Follow the Clues: Suspicious Indicators and Common Findings of Abuse

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How Veterinarians May Become Involved In Animal Cruelty Cases

- As a witness or reporter of abuse
- Working with or at request of local humane society, animal shelter or law enforcement
- Request by attorney as an expert or consultant

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Why is it important to report?

- Animal abuse should be considered an indicator of other problems in dysfunctional and violent households. (Arkow 1995)
- Human and animals at risk
- Vets are protectors of animal health and well-being
- Frontline to see cruelty: if not you, then who?
- Failing to report outcomes: continued suffering, injury, death

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Key to Remember

- Do not need to prove cruelty prior to reporting
- Cruelty comes in many forms: physical trauma, mental/emotional abuse (can be considered torture), neglect
- Reporting *suspected* abuse
- Reporting initiates an *investigation*

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Link to Criminality

- Child abuse, elder abuse, DV
- DV: Link with sexual abuse of animals
- Juvenile drowning of animals and sex with animals greatest predictors of becoming adult sexual offender
- 5x more likely to commit violent crimes
- National Sheriff's Assoc
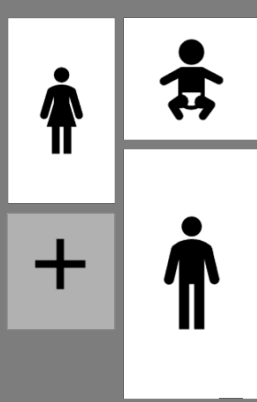- Tracked by FBI/BAU

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Domestic Violence

- In the US, 1 in 3 women will experience DV
- WHO: **1 in 3 world-wide**
- 88% of pets in DV homes will be threatened (emotional abuse, terrorized), injured or killed
- 65% will delay or not leave home without pets

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Animal Abusers

- Can be anyone: men, women, children, any profession or socio-economic class
- Long term clients regardless of history: life changes, new people in home, children
- Hoarders: predisposing factors, can become hoarder later

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Cruelty in the Practice Setting

- Most common type of cruelty: neglect
- Most common source of physical abuse: domestic violence
- Abuse most commonly missed: sexual abuse
- Cause of blunt force trauma commonly missed
- Most common failures: not reporting, failure to document, photograph

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Determining Non-Accidental Injury

- Index of suspicion: when exam findings not supportive of history, investigation, crime scene findings, environment/husbandry
- Context important
- Rely on experience and publications of findings in accidental or natural (disease) causes
- NAI should always be on R/O list
- **Look at client's history for all pets**

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Suspicious Indicators of NAI

- Most pathognomonic features of physical abuse: repetitive injuries and/or multiple stages of healing
- History of unexplained self-resolving symptoms/injuries
- Similar injuries other animals
- Unexplained deaths or disappearances
- List of animals in same home only seen once at vet; pets never live long or always 'run away'

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Suspicious Indicators

- A particular person was implicated
- History or explanation is inconsistent with injury
- Changing the history
- Violence in the home
- Prior injury/death of another pet from same owner or household
- High pet turnover

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Suspicious Indicators

- Owner behavior: aggression, discomfort, embarrassment, apathy, anger, indifference
- Animal behavior: fear, anxiety, aggression
- Vet hopping: various, new vets
- Inappropriate delay in presentation
- Certain types of injuries and fractures

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Children as the Abuser

- Must report - child and animals at risk
- Depending on age, no arrest - intervention
- Investigation, home assessment, court ordered action
- Show your Soft Side Campaign Posters

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Animals At Risk

- Dogs and cats < 2yrs old
- Younger: harder to manage, aggravating, destructive – risk from owners, neighbors
- Older: new person, child
- Male dogs: more aggressive, preferred by violent offenders
- Large-Giant breed dogs: sexual abuse

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Feline Cruelty

- Greater likelihood of death than abused dogs, including hoarding
- Greatest variety of cruelty inflicted- multiple methods
- Most frequent target of all abuse: Burning, fractures, torture, beating, mutilation, suffocation, drowning, thrown (general, from height)

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Animal Behavior Indicators

- Behavior problems that are anxiety driven, especially if associated with new people in home
- Extreme fear reactions
- Inappropriate response to environment, e.g. shutdown
- Extreme reaction/guarding of specific regions of the body
- Fear, anxiety, distress to certain stimuli: people, items, sounds, smells,
- Behavioral indicators of pain

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Animal Behavior

Record	Record activity level, interaction with people/animals
Consider	Consider what the behavior response could have been to the alleged abuse or neglect
Obtain	Obtain info from investigator of animal's behavior prior to presentation
Discuss	Discuss findings with investigator

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Cat Case:

- Female owner presents for behavior consult
- 2 yr old, F/S Persian, indoor only in apartment
- When boyfriend enters residence or room where cat is, the cat freezes, screams, urinates and defecates, then flees the room
- Analysis?
- Outcome:

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Special Considerations: Grooming

- Commonly work alone, unsupervised or intermittent supervision
- Abuse: groomer frustration, lack of assistance, reaction to animal's resistance
- Injuries may go undetected by owner (head trauma, ribs, abdomen)
- May dismiss behavioral signs: e.g. hiding, reluctant to be picked up, change in appetite

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Brazil Research: Grooming Deaths

Distribution of anatomopathologic lesions in dogs that suffered trauma. Sao Paulo, 2004 – 2009

Lesion	Quantity	Percentage
Injury to the brain	25	86.2
Hematoma in cephalic region	20	68.9
Skull fractures	12	41.3
Hemothorax/hemoperitoneum	7	24.1
Dislocation of atlanto-occipital joints	4	13.7
Hematoma-cervical, thoracic, abdominal region	5	17.2
Viceral Ruptures	5	17.2

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Grooming: Risk Management

Consider video cameras in grooming area

Window to area, open doors, routine checking by designated personnel

Proper equipment, restraint training

Ensure has adequate staff assistance and support

Discuss sedation alternatives: when to use, support by staff

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Drug Epidemic: Pets as Pawns

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Ohio Case

The dog owner was addicted to hydrocodone cough syrups. This owner also visited several veterinarians a month with his dog, but with a different twist. The pet owner actually had his dog trained to cough while with the doctor.

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Documented case in Fairfax County: (Summer of 2016)

Dog owner brought his ten-year-old Boxer to six different veterinarians for treatment.

Dog owner reported the following symptoms:
- Separation anxiety
- Fear of thunderstorms
- Chewing trim of flooring
- Urinating on pillows

Pet owner also reported that the dog was in pain from a dislocated kneecap.

Owner received Xanax and Tramadol from multiple veterinarians during the same period of time. He also received early refills. The owner was charged with Prescription Fraud

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Slide 25

Fairfax VA Police: Vet Brochure

How to recognize a veterinarian shopper?

- New patients bringing in seriously injured animals.
- Old, incomplete or missing veterinary care records.
- Describing symptoms that are inconsistent with the exam
- Describing signs and symptoms requiring specific medications
- Requesting medications by name (like Tramadol or Xanax)
- Refusing specific medications
- Requesting early refills of medication
- Claiming medications were lost or stolen.
- Requesting refills while missing appointments
- Aggressive pet owners

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Slide 26

Fairfax Brochure

Practices to minimize drug diversion:

- Thorough documentation when prescribing narcotics.
- Protecting access to prescription pads
- Maintaining strict refill policies
- Asking patients to return unused portions of ineffective medication
- Minimizing the use of medication often used to treat people
- Looking for signs of abuse during physical examinations
- Contacting police when veterinarians see suspicious behavior

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CRUELTY MOST COMMONLY SEEN IN PRACTICE
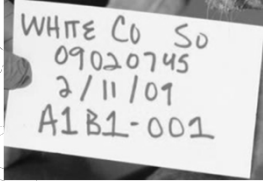**Examination Findings and Considerations**

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Slide 28

Preparation for Examination

- Animal is part of the crime scene
- Need to anticipate and prepare for documentation, evidence collection
- Avoid initiating treatment that can compromise evidence
- Photos and video: where most common mistakes made

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Slide 29

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Photography

- Start with general photo of entire body w/case number, animal ID, and date to start series on photo card
- May start with just photo of info
- Make sure photo card clear of prior images

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Slide 30
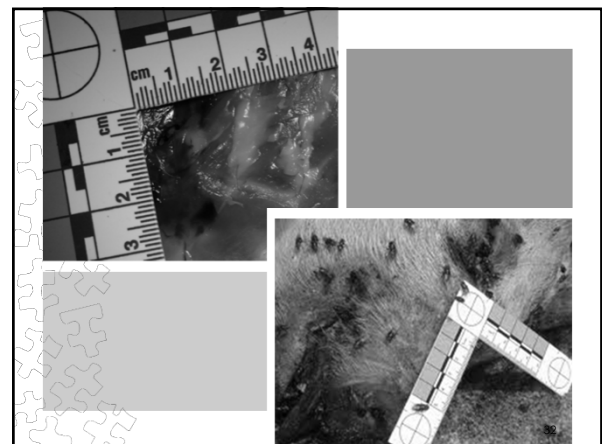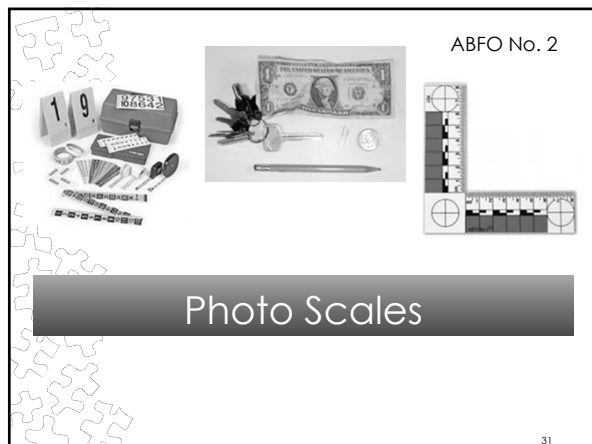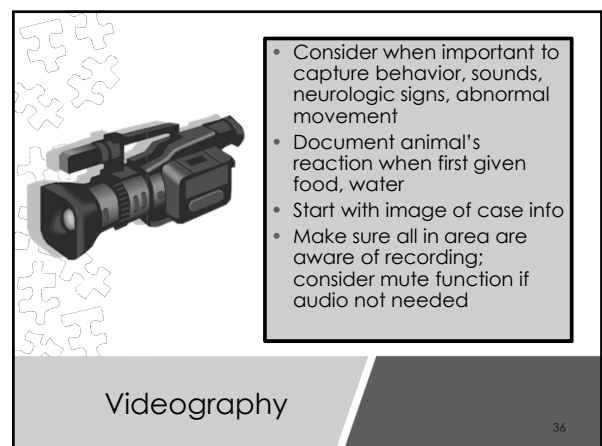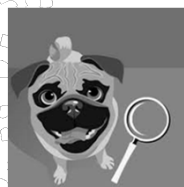
Photography

- Start with minimum 5 views: front, both sides, dorsal, rear, +/- ventral
- Make sure clear pictures, but never delete any photo! Can alter if keep original
- Take distant, mid-range, then close-up photos
- Take photos at 90 degrees
- Take photo of evidence prior to collection
- With and without photo scale – physical evidence, exam findings; when size/shape matters

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ABFO No. 2

Photo Scales

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- Can use small labels, arrows for close-ups
- Take photos before and after treatment, shaving, when evidence changes, the animal improves
- Dog fighting – all sides of legs = bites
- Download in original sequence
- Organize in separate folders on computer by animal ID but keep original series

Photography

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Photography

- Start with external packaging, bag; shipping labels
- Photograph as open each layer of packaging
- Showing chain of custody
- Keep Photo Log

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PHOTO LOG SHEET Page __ of __

Agency: _____

Case Number: _____

Date of Incident/Exam: _____

Photographer: _____ Assisted By: _____

Digital CD Copies: ____ Provided to: _____

Photo #(s)	Notes

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- Consider when important to capture behavior, sounds, neurologic signs, abnormal movement
- Document animal's reaction when first given food, water
- Start with image of case info
- Make sure all in area are aware of recording; consider mute function if audio not needed

Videography

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Identify the Evidence

- What is it and what function did it serve?
- What relationship does it have to other items of evidence or to the scene itself?
- How does it relate to the scene, victim, or suspect?
- How it is part of the criminal event?

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Animal as Part of Crime Scene: Considerations

- Live – prevent evidence loss, contamination, animal removal: E-collar, assign person to supervise
- Exam asap with sexual abuse – investigator should be present during exam, collection of evidence during exam
- Document bruising – can change by exam, use photo scale

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Do not bleed much from skin, lack of detectible bruising

Time lapse for bruising to be seen – indicator of significant trauma, R/O clotting disorders

Will not lift tail if rear injury, may walk on fractured leg

Undetected fractured rib(s)

Evidence inside ear, eye

Often BFI assoc w/other types of abuse

Hidden Findings with Abuse: Considerations

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Blunt Force Trauma

Head Trauma

Fractures

Skin bruising – significant hemorrhage

Subcutaneous bruising
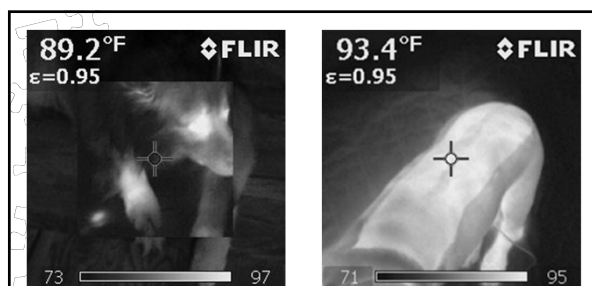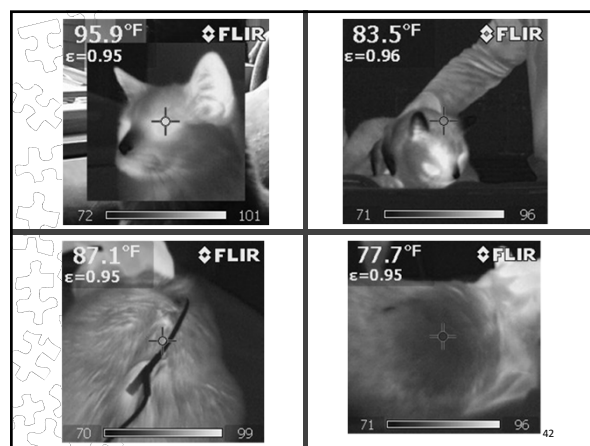
Deep tissue injury

Muscle Injury – Increased CK/CPK

Pain

Nothing

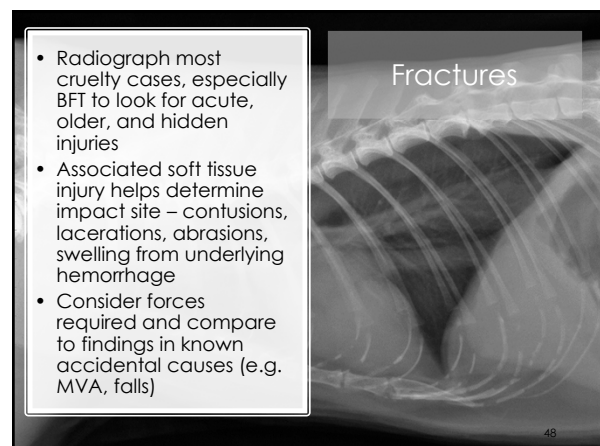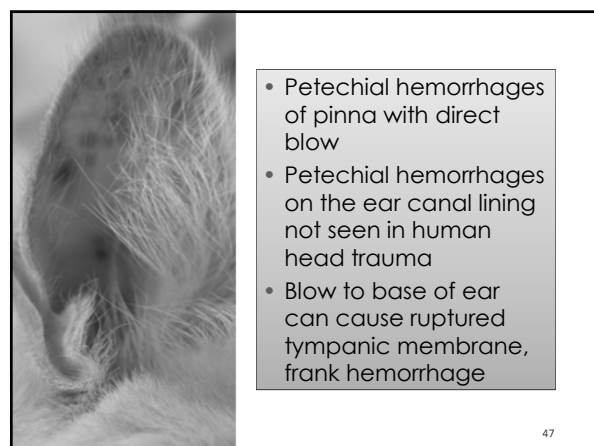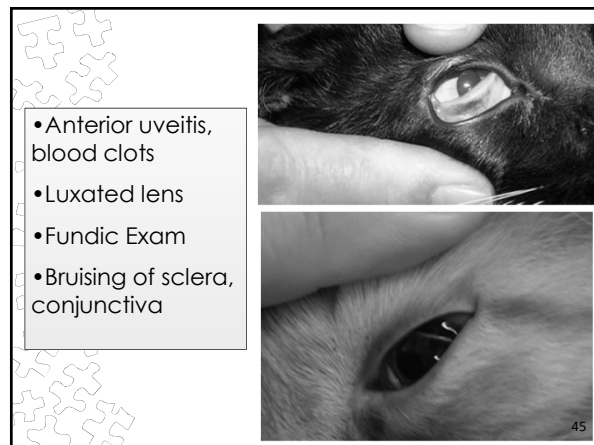Thermal imaging - FLIR Camera

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Thermal Imaging

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FLIR for Smart Phones: $200-400 USD

INTRODUCING THE NEXT GENERATION

FLIR ONE° PRO

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- Anterior uveitis, blood clots
- Luxated lens
- Fundic Exam
- Bruising of sclera, conjunctiva

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- Petechial hemorrhages of pinna with direct blow
- Petechial hemorrhages on the ear canal lining not seen in human head trauma
- Blow to base of ear can cause ruptured tympanic membrane, frank hemorrhage

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- Radiograph most cruelty cases, especially BFT to look for acute, older, and hidden injuries
- Associated soft tissue injury helps determine impact site – contusions, lacerations, abrasions, swelling from underlying hemorrhage
- Consider forces required and compare to findings in known accidental causes (e.g. MVA, falls)

Fractures
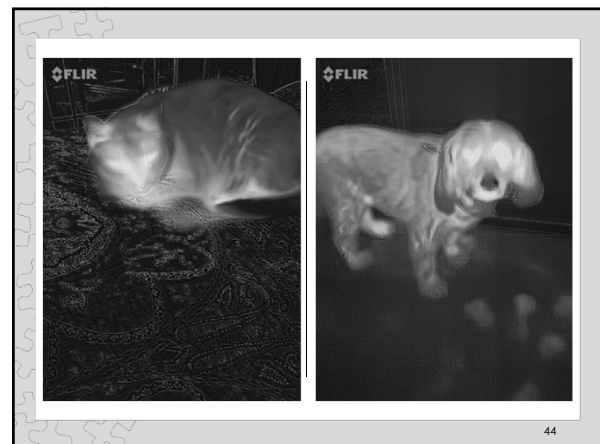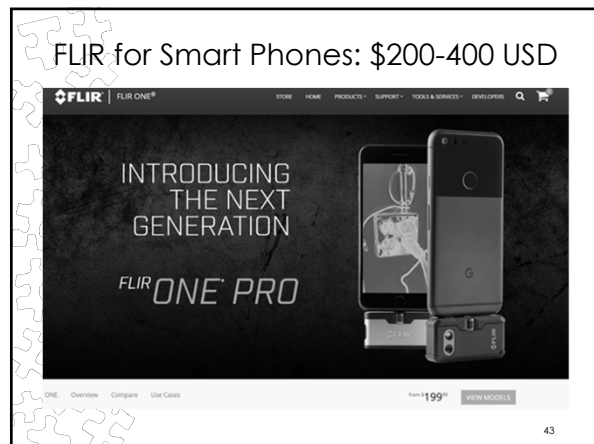
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Suspicious Indicators: Fractures

Multiple fractures	Fxs occurring in >1 body region	Healing fxs – delayed presentation
Fxs with different stages of healing	Transverse fxs	Depressed rib fractures

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Bone Injury

- Considerations: bone type, density, growth plate closures, fracture location, age and size of the animal
- Transverse fx = perpendicular force
- Oblique = direct compression
- Spiral fx = rotational force
- Butterfly fx = point of V indicates directionality
- Broad weapon vs. narrow – force displacement
- Normal expectations: Dislocated hip w/caudal displacement
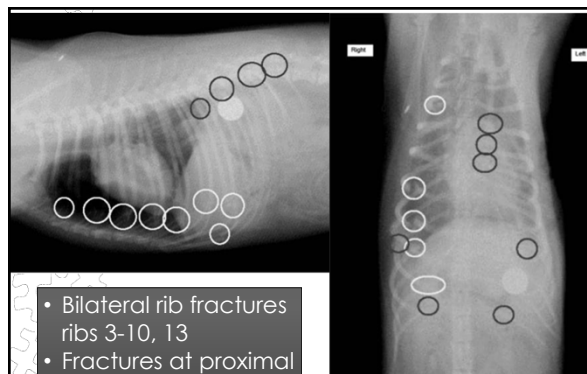
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Rib Fractures

Can be hard to detect on radiographs; may need to do multiple views

Necropsy/palpation- healing tissue, callus

Determining cause: consider forces, size/age of animal, alleged weapon or events

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- Bilateral rib fractures ribs 3-10, 13
- Fractures at proximal ribs and CC's

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Motor Vehicle Accident Injuries

- Depends on where hit, speed of vehicle, secondary impacts
- Body tossed into air, rolled, run over, dragged
- Dirt and debris on fur COMMON
- Skin abrasions
- Frayed nails - cats
- Contusions
- Fractures – depends on impact site

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MVAs

MO Study: 80% struck on left side in US

Theory get hit when crossing first lane and decreased driver reaction time

Coup-contracoup effect with middle lung lobe collapse: heart impacts left thorax and bounces into right middle lung lobe causing contusions and/or collapse

Other studies: rib fractures uncommon (3%)

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MVA vs NAI: 2016 Retrospective Study Tufts University

TABLE 2—*Odds ratio in favor of non-accidental injury (NAI) for injuries found to be statistically significant through chi-square analysis.*

Injury	NAI (n = 50)	MVA (n = 426)	Odds Ratio in Favor of NAI	95% Confidence Intervals
Skull fracture	16	13	15:1	(6.64, 33.64)
Teeth fracture	13	20	7:1	(3.29, 15.48)
Vertebral fracture	5	15	3:1	(1.06, 8.77)
Rib fracture	14	38	4:1	(1.97, 8.01)
Pelvic/sacral fracture	4	96	0.3:1	(0.10, 0.85)
Sacroiliac luxation*	0	48	0.077:1	(0.0047, 1.27)
Abrasions	5	310	0.041:1	(0.016, 0.11)
Degloving injury*	0	36	0.11:1	(0.0064, 1.75)
Damage to claws	6	19	3:1	(1.11, 7.70)
Scleral hemorrhage	14	34	4.5:1	(2.20, 9.12)
Pneumothorax	3	122	0.16:1	(0.048, 0.52)
Pulmonary contusion	12	186	0.41:1	(0.21, 0.80)
Older fractures	11	1	120:1	(15.08, 953.06)

*Haldane correction (adding 0.5 to each cell) was applied to calculate a finite odds ratio.

** CATS

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Rib Fracture Pattern

MVA: 92% one side, location in clusters

- Highest were ribs 1-4, then 4-7, then 7-10, lastly 11-13

NAI: 64% one side, 36% bilateral; no pattern to locations

Characterization and Comparison of Injuries Caused by Accidental and Non-accidental Blunt Force Trauma in Dogs and Cats. N. Intarapanich et al. Journal of Forensic Sciences. 2016. Vol. 61, No. 4, 993-999.

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Domestic Violence in the Veterinary Setting

- *Primary source* of physical abuse cases seen in veterinary practice
- May bring to pet to their primary vet or try to hide by going to other veterinary hospitals, emergency hospitals
- Abuser may come to hospital with partner, or alone with animal

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In the News: Florida Case

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- Female client comes in with her dog, accompanied by her boyfriend
- She manages to slip note to one of the employees…

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- The woman told police Floyd had allegedly held her captive for two days and "repeatedly battered her on Wednesday night, threatened her at gunpoint, and physically prevented her from leaving their home." Finally, the woman managed to convince Floyd she needed to take their dog to the veterinarian, though he only did so while accompanying her with a gun, sheriffs said.
- On the way to DeLand Animal Hospital, the sheriff's office said Floyd pointed the gun at her and threatened to kill her and her family.

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- The hospital called the police, and officers from the DeLand Police Department came and arrested the man, identified as 39-year-old Jeremy Floyd. Floyd is a convicted felon.
- Floyd is charged with domestic violence, aggravated assault with a firearm, false imprisonment, possession of a firearm by a convicted felon, possession of ammunition by a convicted felon and simple battery.

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Client behavior, client or child injuries, history taking can provide clues	Physical and emotional abuse and neglect of animal	Wide range of potential injuries – ribs, tail, abdomen
Can be subtle, hard to detect – perpetrator doesn't want to get caught	Afraid of telling partner cost of care, potentially paralyzed in making decisions	Animals 'run away', rarely older than 2-3yrs old; older if had prior to new partner

Suspicion: Domestic Violence

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Potential Indicators:

- Unexplained death or sudden death with no medical history to support
- May bring in animal for euthanasia without sensible reason
- Desperate to find new home without good explanation, may abandon

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Dog Abandoned at Airport

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Signs of DV Related Abuse

- Often subjected to multiple types of abuse and chronic abuse
- Animal behavior clues: recent behavior changes, extreme reactions
- Blunt force trauma probably the **_most_** common but often undetected or not taken to vet
- Radiographs of entire body important
- May be obvious acute fractures or healing fractures – palpable cartilaginous callus or boney callus

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Signs of DV Related Abuse

Dislocations: tail common; legs

Rotational forces: spiral fx, dislocation

Head trauma

Thoracic trauma: rib fractures most frequently found

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Types of Abuse Associated with DV: Pet-Abuse.com 2000-2015

Throwing 33%	Shooting 13%
Stabbing 32%	Hanging 12%
Kicking or Stomping 27%	Burning (caustic substance) 12%
Sexual abuse 25%	Drowning 11%
Burning (fire, fireworks) 24%	Mutilation, torture 11%
Choking, strangulation, suffocation 24%	Poisoning 7%
Beating 19%	Neglect, abandonment 3%

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Starvation

- Food deprivation, poor quality food, inappropriate food, intermittent feeding, lack of appetite
- Often dehydrated
- Diagnostics: blood, urine, fecal, radiographs
- Document: wt, response to food/water,
- Emaciation ≠ starvation

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Timelines for Starvation

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- Issues: beginning BCS, no food access vs. intermittent
- Total caloric restriction study in obese dogs: wt loss higher first 2 wks (8%), then leveled to 3-4%/wk
- Usually estimate weeks to months

Timelines for Dehydration

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- Influenced by increased water needs- high ambient temperature and medical conditions
- Affected by intermittent access to water sources such as rain or food sources
- Literature: 10-20 days

Lab Tests

Bloodwk asap: +/- ↓Glu, ↑CPK, ↑Mono, ↑ALT, ↓RBC, +/- ↑Phos, +/- ↑WBC, ↓↑Azo

Inanition – going without food 4-5 days: slightly ↑ T bili, +/- slightly ↓ Ca, slightly ↑ AST

Histopath: small intestinal crypt ectasia, serous atrophy of fat – deep organ, coronary groove, omentum

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Bone Marrow Fat Analysis

- In starvation consume expendable fat stores first, vital last: external, internal thoracic/abdominal, deep organ fat, bone marrow
- BMFA postmortem: histopath assessment, laboratory % test
- Normal: >80% (range 63-101%)
- Severe emaciation: <20% (range 1-20%)

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BMFA

Normal BMF % does not R/O starvation – death can occur prior

Low BMF % should ALWAYS be interpreted consideration case and exam findings

Decomposed: if enough BM present, can run test; cool/cold temps preserve BMF (burials, freezing body)

If do not have test available, histopathology evaluation possible

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Starvation Effects: Abandonment

- Reasonable person standard
- Confinement: evidence of seeking food, water, destruction of property, paw prints
- Loose: re-homing instinct of cats, lack of skills, fear, injury, illness, reliance on humans
- May choose dark, enclosed area to die
- COD: postmortem exam and testing may be inconclusive
- Reasonable conclusion based on availability of food/water – die from dehydration before starvation

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Suspicion: Dog Fighting

- Patterned scar and/or wound pattern
- Request for severe ear crop
- Evidence of ear crop not performed by vet
- Osteomyelitis, fractures associated with puncture/bite wound or scar: legs, joints, muzzle
- Injuries to face: eyes, ears, lips
- Intact dogs
- Pressure callus/sores: contact points of pelvis, legs – clues to environment

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Veterinary Supplies Used

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Medications Commonly Found

Antibiotics: oral, injectable	Wound care: topical, bandages	Pain meds: steroids, non-steroidal
Anabolic Steroids, illicit/illegal drugs	Vitamins, supplements, vaccs	Syringes, bandages, suture/staple materials
Critical care drugs /supplies: IV fluids/catheters, shock steroids, epinephrine	LARGE Amt of ALL=expecting high amount of repeated injury and life threatening injury!	

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Medical Bags

- Critical care bag
- Wound care bag
- Vet tech

Examination Considerations

Testing for drugs found at scene

Issues associated with neglect common – skin, untreated injuries, infection, osteomyelitis

Radiographs may be needed to show extent or age of bone injuries

Heartworm, intestinal parasites, anemia common

Babesia gibsoni commonly found in dogs with evidence of fighting injuries

Must differentiate scars from other skin problems

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Injuries and Scars

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Injuries and Scars

May have partial or full punctures

↓

May or may not have opposing bite injury

↓

Deep tissue injury without puncture

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Joint injury/infection and osteomyelitis or fractures not uncommon

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Versus injuries in other types of dogs fighting: respond to submission signals, possibly little injury, no pattern
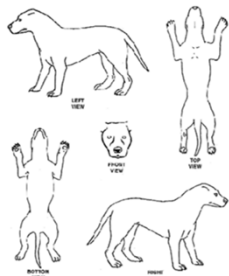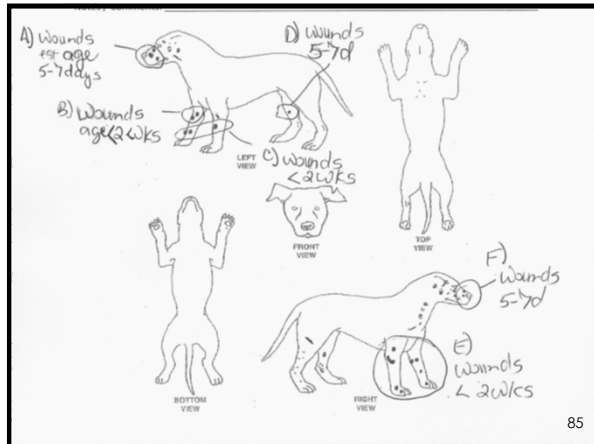
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Dog Fighting Scar and Injury Chart

Date_____ Investigating Agency_____
Case#_____ Officer_____ Veterinarian_____
Dog ID_____ Breed_____ Color_____ Male___ Female___
Distinguishing Marks_____ Chart created/verified by_____
CHART KEY: Red <fresh, healing   Blue <healed, scars
Wound Age Estimate (assigned by veterinarian)
A = _____ B= _____ C= _____ D= _____ E= _____

- Red pen for wounds
- Blue pen for scars
- Do not use black pen
- Generalities of wounds/scars, not exact numbers
- Purpose to show distribution
- This document **only** for injuries related to fighting

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Asphyxia: General Findings

- Often rely on circumstances surrounding death and exclusion of other causes for presumptive diagnosis
- Similar gross and histologic findings across categories: visceral congestion, petechiae,
- ↑ blood fluidity due to ↑ fibrinolysis from high agonal catecholamines
- Cyanosis is non-specific

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General Findings

- Petechiae location can help determine type of asphyxia
- Lung surface petechiae especially when upper airway flow obstructed
- Visceral petechiae: especially epicardium
- Petechiae associated with other medical conditions
- Petechiae: face, sclera, nictitating membrane, gingiva, buccal mucosa, underneath tongue, lingual frenulum
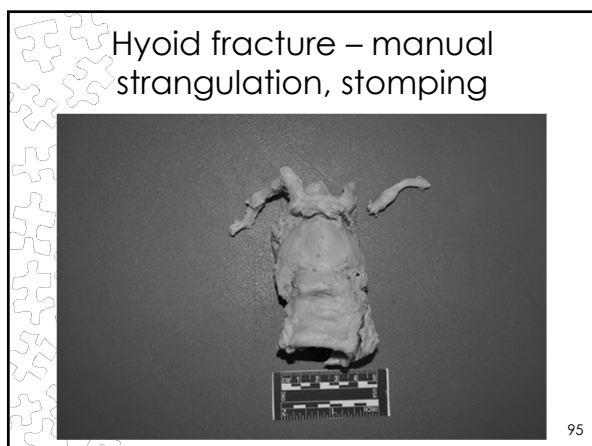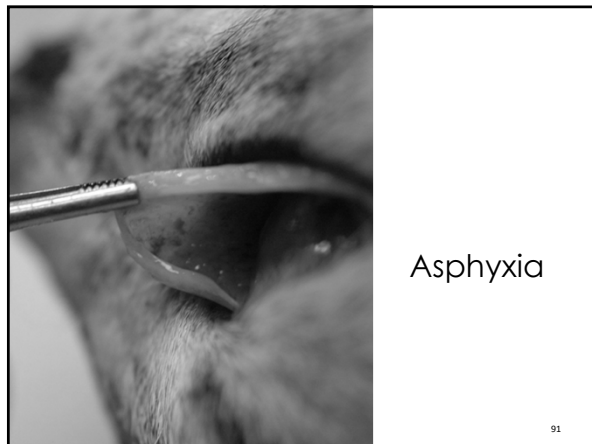
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Exam Considerations

Look for evidence of object used – bruising pattern, fingernails/tip, trace of ligature, inhaled trace

Bruising may not be apparent if soft object or minimal movement

Reflect the skin and muscle layers – injury may be evident in deeper tissue

May have ligature line in underlying tissue without hemorrhage
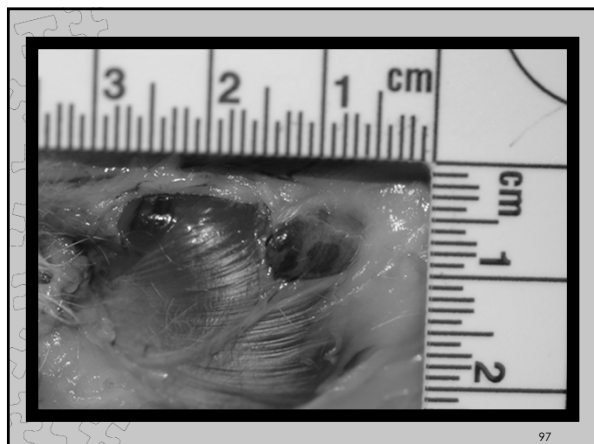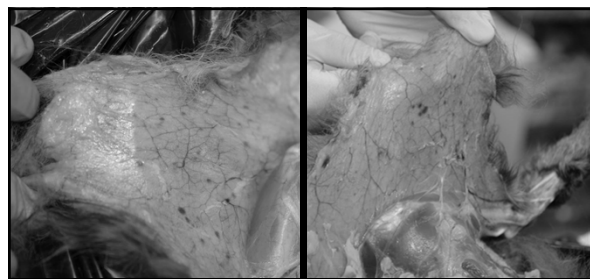
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Exam Considerations

Animal fought back – trace on feet, mouth on animal, scene evidence of struggle, evidence on assailant; intimate attack

Damage to neck – fx laryngeal cartilage, trachea, cervical vertebrae, spinal cord

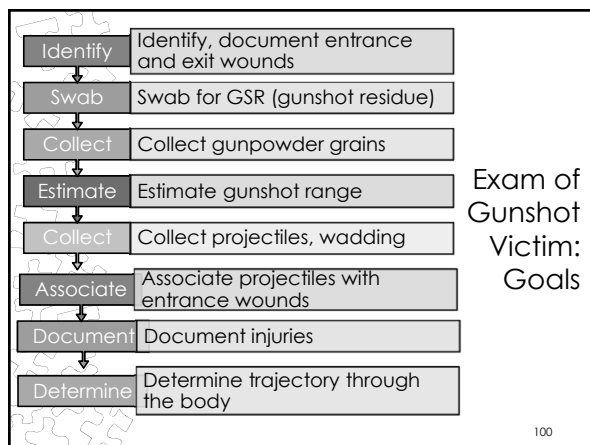Fx hyoid– depends on location of compression; ossification of hyoid required

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Asphyxia

Hyoid fracture – manual strangulation, stomping

Tardieu Spots

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Identify	Identify, document entrance and exit wounds	
Swab	Swab for GSR (gunshot residue)	Exam of Gunshot Victim: Goals
Collect	Collect gunpowder grains	
Estimate	Estimate gunshot range	
Collect	Collect projectiles, wadding	
Associate	Associate projectiles with entrance wounds	
Document	Document injuries	
Determine	Determine trajectory through the body	

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Identify the questions and issues in the case

GS wounds can be mistaken for punctures, bites, lacerations

May have additional, non-related injuries

Full body radiographs: injuries, locate projectile and fragments

Exam of Gunshot Victims

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Issues to Consider When Evaluating Gunshot Wounds

Most common defense is self-defense

Imminent danger (who, no other option?), protection of property (can be legal)

Risk to others by firing weapon

Animal suffering vs. instant death

Gunshot range, trajectory, entrance/exit wounds help answer the questions

Humans- determining entrance/exit can be difficult

Animals have fur….
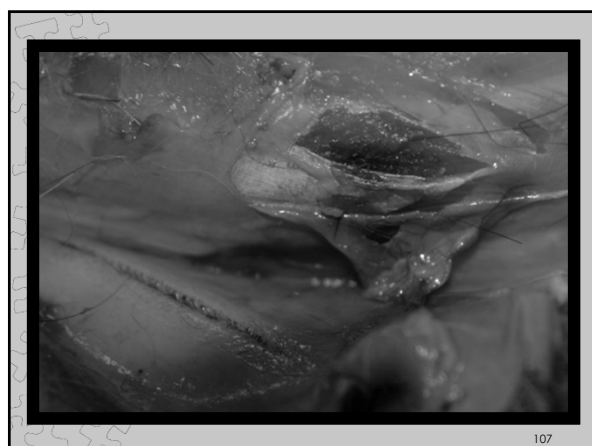
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Gunshot Wounds in Animals

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Examination

- Photograph each wound *in situ*
- Shave wound and surrounding area
- Document wound characteristics, surface evidence, photograph
- Multiple gunshots: determine sequence - evaluate associated hemorrhage, consider animal behavior, case info
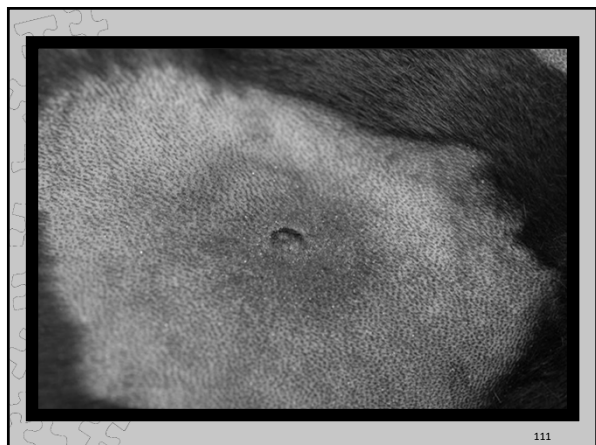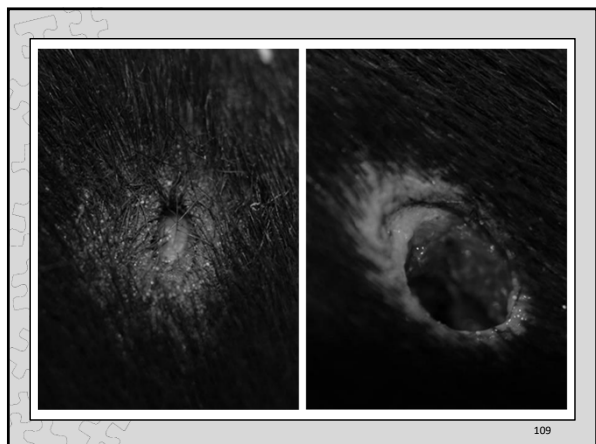
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Gunshot Range

Determines where to look for evidence, use for recreation
Distant – marked by only bullet perforation
Midrange – marked by powder tattooing
Near-contact – marked by wider zone of soot and/or searing (cannot be wiped away) +/- clumps of unburned powder grains
Contact – tight zone of soot and searing
Shotgun – need to test fire

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Projectiles and Bullet Casings

- Retrieve carefully
- Rifling marks
- Fingerprints on casings
- No metal instrument

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Sexual Abuse

Questions: how assaulted, with what, conscious, restrained, history? First time, multiple times? Other animals involved?
Other people? Group? Sharing of pets?
Domestic violence related – NZ Pets as Pawns
Pet Abuse.com – 25% of sexual abuse cases DV related (since 2000; posted 2015)
Associated with child sexual abuse, child porn
Wide variety of animals used: dogs, cats, farm animals, poultry, small rodents

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Suspicion: Sexual Abuse

- Unexplained medical issues or trauma involving genitalia or anorectal areas
- Bruising: genitalia, perianal, grab or restraint areas – thighs, ventral/lateral abdomen, caudal chest, neck, muzzle, ears
- Unexplained chronic vaginitis, rectal bleeding, rectal/vaginal prolapse, strictures
- Proximal tail injury, flaccid tail
- Abnormal behavior or reflexes during exam
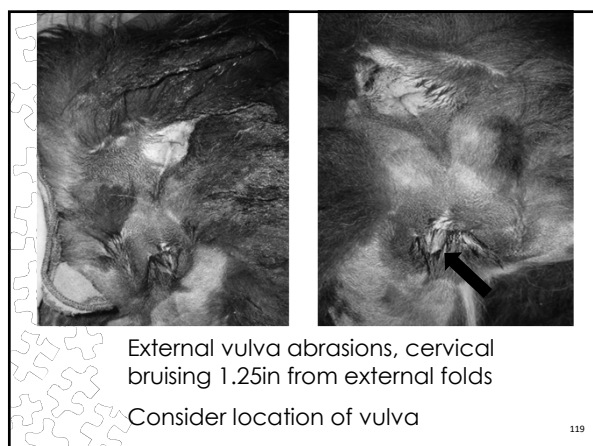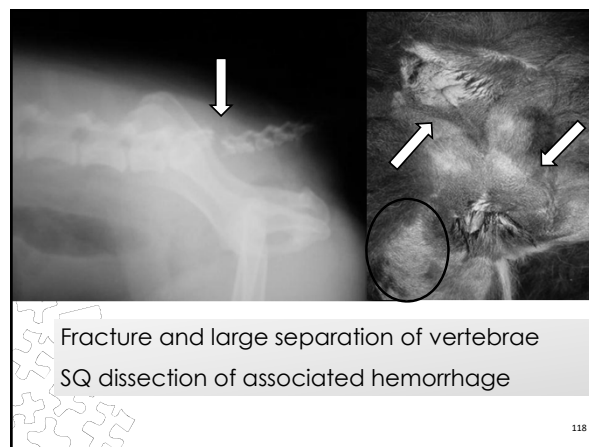
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Examination Considerations

Ideally investigator present during exam and evidence collection

UV light: head to tail
Radiographs

Colonoscopy

Vaginal exam: otoscope, speculum

Drugs used: human and animal sedatives, anxiolytics

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Fracture and large separation of vertebrae

SQ dissection of associated hemorrhage

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External vulva abrasions, cervical bruising 1.25in from external folds

Consider location of vulva

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Differentiation of Canine and Human Sperm

Test	Canine	Human
Size and Shape	Head size appx 7 x 4 µm, dimple on head posterior where human neck-piece would normally be located	Head size average 4.6 x 2.6 µm
Christmas Tree stain	Acrosomal cap pale red, postacrosomal region red, with a colorless band between the two	Postacrosomal region dark red
H&E stain	Acrosomal cap pale purple fading to colorless at the tip, postacrosomal region pale purple and darker at the posterior	Acrosomal cap very pale purple, postacrosomal region dark purple, with a clear demarcation line between the two
Acid phosphatase	Negative	Positive
Anti-p30	Negative	Positive

Source: Schudel, David. 2001. Screening for canine spermatozoa. *Science and Justice.* 41(2):117-119.

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