Laser retinopexy
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Case Report

- Italian Greyhound
- Akina, F, 5 years old
- Anamnesis: anisocoria for 3 weeks
- No signs of neurology problem and any systemic diseases
- Clinical examination, X-ray of thorax, abdominal USG, blood tests negative
Ophthalmology examination

- OS: menace response -, dazzle reflex -, pupilary reflex -, palpebral reflex +, absolute mydriasis was evident, severe vitreal changes, total retinal detachment, STT 20, IOP 13
- OD: menace response +, dazzle reflex +, pupilary reflex +, palpebral reflex +, vitreal strand in the anterior chamber, severe vitreal changes, STT 22, IOP 15
Diagnosis

- Bilateral Vitreous Degeneration
- Giant retinal tear in the left eye
- Vitreal strand in the anterior chamber in the right eye
- Prophylactic Laser Retinopexy in the right eye
- Monitoring of lens instability
- Left eye - untreatable
Surgery Procedure

- Transpupillary retinopexy
- LIO – laser indirect ophthalmoscope
- 20D loop
- General anesthesia
- Ventral recumbency
- Eyelid retractor, stay sutures
- A double row of noncontiguous burns on the peripheral retina for 360 degrees is performed
- 100-150mW/200-400mS
- Avoid excessive energy – can cause choroidal hemorrhage or a retinal hole
Table 3. Recommended initial power settings for diode laser retinopexy in the dog

<table>
<thead>
<tr>
<th>Region of fundus</th>
<th>Power settings</th>
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<tbody>
<tr>
<td>Central nontapetal (mild to moderate pigment)</td>
<td>150 mW–200 mS</td>
</tr>
<tr>
<td>Peripheral nontapetal (moderate pigment)</td>
<td>100 mW–200 mS</td>
</tr>
<tr>
<td>Central tapetum (yellow-green color)</td>
<td></td>
</tr>
<tr>
<td>Medial</td>
<td>200 mW–200 mS</td>
</tr>
<tr>
<td>Lateral</td>
<td>150 mW–400 mS</td>
</tr>
<tr>
<td>Central Tapetum (bright yellow color)</td>
<td></td>
</tr>
<tr>
<td>Medial</td>
<td>200 mW–400 mS</td>
</tr>
<tr>
<td>Lateral</td>
<td>200 mW–500 mS</td>
</tr>
<tr>
<td>Peripheral Tapetum or Tapetal/NonTapetal Junction</td>
<td>150 mW–200–400 mS</td>
</tr>
</tbody>
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mW, milliwatts; mS, milliseconds.

Laser retinopexy
Follow up

- Postoperative treatment
  - Systemic corticosteroids
  - Topical corticosteroids
  - Mydriatics
- IOP measurement, 1 day hospitalization
- Local retinal inflammatory reaction disappear three days postop.
Discussion

• study of 760 eyes with RRD, 350 fellow eyes prophylactic treatment, RRD developed in 1,2% of treated eyes compared with 16,4% in the untreated group (Avitable, 2004)

• Another study: retinal breaks developed in 27% of untreated eyes compared with 4% of treated fellow eye (Freeman, 2001)

• Bichon Frise with cataracts associated with LIU – 57 dogs: 39 dogs received prior laser retinopexy before surgery, RRD developed in 5 dogs (12%). In 18 dogs that did not receive treatment, 10 dogs (55%) experienced RRD (Schmidt & Vainisi, 2004)

• Depends on RD causes
Transpupillary x Transcleral retinopexy
Transpupillary x Transcleral retinopexy
Transpupillary x Transcleral retinopexy

- Less invasive (non contact)
- Ocular media must be clear to permit focus on the target retina
- Diode laser 810nm has the best transmission
- **Prophylactic retinopexy** – vitreal degeneration, lens subluxation, cataract formation (predisposed breed)
- **Barrier retinopexy** – small tears, retinal holes, thin areas of retina associated with geographic retinal dysplasia
- **Demarcation retinopexy** – to stop partial RD
- Max. 250 mW for 400 msec

- Laser probe is in contact with the sclera
- Aproximately 9mm from the limbus, given 75-85 burns around the globe
- 750 mW for 1000 msec
- **Prophylactic retinopexy** before cataract surgery, in cases of LIU
- Bichon Frise, American Cocker Spaniel, Siberian Husky, Havanese – predisposed breed for peripheral retinal detachment after cataract surgery
- Higher risk of excessive treatment resulting in retinal holes or a giant retinal tear
Barrier Retinopexy
Demarcation Retinopexy
Retinal detachment

- separation of the neurosensory retina from underlying retinal pigment epithelium (RPE)
- Rhegmatotogenous (RRD)
- Nonrhegmatogenous (non-RRD)
Rhegmatotogenous Retinal Detachment (RRD)

- fluid from the vitreous cavity enters the subretinal space through a break in the retina
- **primary** (spontaneous)
- **secondary** (due to trauma, inflammation, surgery or other specific ocular disorder)
Primary RRD

• by alteration or degeneration of the vitreous

• Vitreous
  – most important intraocular tissue in the pathogenesis of retinal detachment
  – is composed of salts, proteins and hyaluronic acid contained in a network of insoluble protein fibrils
  – is attached to the retina via collagen fibrillar insertions into the internal limiting membrane
  – In the canine - "nuclear type" - opposite of that in humans
The vitreous body

- Eye movements result in countercurrents of the vitreous and intraocular fluids - can cause turbulence to induce a tear in the area of retinal atrophy

- **Vitreous degeneration** (Abnormal liquid vitreous) heritable disease in 11 breeds of dogs (Shih Tzu, Boston Terrier, Poodle, Jack Russell Terrier, Italian Greyhound and Yorkshire Terrier), reported in 85 other breeds

- The highest incidence of clinical spontaneous giant retinal tear - **head shaking dogs** (while playing with toys)
Secondary RRD

- Trauma
  - penetrating - bite wounds, cat claw injury, surgery
  - blunt
- Glaucoma
- Lens diseases
- Intraocular surgery
- Aggressive cryo or laser therapy
Non-RRD

- **Serous** - results from fluid accumulation in the subretinal space between the photoreceptors and the RPE
  - Exudative detachment
  - Hemorrhagic detachment
- **Tractional** - pulling force (band or membrane) in the vitreous that forces the retina to separate from the RPE
  - Intravitreal hemorrhage
  - Persistant hyaloid remnants
  - Iatrogenic – intraocular surgery
Most common causes of RD

- **Hypermature cataract and Lens induced uveitis (LIU)**
  - can cause vitreal degeneration, retinal cyst formation, obliteration of retinal vessels
  - Breeds (the Bichon Frise, Maltese, American Cocker Spaniel) with rapidly progressive cataract formation - more prone to LIU

- **Lens instability**
  - causes a disruption in the anterior hyaloid face, causing disturbance of the vitreous

- **Cataract surgery**
  - posterior capsular tear
  - vitreal hemorrhage
Most common causes of RD

- Retinal abnormalities
  - Retinal dysplasia (LR, ESS)
  - CEA - Optic nerve coloboma or pit can directly communicates with the subretinal space and can allow fluid from liquefied vitreous create an RD
  - Senile retinal thinning and atrophic retinal holes
Other RD causes

• **Endophthalmitis (chorioretinitis)**
  – inflammatory response to ocular infection - bacterial, viral, fungal or parasitic
  – After intraocular surgery
  – Cat claw injury
  – Foreign body penetration

• **Iatrogenic**
  – aggressive laser or cryoablation of the ciliary body
  – During cryopexy or prophylactic transscleral laser retinopexy
  – Intravitreal or retrobulbar injections
Conclusion

• Risk factors:
  – Breeds predisposition
  – Cataract surgery
  – LIU
  – Lens luxation
  – Vitreous degeneration
    • Shi Tzu, Boston Terrier, JRT, Italian Greyhound, YT, Maltese, Poodle
  – Retinal dysplasia
  – CEA
Thank you for your attention