NEW ORLEANS — Trauma patients should be evaluated in a systematic manner, with highest priority given to injuries that interfere with vital physiologic functions, according to Timothy B. Hackett, DVM, DACVECC, associate professor of emergency and critical care at the Colorado State University College of Veterinary Medicine and Biomedical Sciences.

“The first clinician on the scene needs to be the whole-picture person,” Hackett said in a session held at the 145th AVMA Annual Convention. “What’s going to kill these animals is not going to be what you can see.” If an animal experiences severe external blood loss, it likely is not going to live long enough to make it to the clinic.

If an animal does survive long enough to present to an emergency clinic, that animal was most likely in good health with normal volume and clotting function before suffering head trauma.

When patients present with fractures that are not life-threatening, Hackett said it is important to look for other more serious injuries than it is to proceed with surgical repair. “Animals don’t usually bleed out into their femurs — people do,” he said. “That can be a big source of blood loss, but I would be thinking about the force that it took to break the leg. What else did it do to the inside of the body?”

The most common respiratory concerns associated with animals presenting with traumatic injuries are pulmonary contusions, followed by pneumothorax, broken ribs and diaphragmatic hernias.

“These are occult injuries, but we have to assume they’re there,” he added.

“Abdominal trauma can cause intraabdominal hemorrhage, rupture of biliary structures leading to bile peritonitis, and/or damage to the kidneys or bladder, causing a uroperitoneum.”

Respiratory injuries are the biggest problem when dealing with trauma patients. The sheer forces that tear the vessels that cause these contusions can come from compression or crushing injuries. “The little dog that was squeezed by the big dog can have some massive damage — not only bleeding into the lungs but also the

---

**Traumatic Hemoabdomen — How Much Fluid?**

For cases of trauma-induced hemoabdomen, Timothy B. Hackett, DVM, DACVECC, recommends caution when administering fluids, even in patients that do not appear to be in terrible shape. An otherwise healthy animal’s own physiologic systems will kick in, he explained, and an abnormal hemorrhage can stop on its own if the animal is given time and support.

Animals can transfuse themselves by recruiting fluid reserves from the spleen and large vessels like the vena cava, Hackett said. The elastic arteries are going to retract, clot and fluid is going to be mobilized from the volume-loaded interstitial spaces and restore vascular volume.

“Then we come in like heroes with IV catheters, plug them in and start giving textbook shock volumes of fluid to these animals. That elastic vessel retracted with a nice clot and can start to bleed again if we raise the blood pressure above where it needs to be.”

The renewed bleeding will be worse than it was in the beginning, he said, because the IV fluids will dilute the patient’s clotting factors.

“We can do harm,” Hackett warned. “If the bleeding is into the abdominal cavity, we might turn a nonsurgical case into a surgical case. If the bleeding is into the lungs, we might turn a patient that’s sort of compromised into a patient that is drowning in blood and going to die from terminal hypoxia from flooded airways. I’ve seen cases in which [the animal] walks in the door under its own power and within a half hour of fluid therapy was bleeding internally, its mentation has changed, it has got strabismus in the eyes, it’s nonresponsive and the abdomen is swelling up.”

Hackett said he will place a catheter and begin a patient on maintenance fluids, but without an objective — or even subjective — indication that the patient doesn’t have enough volume, he will not administer a bolus dose of fluids. Early use of colloid fluids like Hextend is another strategy to avoid complications associated with aggressive crystalloid fluid resuscitation.
airways can rupture and result in sub-
acute and mediastinal emphysema as
well as pneumothorax," Hackett said,
adding that lungs can be punctured if
an animal is hit by a car, “which is
probably why we see so many trauma
cases with pneumothorax.”

Pneumothorax should be consid-
ered in any patient with persistent
shock despite fluid therapy, Hackett
explained. Even small dogs with bite
marks on their neck can develop
pneumothorax as air migrates down
from the torn trachea into the medi-
astinum and pleural space.

Hackett keeps a 3-way stopcock
with extension tubing and a 22-gauge
needle in his crash cart. When a
trauma patient presents with rapid,
shallow breathing and decreased lung
sounds, he quickly tests whether pneu-
thorax will be a problem.

“Some of my colleagues like to get
an x-ray first, but that’s down the hall
and around the corner from where I
am,” Hackett said. “If I can, I prefer
to treat it at the same time I diagnose
it. I also realize that sticking a needle
into a normal chest is going to punc-
ture and possibly lacerate the lungs,
so I want to minimize the amount of
time that the needle is in the chest
cavity. If the thoracentesis is negative
for air or fluid, I remove the needle
as quickly as possible.”

To avoid iatrogenic pneumothorax
during surgery, Hackett recommends
checking for small, nonclinical tears
in the lungs. Obtaining a chest radiog-
raph before inducing anesthesia is a
good idea. Even if the radiograph
shows no abnormal findings, the pa-

tient appears to be healing and clot-
ting well and the lungs are expanding
normally, sometimes an endotracheal
tube and positive-pressure ventilation
during definitive surgery can force air
through the small rents and create
pneumothorax.

“If I’m assisting with orthopedic
surgery on a trauma patient — even
if the lungs look normal on radio-
graphs — I like to make sure the
staff anesthetist [recognizes] tidal
volume. You can measure it directly
with a breathing system, but be-
cause most of us don’t have that, we
want to train our staff to know what
decreasing tidal volume feels like,”
Hackett explained.

“If it’s taking you the whole bag
to bring the pressure up to 20 cm of
water and you come back 15 min-
utes later, touch the bag and the
needle jumps up, that’s decreased
tidal volume. That variable is going
to change substantially before the
pressure drops, the oxygen satura-
tion drops or anything bad [like
that] happens. If we’re watching

pulse oximetry and tidal CO₂, it will
have to be a tension pneumothorax
before those variables start to
don’t have to worry
about a little air getting into the
pleural space. But remember, when
you make that hole through the
chest wall, you want to go through
the intercostal muscles and dissect
to make sure you’re not just forcing
it through, potentially traumatizing
the heart or great vessels. I used to
think it couldn’t be done, but when
the blood started to spurt out of a
chest tube as soon as it was forced
through the intercostal muscles, I
became a believer.”

Dr. Hackett reported no potential con-
lict of interest relevant to this article.

For more information:
Hackett TB. Common complications of
trauma: a case-based review. Presented at:
The 145th AVMA Annual Convention.