Hereditary heart diseases in Afghan dogs
An expert status report

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Germany

Types of heart disease

- hereditary
- non hereditary
- congenital
- acquired
Heart diseases in dogs

- Chronic Valve diseases 40,0%
- Primary arrhythmias 16,7%
- Congenital diseases 16,4%
  - Inzidenz 0,6 bis 0,8%
- DCM 11,3%
- Pericardial effusion 7,0%
- Tumor (without effusion) 3,0%
- Heartworm 2,3%
  (Fox, 1999)

Location of heart disease

Valve diseases
- mitral valves
- tricuspid valves
- aortic valves
- pulmonic valves

Heart muscle disease
- dilatation (dcm)
- hypertrophy
- inflammation
- neoplasia
Causes of heart disease

"Congenital does not automatically mean hereditary"

Aortic stenosis

Sub aortic stenosis 95 % of AS in dogs

Stepien und Bonagura 1991

Most common congenital heart disease in dogs

Trait of inheritance: NFL (Nord-Amerika)

Breed disposition for: Golden Retriever, NFL, Boxer, GSH, Great dane, Rottweiler

Seen in Afghan dogs

www.upei.ca/~cidd/intro.htm
Aortic stenosis

- Subvalvular
da
dy

ic

r

g

i

g

- valvulär

- supravalvular
SAS muscular rim as a dynamic stenosis outflow tract obstruction

Normal aortic velocity: 1.6 - 2.0 m/sec

Aortic stenosis:
mild: < 50 mm HG
moderate: 50-80 mm HG
severe: > 80 mm HG
Pulmonic stenosis

- Subvalvular
- valvulär
- supravalvular

Pulmonic stenosis

valvular pulmonic stenosis 95 % of PS
Stepien und Bonagura 1991

second common congenital heart disease in dogs

Trait of inheritance: Beagle autosomal dominant

Breed disposition for: brachiocephalic breeds
Boxer, French English Bulldogs, Terriers

Rarely seen in Afghan dogs

www.upei.ca/~cidd/intro.htm
PDA Persistent ductus arteriosus

third common congenital malformation
Breed disposition Golden – Labrador retriever
PON, Sheltie, GSH,

No Afghan dogs
AV-valve dysplasia
• MD Mitraldysplasie
• TD Tricuspid dysplasia

4. Common malformation

MD: breed disposition: bullterriers, Chihuahua, GSH, GD
often seen: Afghans

TD: breed disposition: Labrador Retrievers, GD

Degenerative mitral valve disease
Causes of mitral valve disease

- **Primary disease** (geneticaly based)
  - degeneration
  - rupture of chordae tendinae
    - mitral valve prolaps
    - valve flail
- **Secondary causes**
  - endocarditis (rare)
  - dislocation of papillary muscle (HCM)
  - due to volume overload (DCM)
Progress of chronic mitral valve disease

<table>
<thead>
<tr>
<th>Age patient</th>
<th>6 - 8</th>
<th>10</th>
<th>12 years</th>
</tr>
</thead>
</table>

Location of heart disease

Valve diseases
- mitral valves
- tricuspid valves
- aortic valves
- pulmonic valves

Heart muscle disease
- dilatation (dcm)
- hypertrophy
- inflammation
- neoplasia
Die Dilatation des Herzens
vs. Dilatative Kardiomyopathie

**Occurrence in life:**
- **Juvenile form:** < 1 year (in Dobermann, port. Waterdog)
- **Normal form:** > 2 years (3-.7. year of life)

**Clinical symptoms:** (2)
- subclinical (occult) DCM
- clinical DCM

**Pathological development (3):**
- cellular stage
- subclinical stage
- clinical stage

**Pathological findings:** 3 types
- Type I attenuated-wavy-fiber-type
- Type II fatty-infiltrated-type
- Type III inflammatory change type

**Breed specific:**
- „Doberman cardiomyopathy“
- „Boxer cardiomyopathy“

**Nomenclature of DCM**
DCM mindestens 2 patho-histologische Typen

Herzmuskelzellen normal

DCM 1 attenuated wavy fiber type

DCM 2 fatty infiltrated type

Progress of DCM type I „classicak type“

Death

cellular stage

occult stage

Clinical stage

myocardial insufficiency

mitral insufficiency

arhythmia

Age patient 2 4 6 Jahre

Juvenile type
Fall 4 „Willi“

**X ray thorax: difference B2 and C**

Zentrifugale Migration des alveolären Lungenödems durch Hypervaskularisation
DCM breed disposition

- Afghane
- Bernhardiner
- Boxer
- Cocker-Spaniel
- Dalmatian
- Doberman
- GSH
- Great Dane
- Golden Retriever
- I.W.
- Labrador Retriever
- Neufoundland
- PON
- Rhodesian Ridgeback
- Weimaraner

Relevance and evidence:

+ rare
++ often
+ literature
+ not described

Breed prevalences described in literature

<table>
<thead>
<tr>
<th>Breed</th>
<th>Number patients n=</th>
<th>Age span (y)</th>
<th>Median age (y)</th>
<th>Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doberman</td>
<td>20</td>
<td>1,5-14,5</td>
<td>6,6-7</td>
<td>Calvert et al. 1982</td>
</tr>
<tr>
<td></td>
<td>66</td>
<td>2-14</td>
<td>7,6</td>
<td>Calvert et al. 1997</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>0,03-0,08</td>
<td></td>
<td>Vollmar et al. 2003</td>
</tr>
<tr>
<td>Dogge</td>
<td>17</td>
<td>1,5-8</td>
<td>4,8</td>
<td>Meurs et al. 2001</td>
</tr>
<tr>
<td></td>
<td>104</td>
<td></td>
<td></td>
<td>Kresken</td>
</tr>
<tr>
<td>Boxer</td>
<td>112</td>
<td>1-15</td>
<td>8,23</td>
<td>Harpster 1991</td>
</tr>
<tr>
<td>NFL</td>
<td>37</td>
<td>0,29-11,7</td>
<td>5</td>
<td>Tidholm 1996</td>
</tr>
<tr>
<td>I.W.</td>
<td>39</td>
<td>2,3-10</td>
<td>6,4</td>
<td>Brownlie 1999</td>
</tr>
<tr>
<td></td>
<td>66</td>
<td></td>
<td>4,7</td>
<td>Vollmar 1999</td>
</tr>
<tr>
<td></td>
<td>121</td>
<td>1-11</td>
<td>4,2</td>
<td>Vollmar 2000</td>
</tr>
<tr>
<td>Cocker Spaniel</td>
<td>8</td>
<td>0,83-8</td>
<td>3,7</td>
<td>Thomas 1982</td>
</tr>
<tr>
<td>Dalmatiner</td>
<td>9</td>
<td>3-12</td>
<td>6,8</td>
<td>Freeman 1996</td>
</tr>
</tbody>
</table>
Data from literature

Veterinary Data Base der Purdue Universität (USA)
Breeds listed in frequency of dcm findings:
Doberman Pinscher, Boxer, Dogge, Labrador Retriever, American Cocker Spaniel, Golden Retriever, English Sheepdog, Afghan, Scottish Deerhound and English Cocker Spaniel.

University of California, Davis, Veterinary Teaching (USA)
260 cases of DCM
33 % Doberman pinscher, 15 % Boxer followed by: Great danes, American Cocker Spaniel, Golden- and Labrador Retriever, Irish Wolfhounds.

Data University of Berlin Clinic for Small AnimalsFU Berlin
80 cases of DCM:
In frequency: Doberman Pinscher, Great danes, Boxer, English Cocker Spaniels [SAMELUCK 2002]

DCM prevalence

C. Bussadori ECVS Parma 2002
heart diseases in Afghan dogs
what literature says


heart diseases in Afghan dogs
what literature says


Certified examiners in Germany, Austria, Netherlands, Switzerland, UK

central online data base
15,000 dogs included

Qualitätssicherung durch Zertifizierung und Fortbildung
Einheitliche Befundermittlung europaweit
Beratung der Mitgliedsvereine im VDH
Bereitstellung von Daten zu Herzerkrankungen DATABASE

The standardized cardiac examination of the dog with centralized entry and collection of data of the Collegium Cardiologicum (CC) (registered association)

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69168 Weinheim
Germany
Email: m.deinert@tierklinik-sanderoda.de

Standardisierter kardiologischer Untersuchungsgang beim Hund mit zentraler Datenerfassung des Collegium Cardiologicum (CC) e. V.
(English version of Tierarztl Prax 2012; 40 (K): 283-289
Received: July 2, 2012
Accepted: July 2, 2012

central online data base
15,000 dogs included
CC data Base

15,000

437 Afghans

9,700 Boxers

437 Afghans

182 Afghans in DWZRV pilot study
In collaboration with DWZRV/VDH

- Pilot study about heart disease in Afghan dogs and Salukis
- Obligatory cardiac examination and documentation
  - Before first mating
  - All two years
  - Not for male from abroad
  - Minimum age 15 month
- Study over 3 years 2009 - 2012
- Without consequences for breeding before analysis

Aim of the study:
Overview about the findings in an afghan population
Produce normal echo values from healthy dogs

1. Collecting period:
182 Afghans and 171 Salukis have been included

2. Analyzation period
Produce normal echo values from healthy dogs

3. Selection
Definition of selection criteria on heart disease
Normal heart of Afghan dogs
what literature says


USA n = 20
IVSd 10 mm  8-12
LVDd 42 mm 33-52
LVWd 9 mm  7-11
IVDs  13  8-18
LVDs  28 mm 20-37
LVWs  12 mm 9-18
FS 33 %  24-48
EPSS 4 mm  0-10
weight 23 kg  17-31 kg

Europe n= 139
LVIDd 43,4 +/- 4,1
Minimum 33,2 mm
Maximum 57 mm
LVIDs 30,6 +/- 3,2
Minimum 21,4 mm
Maximum 40 mm

Normal echo values for continental Afghan dogs
Status report: results of cardiological exams on afghan dog in CC database  n= 437  2018

Befundbögen pro Rasse

Total exams:  n = 437  
None or minimal cardiovascular changes:  371  85  
Mild cardiovascular changes:  48  11  
Moderate cardiovascular changes:  6  1,5  
Severe cardiovascular changes:  6  1,5

Status report: results of cardiological exams on afghan dog in CC database  n= 437

Ergebnisse und Beurteilungen

Aortic stenosis
Total exams:  n = 437  
None or minimal cardiovascular changes:  410  93  
Transitional:  13  3  
Mild cardiovascular changes:  0  0  
Moderate cardiovascular changes:  0  0  
Severe cardiovascular changes:  0  0
Status report: results of cardiological exams on afghan dog in CC database n=437

### Pulmonic stenosis

- **Total exams:** n = 437
- **None or minimal cardiovascular changes:** 427 (97%)
- **Transitional:** 0 (0%)
- **Mild cardiovascular changes:** 1 (0.2%)
- **Moderate cardiovascular changes:** 0 (0%)
- **Severe cardiovascular changes:** 0 (0%)

### AV Valve Dysplasia

- **Total exams:** n = 437
- **None or minimal cardiovascular changes:** 427 (94.2%)
- **Mitral dysplasia:** 19 (4.4%)
- **Tricuspid dysplasia:** 5 (1.4%)
Status report: results of cardiological exams on afghan dog in CC database n= 437

**DCM Dilative Cardiomyopathy**

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>None or minimal cardiovascular changes:</td>
<td>414</td>
<td>94,74</td>
</tr>
<tr>
<td>equivocal</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>occult</td>
<td>1</td>
<td>0,2</td>
</tr>
<tr>
<td>clinical DCM</td>
<td>4</td>
<td>0,9</td>
</tr>
<tr>
<td>median age:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3,4</td>
<td>years</td>
</tr>
</tbody>
</table>

**Degenerative mitral valve „endocardiosis“**

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>None or minimal cardiovascular changes:</td>
<td>301</td>
<td>68,8</td>
</tr>
<tr>
<td>Mild</td>
<td>115</td>
<td>26,3</td>
</tr>
<tr>
<td>Moderate</td>
<td>12</td>
<td>2,7</td>
</tr>
<tr>
<td>Severe</td>
<td>3</td>
<td>0,7</td>
</tr>
<tr>
<td>median age:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3,4</td>
<td>years</td>
</tr>
</tbody>
</table>
Status report: results of cardiological exams on afghan dog in CC database n=437

Degenerative tricuspid valve „endocardiosis“

Total exams: n = 437

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>None or minimal cardiovascular changes:</td>
<td>367</td>
<td>83,9</td>
</tr>
<tr>
<td>Mild</td>
<td>51</td>
<td>11,6</td>
</tr>
<tr>
<td>Moderate</td>
<td>3</td>
<td>0,7</td>
</tr>
<tr>
<td>Severe</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>median age: 3,4 years</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

• 195 Untersuchungen (01.08.2009 - 2012)

• age: 0 – 11 years, M = 4,3 +/- 2 J., Median 4 J.
• weight: 10 – 38,5 kg, M = 27,2 kg +/- 4,2 kg
• gender: 116 female, 79 male
Results: Afghans and heart disease

- Judgement n=195
  - grade 0: 165 (84,6 %)
  - grade 1: 18  (9,2 %)
  - grade 2: 6  (3,1 %)
  - grade 3: 6  (3,1 %)

Total exams: n = 437

<table>
<thead>
<tr>
<th>Type of Cardiovascular Changes</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>None or minimal cardiovascular changes</td>
<td>371</td>
<td>85</td>
</tr>
<tr>
<td>Mild cardiovascular changes</td>
<td>48</td>
<td>11</td>
</tr>
<tr>
<td>Moderate cardiovascular changes</td>
<td>6</td>
<td>1,5</td>
</tr>
<tr>
<td>Severe cardiovascular changes</td>
<td>6</td>
<td>1,5</td>
</tr>
</tbody>
</table>

Results: Afghans and heart disease

- MD/TD: hereditary
- DCM: Hereditary
- MVD: hereditary

Median age of population

1ño 2ño 3ño 4ño 5ño 6ño 7ño 8ño 9ño 10ño years

congenital acquired

birth
Results: Afghans and heart disease

<table>
<thead>
<tr>
<th>Disease</th>
<th>Age 1</th>
<th>Age 2</th>
<th>Age 3</th>
<th>Age 4</th>
<th>Age 5</th>
<th>Age 6</th>
<th>Age 7</th>
<th>Age 8</th>
<th>Age 9</th>
<th>Age 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD/TD</td>
<td>5.8%</td>
<td>5.8%</td>
<td>5.8%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DCM</td>
<td>0%</td>
<td>3.1%</td>
<td>&gt; 3.1%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MVD</td>
<td>0%</td>
<td>16.1%</td>
<td>&gt; 16.1%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Median age of population

Conclusions: Afghans and heart disease

- **Mitral valve disease**: degeneration ist most common cause in elder dogs
  - Cases of mitral dysplasia in young dogs
- **Dilative cardiomyopathy**: rare but evident
  - not as common as in USA
- **Congenital diseases**: rare cases of aortic and pulmonic stenosis
  - Familial problem