 5 mm in dogs > 9 kg with little height change [$< 10\%$]).

Vet BLUE screens for lung abnormalities along the pulmonary-diaphragmatic interface.

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