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Retinal detachment in dogs: A brief review

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Abstract
Retinal detachment is an ocular emergency in which the neurosensosry layer of retina gets separated from underlying retinal pigment layer. Regardless of type of retinal detachment rapid recognition of underlying cause is necessary with the help of necessary clinicopathological testing and various diagnostic modalities like blood tests, ophthalmoscopy, ultrasonography, contrast enhanced ultrasonography, electroretinography. Success of retinal detachment surgery i.e. retinopexy rely on from how long the retinal detachment occurs and temperament of dogs. Among various retinal-reattachment procedures like pneumatic retinopexy, laser retinopexy and cryoretinopexy, the laser retinopexy is best suited for rhegmatogenous retinal detachment and pneumatic retinopexy is least suited for dogs.

Keywords: retinal detachment, scleral buckles, vitrectomy, retinopexy

Introduction
The eye is an active organ that constantly adjusts the amount of light it lets in and focuses on objects near and far. It produces continuous images that are quickly relayed to the brain (Micheal *et al.*, 2008) [1] and having three tunic"s i.e. outer fibrous tunic, middle vascular tunic and inner nervous tunic.
Retinal detachment is the separation of neurosensory retina that is rods, cones and inner layer from the retinal pigment epithelium (RPE). This is because the RPE and the sensory layer are two embryologically distinct layers, with a potential space between them (Ofri, 2013) [3]. The connections between these two layers are predominantly physiological in nature, not morphological. Due to any pathological process, which results into retinal detachment, the intimate contact between the photoreceptors and RPE is disrupted and metabolites are no longer available from the choroid, nor can end products of metabolism be removed. As a result of high metabolic rate of retina, severe and irreversible changes may occur soon after the separation (Murphy *et al.*, 2012) [2].
The retinal detachment can be rhegmatogenous, non rhegmatogenous or the tractional in nature. The retinal detachment can also be classified as focal, multifocal and complete. Significant detachment lead to appreciable vision deficits and blindness, while smaller and focal detachments may go unnoticed due to lack of clinical signs (Meekins, 2015) [4].
Ophthalmoscopy, electroretinography (ERG), B- mode ultrasonography, contrast-enhanced ultrasonography (CEU) and colour Doppler imaging can be used to diagnose this condition.
Rhegmatogenous retinal detachment are amenable to surgical treatment, exudative retinal detachments require medical therapy, both, symptomatic to lessen the severity of inflammation (systemic anti-inflammatory medications) and specifically targeted at any identifiable cause e.g., systemic antimicrobial for infectious chorioretinitis (Meekins, 2015) [4].
The most common surgery used in dogs for retinal reattachment is a pars plana vitrectomy with perfluoro- n-octane (PFO)-silicone oil exchange and endolaser retinopexy. Approximately 75% of canine surgical RD cases have tears of 2700 or more and the surgery is the only possibility for detachments that are so advanced (Vainisi and Wolfer, 2004) [5].

Incidence of retinal detachment
In various ocular affections the retinal detachment is serious event. Out of various ophthalmic affections breed wise incidence is maximum in spitz (65%) and least in Dalmatian and beagle (0.12% each). Sex wise incidence is more in males (60%). Retinal affections are 11% out of various ophthalmic affections, of which retinal detachment is 34% (Sale *et al.*, 2013) [6].

Classification of retinal detachment

Rhegmatogenous

- It occurs due to the break in the retina allowing vitreous to pass in to the sub- retinal spaces. The retinal breaks are divided in to three types– holes, tears and dialysis.
- Holes are form due to retinal atrophy.
- Tears are due to vitreoretinal traction.
- Dialyses are very peripheral and circumferential, and may either tractional or atrophic.
- This type of detachment is more common in older patient, which are more prone to retinal hole formation and vitreous liquefaction.

Non rhegmatogenous

They have no break or tear. It is further classified into two types–

a) Serous: It is further divided in to two types on the basis of types of fluid causing separation.

- **Exudative:** Due to infectious diseases caused by viral (e.g., distemper), Fungal(e.g., blastomycosis), or protozoal (e.g., leishmania) disease (Ofri, 2013) [3].
- **Transudative:** Caused by systemic hypertension, by vascular diseases such as coagulopathy, thrombocytopenia, anemia and hyperviscosity or by trauma (Meekins, 2015) [4].

b) Tractional: It results if there is a pulling force in the vitreal traction band or pre-retinal membrane in the vitreous. The band may forms due to the injury, inflammation or neovascularization in the uvia. It also occurs due to displacement of vitreous after lens luxation (Ofri, 2013) [3].

Clinical signs

a. Absence of menace response.
b. Boophthalmous condition may be present.
c. Signs of acute loss of vision. Blindness is noted in case of complete detachment. Focal detachments are usually innocuous.
d. Dilated pupils are non- responsive to light.
e. Appearance of floating sheet i.e., the detached retina may be seen behind the lens without ophthalmoscope. The sheet may be transparent, white, or bloody depending on pathogenesis.

Causes of retinal detachment- Causes of Rhegmatogenous detachment:

a) Cataract surgery especially when if the surgery is complicated by a tear in posterior lens capsule, vitreous loss and retained lens fragment or intraocular heamorrhage (Grahn *et al*., 2007, Vainisi *et al.,* 2007*)* [7, 8].
b) Vitreal liquefaction (Meekins, 2015) [4].
c) Congenital Causes- It is very uncommon cause but sometimes detachment can develop in the first few months of life. But breeds with inherited retinal dysplasia, folding of retina. Collie eye anomaly with defects of retina, choroid, and sclera. Poor nutrition and radiation exposure, or other serious infection during pregnancy.
d) Breeds with excessive vitreous degeneration eg- Shih Tzu, Chihuahua, Lhasa Apso, Boston terrier, Bull terrier, Grey hound, Miniature Pinscher.
e) Immune mediated disease (Cullen *et al*., 2000) [9].
f) Retinal cyst, choroidal tumors such as choroidal melanoma results in retinal detachments (Christine *et al*., 2006) [10] and optic nerve colobomas.

Causes of non-rhegmatogenous detachment

a Circulatory Causes: Hypertension is potential cause of retinal detachment in older dogs. The hypertension may be due to chronic kidney disease and hyperadrenocorticism. Rare causes include tumors of adrenal gland and hyperthyroidism (Sansom and Bodey, 1997) [11].

Hyperviscosity syndrome can also cause retinal detachments. With this syndrome there is too much circulating protein in the blood and the blood becomes very thick, which can rupture small blood vessels.

Thick blood having increased numbers of cells or poor clotting of the blood is the some other circulatory cause of retinal detachments.

b Infectious causes: Fungal: Blastomycosis causes retinal detachment along with anterior uveitis, optic neuritis and granulomatous chorioretinitis.

Protozoal: Canine monocytic ehrlichiosis causes blood hyperviscosity, elevation in oncotic pressure, vasculitis, thrombocytopenia and platelet dysfunction all are causative agent of exudative retinal detachment (Harrus *et al.*, 1998) [12]. Retinal detachment is also found in *Babesia canis* along with the retinal hemorrhage. Out of total ocular manifestation caused by *Leishmania donovani*, only 9% cases have posterior uveitis which includes chorioretinitis, retinal hemorrhage and retinal detachment.

Diagnosis-Ophthalmoscopy

Retinal detachments in dogs is characterized by a grayish-white sheet of retinal tissue detached from the pars ciliaris retinae and remaining attached to optic nerve. Most types of retinal detachments seen in animals are giant dialysis in which large areas of retina have become detached.

Since the nature of material can indicate the disease process. Clear fluid i.e. transudate or modified transudate is transparent and imparts a bubble- like appearance to the detached retina and it is most common type of sub-retinal fluid in hypertensive retinopathy and steroid responsive retinal detachment described in dogs. Cloudy yellow-white exudates are typical to infectious/inflammatory material beneath the retina caused by chorioretinitis of various diseases which results in to the retinal detachments (Meekins, 2015) [4].

Ultrasonography

In cases where posterior segment of eye cannot be visualized by ophthalmoscopy e.g., corneal edema, hyphema, cataract, vitreous hemorrhages, a grey- scale B- mode ultrasound examination may be used to demonstrate the condition (Audu *et al.,* 2017) [13].

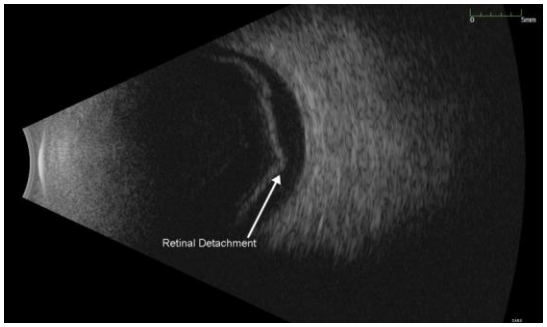


Fig 1: Ultrasonographic image (seagull sign) of retinal detachment

A direct transcorneal ocular examination in sagittal and dorsal plane is very helpful (Dietrichh, 2007) [14]. The classic appearance of complete retinal detachment is the "seagull sign"- a V- shape (figure 01) thick and immobile membranous structure of high echogenicity that remain fixed to the posterior wall of the eye at the optic nerve head and at the ora-serrata retinae (Ofri, 2013) [3]. While in case of partial retinal detachment diagnosed as a convex echogenic structure separated from posterior ocular wall by a zone of sonolucency may or may not be attached with optic disc (Joy *et al.*, 2011) [15]. But when an echogenic linear structure, mobile and of uneven thickness, coursing through the vitreous cavity in any direction and not attached to optic disc, it confirms the vitreous membrane (Labruyere *et al*., 2011) [16].

Colour DOPPLER

It is used to differentiate the complete retinal detachment and posterior vitreous membrane since there is vascularity within a detached retina but no vascularity is present within detached posterior vitreous membrane (Ido *et al.*, 2007) [17].

Contrast Enhanced Ultrasonograpy (CEU)

It is 100% accurate for detection and differentiation between retinal detachment and vitreous membrane, since colour Doppler is limited in its ability to demonstrate flow in small vascular structures, especially in the smaller ramifications of the retinal vasculature (Labruyere *et al.*, 2011) [16].

Electroretinogaphy (ERG)

The ERG is the electrical response recorded when the retina is stimulated by flashes of light. In case of retinal detachment the ERG response may be present or absent, depending on duration of detachment and several other factor (Hoffman *et al.*, 2018) [18]. ERG can be used to determine prognosis of surgical reattachment surgery (Ekesten *et al.*, 2013) [19].

Principle of retinal re-attachment surgery

The retinal re-attachment surgery in dogs is still in its infancy. The principle is to close all the retinal breaks and create strong chorioretinal adhesions so that these breaks do not open and new breaks do not occur (Gelatt and Gelatt, 2011) [20].

Surgical techniques

For simplicity retinal re-attachment surgery may be divided in to:

(1) External approach- Scleral indentation
(2) Internal approach or vitrectomy

(1) Instrumentation for sclera buckling procedure

(a) Scleral buckling biomaterials
(b) Caliper for scleral measurements
(c) suture material

Scleral buckling biomaterials

Non-absorbable implants

- Polyviol- it is a red rubber, composed of polyvinyl alcohol, Arabic gum and Congo red.
- Polyethylene- polyethylene tubes used either as segmental or encirciling implants.
- Silicone- at present, it is considered the material of choice in sclera buckling procedures due to its excellent biocompatibility, chemical inertness and long-term stability *in vivo*. Silicone implants have been extensively reported to be well tolerated by ocular tissue.
- Solid silicone implants are- rod, flat band, round sleeve, grooved strips, asymmetrical tyre, meridional and wedge type
- Porous silicone implants are- round sponge, oval sponge, grooved sponges, half-thickness sponges, tunnel sponges, ellipsoidal sponges and L-shaped sponge.
- Polytetrafluoroethylene scleral buckles
- Hydrogels-polyglycerylmethacrylate(PGMA), polyhydroxyethyl acrylate (PHEA), polymethyl methacrylate(MAI)

Absorbable implants

- Biological material– tissue transplants such as autografts, allografts and xenografts
- Gelatin
- Surgical gut
- Fibrin– single rod or open-cell sponge
- Injectable materials– air, homogenized autologous fat, sodium hyaluronate (Baino, 2010).

Instrumentation for vitrectomy

- Vitrectomy mechine
- Trocar-cannula system: for placing ports, available in 20-, 23-, 25-, and 27- guage
- Surgical microscope and wide angle viewing system
- Infusion canula: to maintain intraocular pressure set by the vitrectomy mechine
- Vitrectomy probe/ cutter (vitrector): for vitreous removal, aspiration, and peeling and cutting membranes. These are available with cut speeds up to and exceeding 10,000 cuts per minute (figure 02).

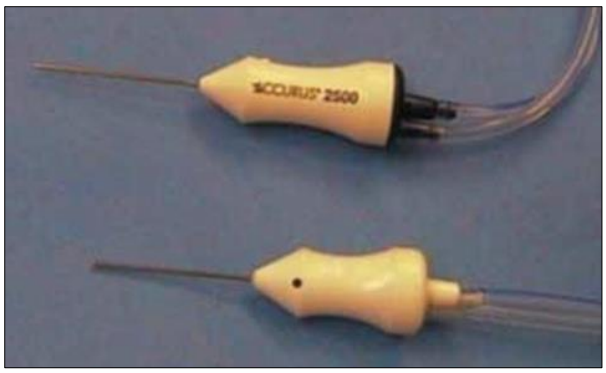
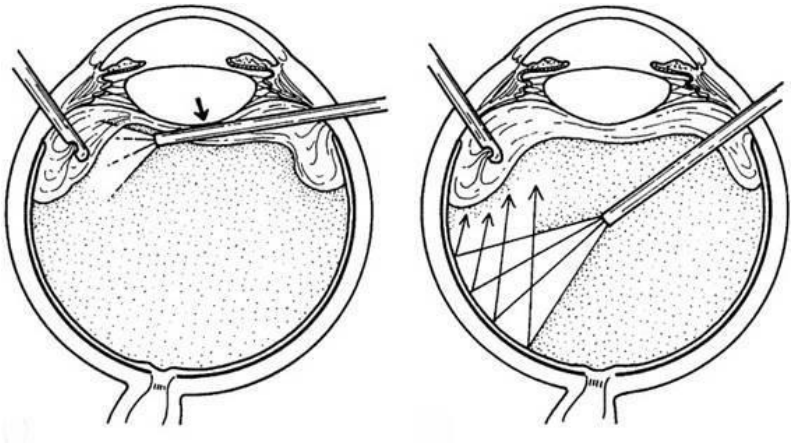


Fig 2: Vitrectomy probe

- Endoillumination light source: for visualization of the posterior segment including vitreous and retina available in focal and wide- angle illumination which uses varying light sources such as Xenon and LED (figure 03).



Direct illumination Indirect illumination

Fig 3: Endoilluminator

- Chandelier lighting system: placed using trocar- canula systems that enable by manual surgery without having to devote one hand to holding a traditional endoilluminator
- Forceps to peel the membrane and scar tissue.
- Silicone-tipped drainage needles to remove fluid from eye.
- A laser probe (endolaser) to seal around retinal tears or treat abnormal blood vessel in the eye and available in straight and curved form
- Scissors: for cutting retinal band and tractional membranes. They are available in horizontal, vertical and angled designs
- Membrane scrapers: for lifting an edge of a membrane
- Extrusion canulas: used to drain sub retinal fluid, perform fluid air exchange, disperse fluids resting on the retinal surface e.g., soft clip canula, backflush canula
- Vitreous substitute such as gas bubble or silicone oil (Vainisi and Wolfer, 2004) [5].

Scleral buckling

In this ophthalmic surgical technique, a scleral sponge and encircling silicone band are used with imbricating scleral suture to indent the sclera over the area of detached retina due to which the underlying tissue comes in contact with the neurosensory retina. It is performed to produce functional closure of retinal breaks responsible for retinal detachment and to reduce chances of recurrent detachment.

The selection of specific buckling technique depends upon the location, number, size and types of retinal breaks. If retinal breaks, vitreoretinal degenerative disorders, and significant vitreoretinal traction are present in multiple quadrants, a circumferential buckle is usually favored. A single retinal tears unassociated with additional significant problems may be managed with an isolated segmental buckle.

Scleral buckling procedure

This ophthalmic surgical procedure involves routine preparation and draping, conjunctival incision, identification and treatment of all retinal breaks and areas of vitreoretinal degeneration, suturing of buckle material to the sclera, and additional techniques as indicated.

As with all vitreoretinal surgery, the preparation and draping includes, the face, eye lids, and conjunctiva are prepared with appropriate antiseptic techniques. Then a plastic adhesive drape is placed over the open lids so that the drape adheres to the margins of eyelids that are held securely in place with the eyelid speculum.

After this a 360 degree limbal cunjunctival peritomy incion is usually made for encircling procedure, and a less extensive incision is performed for segmental buckles. A five clock-hour peritomy is usually sufficient for a quadrantic detachment when a radial or short circumferential buckle are used, and only the two rectus muscle bordering the involved quadrant are isolated in this situation. Then after traction sutures are placed beneath the insertions of the exposed rectus muscles to facilitate the positioning of globe and examination of sclera and the retina 360 degrees with binocular indirect ophthalmoscope (Gelatt and Gelatt, 2011) [20].

Then after, a localizing mark is made with a scleral marking device on the point of sclera overlying an edge of the retinal breaks. Afterward this many thermal treatments are employed to irritate the choroid and pigment epithelium so that chorioretinal adhesions create scar tissue to seal retinal breaks. The three most common techniques, which have persisted for many years, are diathermy, cryotherapy, and laser photocoagulation.

Types of buckling procedure

(1) Episcleral buckling (2) Intrascleral buckling

Episcleral buckling: These silicone explants are secured to the sclera with 5-0 non absorbable synthetic suture attached to spatula needles with cutting tips, by horizontal mattress sutures. The bites of suture penetrate at least one-half to two third thickness and spaced 5 to 6 mm apart. When a radially oriented segmental buckle are applied, intrascleral suture limbs are placed parallel to the meridian of the retinal breaks and equidistant from its edges so that the knots can be tied posteriorly but when circumferentially oriented segmental buckle is used, suture limbs are placed parallel to the limbus. Narrower bites inhibit circumferential movement of the band, if they are pulled tight while wider bites will allow the band to move anterior to its desired location (Gelatt and Gelatt, 2011) [20].

Intrascleral buckling: In this technique lamellar dissection is done to create a partial thickness scleral bed. It usually involves a limited part of circumference of globe, but can vary in length from one to twelve hours of clock and in width from four to twelve mm. Then an encircling band is usually

placed at the area that was undermined. The ends then joined together with moderate tension. Finally the flaps are closed over the top with suture.

Advantages

- Scleral buckling with encirclement may achieve retinal reattachment even a retinal break is missed. It can be very "forgiving" procedure in this sense.
- During sclera buckling, the surgeon gets a second look in the operating room with the patient sedated, with the full control of globe, and with open conjunctiva for deep sclera depression.
- Scleral buckling especially encirclement, supports the peripheral retina, reducing the traction which the vitreous will be able to exert on the retina in the near future (Maitray *et al.*, 2017) [22].

Postoperative comlications

- **Recurrent retinal detachment:** It is often due to errors in the initial surgery like as inadequate buckle length missed retinal break, misplaced buckle and fishmouthing (Lincoff and Kreissing, 1996) [23].
- **Glaucoma:** Angle closure glaucoma secondary to excessive tight scleral encircling buckle or excessive cryopexy which causes forward displacement of cilliary body (Gelatt and Gelatt, 2011) [20].
- **Cataract:** 25-50% cataract in phakic animals.
- **Uveitis:** Posterior uveitis with re-detachment non responsive to any medicinal treatments.
- **Orbital haemorrhage:** Occurs along with some exophthalmia.
- **Necrosis of anterior segment:** From damage to the long posterior ciliary blood vessels, tenotomy of the insertion of all of the rectus muscle, or an excessively tight encircling band.

Vitrectomy

It is an ophthalmic surgical procedure where the vitreous humor gel, that fills the ocular cavity, is removed to provide better access to the retina.

Types of vitrctomy:

1. **Anterior vitrectomy:** It is done in rare cases, when the vitreous gel comes through the pupil in to the anterior chamber of eye.
2. **Posterior pars plana vitrectomy:** it is regular in practice and performed to approach retina. Its indications are tractional retinal detachment, rhegmatogenous retinal detachment, vitreous biopsy, intraocular foreign bodies, dislocated intraocular lens, vitreous hemorrhage.
   After the vitrectomy, retinopexy is done. The retinopexy can be performed with either cryosurgery or laser. Cryosurgery is performed either trans-sclerally alone or combined with indirect ophthalmoscope.

Steps of 20 g three port pars plana vitrectomy

1. Depending on the lens status two scleral incisions of 5.0 - 6.0 mm from the limbus at 1 and 2 o"clock positions by typically using a beveled incision technique for the insertion of the intra-vitreal instruments.
2. Third incision is made 7.0 - 8.0 mm posterior to the limbus at the 4 o"clock position inferotemporally.
3. Now place all three ports in the above three scleral incisions.
4. The sclerotomies are performed with 20 g microvitreoretinal (MVR) blades. The first sclerotomy is used for infusion to maintain intraocular pressure (IOP) and volume and second sclerotomy is used for insertion of endoilluminator and third will be the entry site for vitrector and endolaser instruments.
5. Then a 20 g infusion canula is sutured to the 4 o"clock sclrerotomy site with a 7-0 absorbable suture, which delivers balanced salt solution into the vitreous cavity throughout the surgery. The rate of infusion and the level of IOP during vitreoretinal surgery are controlled by changes in the level of the infusion reservoir.
6. Excise any material around the retinal detachment with special intraocular scissors and aspirations. The vitreous is removed in small pieces at low vacuum pressure (<150 mm Hg).
7. After sufficient vitreous removal manipulate the retina using the tip of light pipe and the vitrectomy probe.
8. Since in canine 75% of retinal detachments have tears over 270°, perfluoro-n- octane (PFO) heavier than water is needed to flatten the retina. For small retinal breaks perfluorocarbon (SF6) or (C3F8) are used with the help of soft- tipped silicon needle over optic nerve head, to unfold and flatten the retinal detachment.
9. The gas is injected very slowly so that, the single large bubble is maintained.
10. Now, retinopexy is performed either by laser or by cryotherapy. Laser is applied by transpupillary or endovitreal route and cryotherapy is applied externally. Often two or three rows of contiguous burns near the ora serrata are applied for 360°. The retinal insults (burns or freezes) will appear as small white spots.
11. After retinopexy silicone oil (medical grade 5000 centistoke SiO) or air is exchanged with perfluorocarbon gas. For large retinal tears in the dogs, silicone oil is preferred to air. The silicone oil is injected deep within the vitreous usually two to three mm in front of the optic disc to produce a large and single bubble.
12. Power and time setting will vary depending on the type of laser used, clarity of media used, degree of tissue pigmentation and angle of incidence of the laser beam (Gelatt and Gelatt, 2011) [20].

Retinopexy

Retinopexy procedure forms adhesions between the retina and the underlying retinal pigment epithelium and choroid. These procedures are of particular value in „sealing" the area surrounding the retinal tear. They cannot attach an area of the retina that is completely separated, but can prevent progression of rhegmatogenous detachments.

Pneumatic retinopexy

In this technique expansible gases are used to tamponade the retina underlying RPE to close the retinal tears or break. Then laser or cryopexy is used to seal the break and cause focal adhesion between the retina and the RPE/choroid layer (Vainisi and wolfer, 2004) [5].

Indications

- Retinal breaks within the superior 8 clock hours (8 to 4 o" clock)
- Single or multiple breaks within 1 clock hour
- No or minimal media opacity

Contraindications

- Breaks within the inferior 4 clock hours
- Proliferative vitreoretinopathy
- Extensive lattice degeneration or traction
- Significant media opacity

Choice of gases used

Air or sulfur hexafluoride (SF6) or perfluoropropane (C3F8), or other perfluorocarbon gases such as C2F6. Currently C2F6 is used successfully. In selecting a gas, it is important to understand the longevity and expansion characteristics of the gases. The choice of type and amount of gas depends on two factors:

(1) What size of bubble is needed- The gas bubble should be large enough to cover all detached breaks, simultaneously or alternately, and keep them covered for three to five days with some extra volume as a margin of safety. In the human eye, 0.3 ml gas bubble covers almost 60 degrees arc of retina, but it takes approximately 1.2 ml bubble to cover 80-90 degrees.
(2) What length of time the bubble should stay in the eye- It is optimal for the gas bubble to cover the breaks for 4-5 days and then disappear as soon as possible.

Two characteristics of perfluorocarbon gases which accounts for their efficacy in reattaching the retina are:

(1) Surface tension allows the gas bubble to occlude a retinal break instead of passing in to subretinal space. The surface tension of any gas is much higher than that of other substances in the eye. Once the break is occluded, the retinal pigment epithelial pump can absorb the subretinal fluid.
(2) Buoyancy provides the force which pushes the uppermost retina back against the wall of eye.

Advantages

- It is an outpatient procedure
- Very less discomfort than operating room procedure
- There is no need of general anesthesia
- There is no change in refractive error
- There is faster ocular and systemic recovery
- It‟s a lower cost procedure

Disadvantages

- The operation success rate is lower than operating room procedure
- Not all detachment are amenable to repair with pneumatic retinopathy
- It requires significant patient cooperation and positioning hence not recommended in dogs
- Lastly it needs to be surgeons highly skilled in retinal examination.

Demarcation and barrier retinopexy

Demarcation retinopexy is an attempt to stop any retinal detachment in progress. It is helpful in stopping temporal rhegmatogenous detachment before the retinal detachment progress to the macula. This is a salvage retinopexy (Vainisi and Wolfer, 2004) [5]. If one or two rows of laser burns are made along the leading edge of retinal detachment, it is possible to stop that detachment. It is always helpful on inferior and horizontal detachment, but not for superior detachment, as gravitational forces overcome the adhesions. Barrier retinopexy is always indicated for small tears, retinal holes or thin areas of retina associated with geographic retinal dysplasia (Vrabec and Baumal, 2000) [24].

Laser retinopexy

In this retinopexy procedure laser burns are applied to selected areas in the fundus with an indirect headset delivery system using settings varying from 100 to 200 milliwatts and 100 to 600 milliseconds with total delivered energy raging between 15 and 100 millijoules. As a result ophthalmoscopically visible lesions in the nontapetal fundus are produced with all laser settings used. The appearance of these lesions corresponds to the energy level used, and the degree of pigment in the lased region. In the tapetal fundus, laser burns are more difficult to produce, less repeatable, and required higher energy levels. Generally He-Ne laser is used for this (Pizzirani *et al*., 2003) [25].

Cryoretinopexy

This procedure involves placement of a metal probe against the eye. When the foot pedal is pressed, the tip of cryopexy probe becomes very cold, as a result rapid expansion of very cold gases usually nitrous oxide within the probe tip occurs. When the probe tip is placed against the eye formation of water crystals followed by rapid thawing results in tissue destruction which is followed by healing and scar formation. For retinopexy standard probe of 2.5 mm is used which may have tips of various shapes like ball shape, spatula shape, „T"" shape and bonnet shape.

Conclusion

Regardless of the type of retinal detachment, rapid recognition of the lesion resulting in blindness and appropriate diagnostic procedure is necessary to improve prognosis for vision impairment in individual animals. Complete physical examination, along with basic clinical, pathologic testing and when indicated, imaging techniques and infectious disease screening tests, are necessary in case of retinal detachment. Visual success does not rely on the successful reattachment surgery. It depends on that how fast the retinal detachment is diagnosed and within which time the retinal reattachment surgery has been performed. If the retinas are attached within 4 weeks, have a reasonable chance of achieving some functional vision.

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