

FACT after FAST? : Trauma CT Examinations Required in Veterinary Medicine

Ai Hori
Sapporo Night Veterinary Hospital
(Diagnostic Imaging)

1

Conflict of Interest (COI) Information

The presenter has no financial or personal relationships to disclose.

2

What is FACT?

- Focused assessment with CT for trauma (FACT)
: **Whole body imaging** with CT for **rapid evaluation**
in 2-3 minutes.

The readings include "hematoma," "pneumothorax" . . .

Screening test for "Killer disease"
※ "Killer disease" : **life-threatening disease.**

*Adopted as a guideline for initial treatment of trauma patients (JATEC)

3

Usually a CT scan is...

- clinical condition
- blood test
- radiology
- ultrasonography

CT = Purposeful examination
under general anesthesia

Is full body scanning appropriate?

4

Emergency physicians vs. diagnostic imaging physicians

- "I want to know exactly where the trauma site is."
Secondary injuries in areas unrelated to the trauma site
~ I want to move on to treatment quickly~
- "I want to shoot where I need to be, for as long as I need to be there."
: exposure to radiation
: Purposeful photography prevents misdiagnosis
: Contrast Timing . . . Never Miss a Contrast Timing
~Is it safe to go in for CT scan with the condition?~

5

Usefulness of FACT (persons)

- In human medicine, 1997 - reported usefulness in many cases
- Avoiding **Preventable Trauma Death (PTD)**

By taking the appropriate steps
raise the survival rate

6

FACT

Is it same in veterinary medicine?

✔ FACT imaging - reading points

7

Hurdles in Veterinary Medicine

- cost
Not "medical care".
: How well does it work?
- Anesthesia
- Is that really necessary in the first aid?



8

FACT ~ with a personal view~.

9

FACT Timing: Difference from FAST

Primary survey : **ABCD** "You need to take action now."
⇒ **FAST**

Secondary survey : Evaluation of general condition
Determine the cause and treat ⇒ FACT

Basically, if **ABCD is in place**, go to the root cause.

10

"What's a well-organized situation?"

Primary survey : ABCD

...bleeding? From where?
... brain? Tumor? Bleeding? Stroke?

Secondary survey

State that can be moved from bedside
No continuous monitoring required
⇒ CT scan is possible

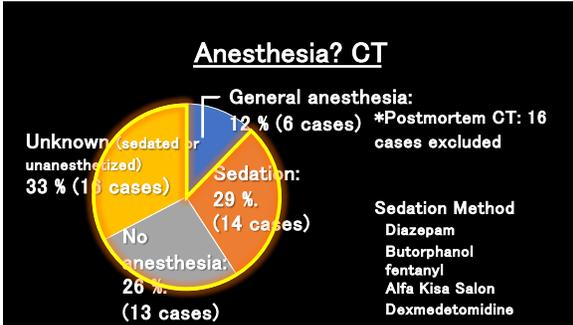


11

Anesthesia?

- Give up CT because I can't do general anesthesia? **NO!**
- Survey conducted at Sapporo Night Veterinary Hospital (retrospective study)
CT performed with sedation or without anesthesia
.....43 / 65 cases
*Excluding 16 postmortem CT cases
: general anesthesia scheduled for post-CT surgery and endoscopy.
MRI scan with sedation and no anesthesia 10 / 33 cases (brain)

12



13

FACT is a full body scan (Pan scan)

Tips!

- Set up various reconstruction.
- Take several scanning (including contrast CT)

...There are motion artifacts under no anesthesia or sedation

• In humans, : head and thoracoabdominal contrast radiography (venous and equilibrium phases)

14

FACT reading : 3 STEPS

- 3-step reading
- (1) 2-3 minutes to assess rough systemic damage (FACT)
- (2) Search for active bleeding and damaged areas requiring emergency treatment
- (3) Check for minor damage sites not related to life or prognosis.

The important thing is to shoot for Killer disease.

15

FACT reading

- (1) Head : Intracranial hemorrhage requiring craniotomy
- (2) Chest (in mediastinum): Intradiastinal hemorrhage · Pericardial effusion
- (3) Chest (intrathoracic): hemopneumothorax, pleural effusion, extensive pulmonary contusion
- (4) Abdomen ⇒ to caudal side: blood and qi abdomen
- (5) Skeletal and retroperitoneal: hemoperitoneum and ascites Fracture / Dislocation
- (6) Injury to parenchymal organs

16

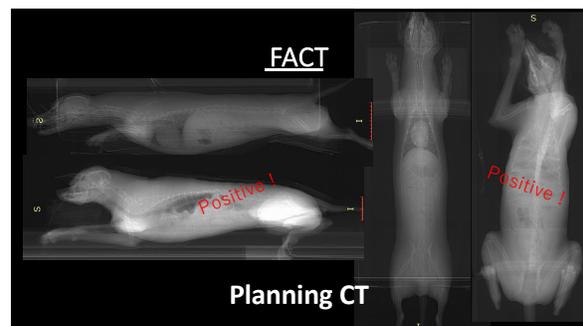
FACT reading

- 1) Head : Intracranial hemorrhage requiring craniotomy
- 2) Chest (in mediastinum): Intradiastinal hemorrhage · Pericardial effusion
- 3) Chest (intrathoracic): hemopneumothorax, pleural effusion, extensive pulmonary contusion
- 4) Abdomen ⇒ to caudal side: blood and qi abdomen
- 5) Skeletal and retroperitoneal: hemoperitoneum and ascites Fracture / Dislocation
- 6) Injury to parenchymal organs

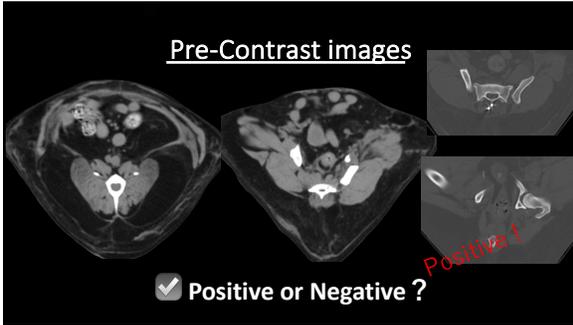
- ✓ Fluid retention (bleeding)
- ✓ Free air
- ✓ Substantial organ damage
- ✓ Obvious fracture or dislocation

Positive or Negative

17



18



19

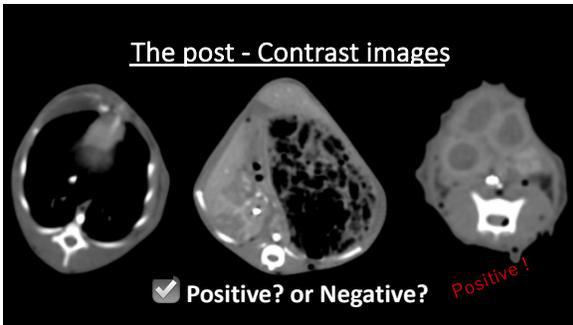
Contrast CT?

- Do I need a contrast CT? → YES!
- *Caution: obvious acute renal failure

Active bleeding
Injury to intraparenchymal organs
Thrombus
...Other

} We need a contrast CT.

20



21

FACT: Step 2

- Whether FACT is Negative or Positive, go to Step 2
- : active bleeding and damaged areas requiring emergency treatment

- (1) Active bleeding : Which space are you bleeding in? is important
- (2) Presence of free air in the abdominal cavity (intestinal injury)
- (3) Cranial nervous system

22

FACT: Step 2

- Ascites accumulation! → CT values
- Coagulated blood

"sentinel clot sign"

- CT values are higher closer to the bleeding site
- CT values are lower far from the site of hemorrhage (free ascites)

Liquids close to water (urine, bile, intestinal fluid)	: 0-15 HU
Uncoagulated extravascular blood	: 30-45 HU
Coagulated blood	: 45-70 HU

Lubner M et al. 2007;27:109-125.
Orwig D, et al. Am J Roentgenol 1989;153:747-750.

23

Hemorrhage(1): Sentinel clot sign

- A region of high CT value adjacent to an organ, already high CT value before contrast CT

https://qqct.sakura.ne.jp/seminar_answer_id_1864.html

24

Sentinel clot sign

- Sentinel clot sign in 16/19 dogs with intra-abdominal bleeding
- **Sentinel Clot Sign: CT value 43-70 HU (median 56 HU)**
- Ascites portion: CT value 20-45 (34HU)

Specchi S, et al. 2017. vet Radiol Ultrasound. 58(1):18-22.

*CT values for ascites are For properties, original Ht, and spread
Note that it varies depending on

***Tips!**
WL50: WW200

Fig. 1. Transverse (A) and postcontrast (B) multibed/coronal contrast-enhanced CT images of a dog with hemoblastosis. Note the presence of a large amount of ascitic effusion consistent with blood. There is an irregular area of contrast enhancement of the peritoneal surface in the ventral aspect of the spleen with no contrast enhancement (arrow heads) consistent with a "sentinel clot sign".

25

Hemorrhage(2): Extravasation

- Extravasation of contrast media = active bleeding
- **Contrast media leakage near the sentinel clot sign**
- ... Arterial and equilibrium phase comparison

• If there is too little ascites fluid, the sentinel clot sign and extravasation are not described clearly.

Specchi S, et al. 2017. Vet Radiol Ultrasound 58(1):18-22.

Fig. 4. "Hemorrhagic" (A) and postcontrast (B) multibed/coronal contrast-enhanced CT images of the same patient as Fig. 2. Note the presence of contrast extravasation (arrow heads) consistent with active bleeding. There is also a large amount of ascitic effusion consistent with blood. There is an irregular area of contrast enhancement of the peritoneal surface in the ventral aspect of the spleen with no contrast enhancement (arrow heads) consistent with a "sentinel clot sign".

26

Where is hemorrhage coming from?

- Hemangiosarcoma is said to have a similar contrast pattern

Pintar J, et al. 2003. J Am Anim Hosp Assoc. 39:518-22.

Where does the hemorrhage actually begin and end? Is it hemangiosarcoma?
→ Not certain.

27

Hemorrhage (3): damage to parenchymal organs

- Organs damages
 - : Presence of areas of **poor contrast**
 - • Arterial phase: Uneven contrast.
 - Check equilibrium phase
- Gastrointestinal tract injury
 - : Presence of free air in the abdominal cavity
 - : Alterations in the wall structure of the diges^t
 - : Peritonitis findings

28

(1) Free air

- check different WW/WL.
- Find the perforation site
Suspect and look for luminal organs in the vicinity.
Gastrointestinal mucosa continuity defects
: definitive if leaking gas is seen.

29

Findings of gastrointestinal perforation

- Accuracy of pneumoperitoneum detection in dogs and cats (X-ray examination)
 - : Accuracy depends on experience level.

Marwood R, et al. 2022. Vet Rec. 191(9).
- Ultrasonography tends to underestimate the number and size of lesions
Is surgical intervention necessary? Not Necessary?
 - : Under-estimation

Shanaman MM. 2013. vet Radiol Ultrasound. 54(6):591-604

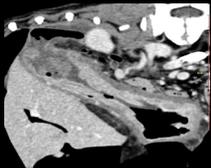
Gastrointestinal perforation is a "Killer disease"

30

(2) Contrast abnormalities of the intestinal wall

Wikipedia, the free encyclopedia

- **Janus sign** (sensitivity 10-15%, specificity 90%)
: Sometimes the side being contrasted is damaged.
- **Gastrointestinal mucosa continuity**
- Intestinal thickening (persons)
When: mild thickening

Cho HS, et al. 2013. Korean J Radiol. 14(4):607-15.

31

Case: Bite Wound

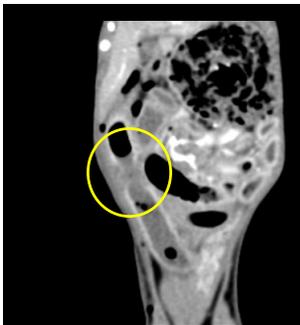
Hemorrhage /infection by perforation of the abdominal wall ?

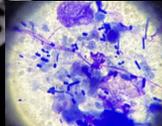
- Mix cat one month old
- Shock
- 1 cm bite wound on the right abdominal wall.
- FAST Positive



ASCITE

32

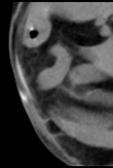




33

(3) Peritonitis findings

- Fat stranding = Hazy image of intra-abdominal fat
: Fat : -100 to -160 HU → -40 to -60 HU Jang S, et al. 2022. J Vet Sci. 23(6).
- Nonspecific findings, but useful when looking for etiology adjacent organs are often affected.



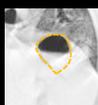
34

Chest trauma: 8 Points

(i) Injury to trachea and bronchi
: mediastinal emphysema and subcutaneous emphysema

(ii) Pulmonary contusion
: mottled, reticulated, diffuse consolidation
Pulmonary sclerosis
Traumatic pulmonary emphysema

*Underestimated immediately after injury, more pronounced 24-48 hours later in X-rays




35

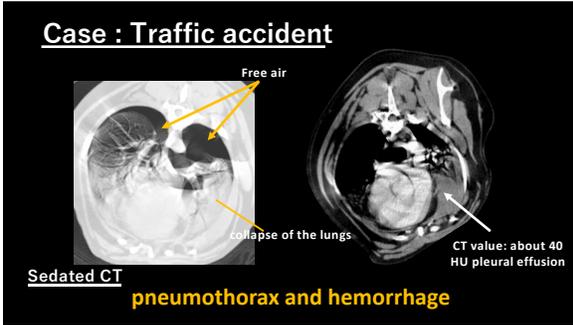
Case : Traffic accid

- Akita dog, 5 years old
- Hit by a car.
- awareness is clear
- able to walk unaided
- cyanosis
- Shallow rapid breathing
- Blood pressure 100/60 mmHg

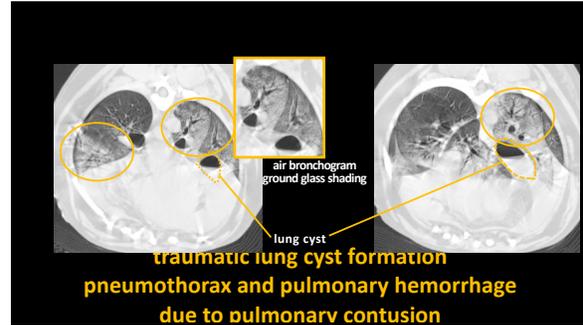
Pneumothorax and hemothorax pulmonary contusion



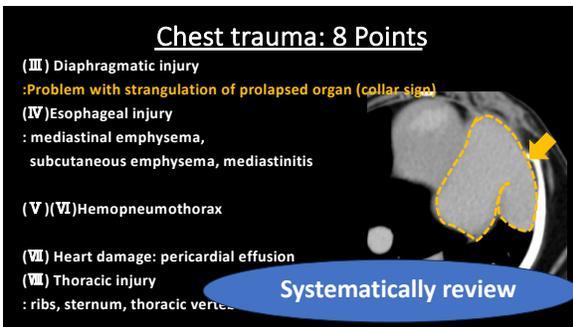

36



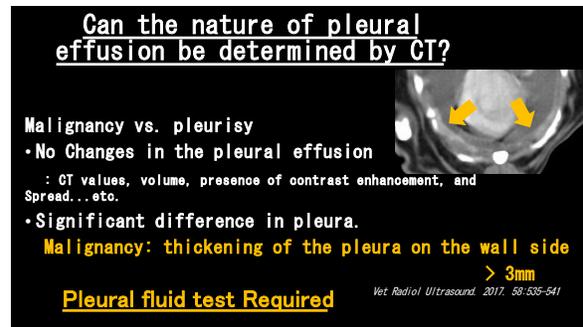
37



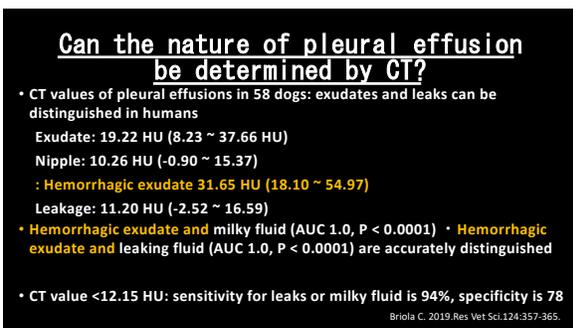
38



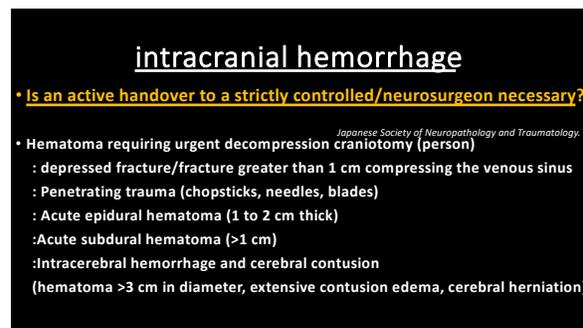
39



40



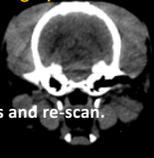
41



42

Observation of the central nervous system

- Three reconstruction : soft tissue, bone, and brain
 Brain : WW 80 - 100 / WL 30 - 40
 MPR (sagittal, dorsoventral, and transverse images)
 + 3D
- • • Beam Hardening artifacts
 : You can also change the shooting conditions and re-scan.



43

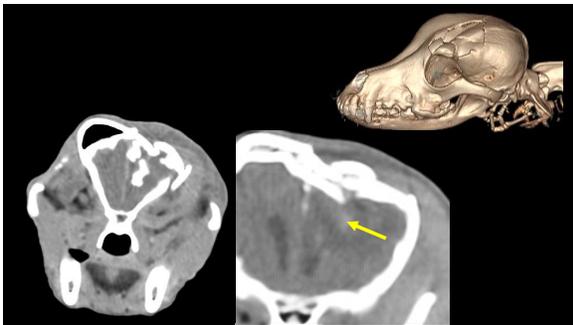
Case: Head injury

- Toy poodle, 17 years old
- Hardball hit, nose bleeding

skull fracture
 cerebral contusion
 With internal medicine therapy...?



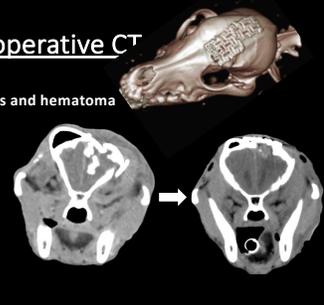
44



45

postoperative CT

- Removal of bone fragments and hematoma
- Food and drink available
 Discharged in a week
- Lacosamide levetiracetam
 Epilepsy controllable



46

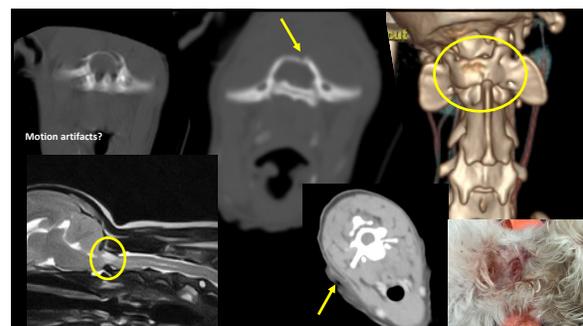
Case: Bite wound

- Maltese 4 years old
- shock
- Tetraplegia

spinal cord injury

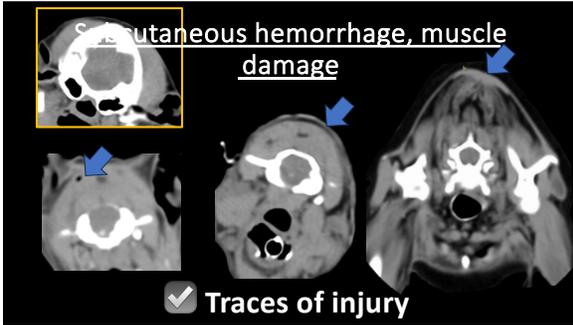


47



Motion artifacts?

48



49

summary

- What is FACT...
 Whole body scan to check for abnormalities within 2 to 3 minutes after imaging.
- Three-step reading is the basic approach, concentrating only on finding "killer diseases."
- The trick to finding anomalies is to Change the conditions, use contrast, take several scans.
- No anesthesia need be applied.

Emergency CT: The goal of emergency CT is to **find Killer disease.**

50

If you can do it, not vs....

- Traumatic diseases are a race against time.
- If possible, as a team as well as human medicine.

I hope emergency CT could be developed.

Question?

51

3rd Veterinary Emergency & Critical Care International Symposium
 March 14-15, 2026

VENUE
 Ariake Central Tower Hall & Conference
 5-7-18 Ariake, Koto-ku Tokyo, Japan 135-0063

WEBSITE
www.event.javeccs.com/en

CONTACT US
info@javeccs.com

SIGN UP TO USE OCCS EARLY BIRD ACCESS!

第3回日本獣医救急集中治療学会国際シンポジウム
 2026年3月14日(土)-15日(日)

会場
 有明セントラルタワーホール&カンファレンス3F・4F
 〒135-0063 東京都江東区有明3-7-18 有明セントラルタワー

お問い合わせ
www.event.javeccs.com
info@javeccs.com

※本イベントは、JVA/VECCSの共同主催によるものです。

IN PARTNERSHIP WITH OUR PLATINUM SPONSOR **VECCS**

52