Scope of lecture

- The intervertebral disc (IVD)
- The IVD in the chondrodystrophic dog
- Clinical signs and prognosis
- Non surgical management
- Surgical management
- Genetics
- Prevention
Intervertebral disc degeneration in the dog. Part 1: Anatomy and physiology of the intervertebral disc and characteristics of intervertebral disc degeneration

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Chondrodystrophic disc

picture acknowledgement Niklas Bergknut

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Intervertebral disc degeneration in the dog. Part 2: Chondrodystrophic and non-chondrodystrophic breeds

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Hansen type I disc disease

**Hansen type I disc degeneration**

- **80% Water**
  - Normal disc has a fibrous outer coat and a jelly centre

- Normal disc deforms under pressure - acting as a shock absorber

- Centre of disc in chondrodystrophic dogs like Dachshund and Bassett Hound dehydrate, degenerate and calcify

- Disc is no longer able to deform under pressure. The outer layer tears and the inner contents burst out compressing and damaging the spinal cord above

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Chondrodystrophic dogs

- Nucleus pulposa (NP) is smaller
- NP is eccentric (more dorsal)
- NP degeneration can be observed at 3-4 months
  - becomes replaced by chondrocyte cells
- NP dehydration complete at 1 year
  - 75% cervical
  - 100%, thoracic
  - 93.8% lumbar
- Disc extrusion from 2 years

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IVDD – not a new disease

1922

1st report - Janson, 1881
chondroma mass compressing spinal cord

1st correct report - Tillmanns, 1939
extrusion of nucleus pulposa

1st good description – Hansen 1952
Hansen type I and type II description
Surgery for thoracolumbar IVDD

- 2012
  - 244 dogs
  - 67/244 Dachshunds (27.46%)
- 2011
  - 264 dogs
  - 55/265 Dachshunds (20.83%)

- i.e. Dachshunds ~ ¼ surgical case load and at least 1 / week
Grading of spinal cord injury

• Grade 1  Pain
• Grade 2  Pain, paraparesis (walking)
• Grade 3  Pain, paraparesis (not walking) or paraplegia
• Grade 4  Pain, paraplegia and urinary incontinence
• Grade 5  Paraplegia, urinary incontinence and loss of deep pain perception
           poorer prognosis and surgical emergency

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Diagnosis - radiographs

Calcified discs
Disc Calcification

chondrodystrophic dogs

- Calcified discs are more likely to herniate
- 1 year of age
  - 31.2% cervical, 62.5% thoracic, 43.8% lumbar
- Steady state / maximum at 24–27 months
- Screening?
  - Radiographs entire spine at 24–42 months
  - Dachshunds with 5 calcified discs excluded from breeding (Denmark)
  - Lucas terriers (UK)
Diagnosis – MRI

- Disc extrusion
- Spinal cord
- Dehydrated Calcified IVD
- Normal IVD
- Vertebral Body

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Non surgical management

Two weeks cage rest
with or without anti-inflammatory drugs

- Improvement
  - Continue cage rest for two weeks
    - Improvement
      - Gradual return to normal function over one to four weeks
    - No improvement
      - Consider surgery
- No improvement
  - Consider surgery
- Deterioration at any stage
  - Surgery
Non-surgical management

• Indicated
  – Grades 1-2
  – May be success up to grade 4.
  – Grade 5 cases are a surgical emergency

• Advantages
  – Comparatively inexpensive
  – Does not require specialised equipment or expertise

• Disadvantages
  – A high rate of recurrence
  – Higher chance of deterioration
  – Higher chance persistent neurological deficits
  – Diagnostic tests may not be performed
Non-surgical management

• Hansen type I - Restriction of movement
  – limits further IVD extrusion / exacerbation of injury.
  – natural healing process repairs damaged spinal cord

• Painkillers
  – Must restrict!
  – NSAIDs (e.g. Previcox), opioids or gabapentin (Neurontin)
Surgery – Fenestration

• Easy, quick, no specialised equipment
• Prophylactic?
  – disc material in vertebral canal remains
  – not suitable for large spinal cord compression
• Nuclei pulposus
  – removed (?) through small window in anulus fibrosis.
  – T11/T12 to L3/L4

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Surgery – Hemilaminectomy

• Hole made (with drill) into vertebral canal
• Extruded disc material removed
• Technically difficult
• Requires specialised equipment & training
Inactivity and recumbency results in decreased joint movement and muscle contracture.

Short walks with support (if not cage rested)

Referral to chartered physiotherapist

- specialised techniques e.g. laser therapy
- exercise program

  e.g. to improve joint position sense & core strength
Cart rehabilitation

Kerdog rehabilitation cart

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Neurogenic bladder

Pharmacological aids for neurogenic bladder

- Diazepam 2-10mg 3x daily
- Phenoxybenzamine 0.5mg/kg 3x daily

Bladder expression 3x daily 20-30 mins after drugs
Stem cell therapy?

Nose cell transplant enables paralysed dogs to walk

Scientists have reversed paralysis in dogs after injecting them with cells grown from the lining of their nose.

The pets had all suffered spinal injuries which prevented them from using their back legs.

The Cambridge University team is cautiously optimistic the technique could eventually have a role in the treatment of human patients.

The study is the first to test the transplant in "real-life" injuries rather than laboratory animals.

In the study, funded by the Medical Research Council and published in the *neurology Journal Brain*, the dogs had olfactory ensheathing cells from the lining of their nose removed.
• Severe disc degeneration with calcification highly heritable 0.47–0.87
  – Jensen and Christensen 2000
• What does that actually mean?
  – You could breed away from it if you knew what to select for
  – Selection based on tendency for calcification may reduce disc disease but **not** change breed characteristics
  – Is influenced by other (environmental) factors
• locus on chromosome 12
• Program to collect DNA from confirmed cases and 10y dogs with no hx IVDD

Genome-Wide Association Study in Dachshund: Identification of a Major Locus Affecting Intervertebral Disc Calcification

Mette Sloth Mogensen, Peter Karlskov-Mortensen, Helle Friis Proschowsky, Frode Lingaas, Anu Lappalainen, Hannes Lohi, Vibeke Frøkjær Jensen, and Merete Fredholm
Prevention?

Optimise diet??

Optimise activity?

Change conformation?

Optimise body condition?

Improve core strength?

Find the gene?
Summary

• IVVD is a significant problem
  – 1 in 10 Dachshund deaths are due to neurological disease (11%)
    Purebred Dog Health Survey for Dachshunds (UK Kennel Club)
  – More of a problem in smooths?
    • 15.3% prevalence rate
    • Dachs-Life May 2012: Page 22

• We need to work together to improve the health and welfare of our dogs

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Thank you for listening!

Any questions

While their owners sleep, nervous little dogs prepare for their day.