

what's the take-home?
INSIGHTS FROM CLINICAL CASES . PRESENTATION

Shock Fluid Therapy in Cats

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A 4-year-old, intact male cat presents to your clinic after being hit by a car earlier in the afternoon.



Courtesy Dr. Deborah S. Greco, The Animal Medical Center

Physical Examination. Information obtained during the primary assessment is shown below.

Primary Assessment Findings

- _____ Lateral recumbency
- _____ Rectal temperature, 93° F
- _____ Pale mucous membranes
- _____ Weak femoral pulses
- _____ Heart rate, 140 beats per minute
- _____ Respiratory rate, 60 breaths per minute

In addition, you are unable to measure capillary refill time or obtain Doppler blood pressure, but you are able to place a catheter in the cephalic vein. Secondary assessment reveals a fractured left tibia.

ASK YOURSELF. . .

What is the most important initial aspect(s) of shock therapy in this cat?

- A. Immediate administration of 60 ml/kg of IV crystalloid fluids
- B. Immediate administration of 10 ml/kg of IV hetastarch
- C. Aggressive external rewarming of the thorax and abdomen
- D. Administration of small IV boluses of crystalloid (15 ml/kg) or colloid (2 ml/kg)
- E. C and D

continues

Correct Answer: E
Aggressive external rewarming of the thorax/abdomen and administration of small IV boluses of crystalloid (15 ml/kg) or colloid (2 ml/kg)

Fluid resuscitation in cats and dogs is as different as cats and dogs. A triad of clinical signs seems to occur during shock in cats: bradycardia, hypothermia, and hypotension. Cats have vagal stimulation as well as sympathetic stimulation when baroreceptors have detected low blood pressure. Vagal stimulation may blunt the typical response of tachycardia. Decreased blood flow to the periphery contributes to hypothermia; as hypothermia progresses, peripheral vasoconstriction is replaced by



vasodilatation, which continues peripheral heat loss. Hypothermia decreases the ability of the hypothalamus to respond to hypothermia. Hypothermia also decreases blood vessel responsiveness to catecholamines that would

normally cause vasoconstriction during shock. The result is persistent vasodilatation, continued low blood pressure, and hypothermia—a classic vicious cycle of events.

Aggressive Rewarming

Understanding the changes that occur during shock in cats leads us to better understand the approach to general therapy and fluid therapy. Although scientific evidence is not yet available to substantiate this finding, my own clinical experience and that of others indicates that one of the keys of general initial therapy of a cat in shock is aggressive rewarming. Because of the high incidence of cardiac dysrhythmia in accidental hypothermia, electrocardiographic monitoring should be instituted. External rewarming of the thorax and abdomen without incorporating the extremities results in the best clinical effect.

Caution with Fluids

Initial fluid therapy should be used with caution during hypothermia because of the potential for fluid overload after rewarming. The blood vessels during hypothermia are not responsive to catecholamines and remain dilated, showing clinically as persistent hypotension. The intuitive response to persistent hypotension is continued fluid therapy. Once the cat becomes normothermic, however, the vessels can then respond to catecholamines and constrict on the “added volume.” The fluid may then leak from the vessels, resulting in pulmonary edema.

What to Use

The standard recommendations of crystalloid (50 to 70 ml/kg IV bolus) and colloids (hetastarch, 10 to 15 ml/kg IV) may cause volume overload upon rewarming. An initial bolus of crystalloid at reduced doses (10 to 15 ml/kg IV) or colloid at reduced doses (2 to 3 ml/kg IV) should be used during hypothermia.

TAKE-HOME MESSAGES

- **Cats in shock that are also hypothermic should initially be treated with aggressive rewarming and conservative fluid therapy until normothermia is established.**
- **Oxyglobin use in cats in shock is not recommended at this time.**

How to Proceed

Aggressive rewarming should commence. Warm water bottles covering the majority of the abdomen and thorax, separated by a single sheet or towel to prevent burns; circulating warm water blankets wrapped around the thorax and abdomen (prewarmed is preferable to prevent further decrease in body temperature upon application); neonatal beds (my preference); and neonatal incubators are the most common and effective ways to provide external warming. Bair Huggers (Arizant Healthcare, Eden Prairie, MN) may not be as useful as they tend to maintain body temperature and do not necessarily warm the animal. Warm the parenteral fluids (consistent temperature > 100° F) to facilitate the warming process. Once the temperature reaches 98° F, recheck blood pressure. Treat persistent hypotension with the same dose of crystalloid or hetastarch until systolic blood pressure exceeds 90 mm Hg. Continue crystalloids at a maintenance rate to maintain blood pressure after rewarming. If volume overload occurs after rewarming, administering furosemide (2 to 4 mg/kg IV) as well as stopping fluid therapy can help.

Note: Oxyglobin (Biopure, Cambridge, MA) should not be administered to cats in shock. More information on the use of this agent is required before a specific recommendation can be made on administration to cats in shock. ■

See Aids & Resources, back page, for references, further reading, and contacts.