

## Eye Cases Requiring Emergency Intervention in Animals\*

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**Abstract:** Head injuries and accidents that cause lesions in the eye tissue can cause loss of vision, pain and severe deformities. In the emergency clinic, intervention in eye injury cases requires accurate and rapid diagnosis. The main objectives of such interventions are to prevention of loss of vision, prevention of loss of bulbus oculi, reduction of pain, and prevention of long-term complications. Traumatic proptosis (especially brachicephalic dog breeds), traumatic retrobulbar hemorrhage, desemetoccele, iris prolapse and corneal lacerations are more common in dogs, cats and horses when evaluated according to animal species. General condition and regional deformity in clinical examination and loss of vision in systematic eye examination are evaluated. Complications should be prevented by medical intervention or surgery immediately after diagnosis. In conclusion, it is extremely important to prevent the permanent sequelae of the eye in the emergency clinic through a correct diagnosis without delay.

**Keywords:** Emergency; eye; trauma; vision loss

### Hayvanlarda Acil Girişim Gerektiren Göz Olguları

Göz dokusunda lezyon oluşturan kafa travmaları ile kazalar görüş kaybı, ağrı ve şiddetli deformitelere neden olabilir. Acil klinikte göz olgularına girişim doğru ve hızlı teşhis gerektirmektedir. Bu girişimde temel amaçlar; görüş kaybının engellenmesi, bulbus oculi kaybının engellenmesi, ağrının azaltılması ve uzun dönem komplikasyonların engellenmesidir. Hayvan türlerine göre değerlendirildiğinde köpek, kedi ve atlarda travmatik proptosis (özellikle brahisefalik köpek ırkları), travmatik retrobulbar kanama, desemetosel, iris prolapsusu ve korneal yırtıklarla daha sık karşılaşılmaktadır. Klinik muayenede genel durum ve bölgesel deformite, sistematik göz muayenesinde ise görüş kaybı değerlendirilir. Tanı kesinleştirildikten hemen sonra medikal tedavi veya operatif girişimle komplikasyon gelişimi engellenmelidir. Sonuç olarak acil klinikte göz olgularına doğru teşhisle zaman kaybetmeksizin girişimde bulunulması gözdeki kalıcı sekellerin önlenmesi açısından son derece önemlidir.

**Anahtar Kelimeler:** Acil; göz; travma; görme kaybı

### Introduction

Accidents such as trauma affecting the eye tissue, chemical burns, penetration of foreign bodies into different depths of the bulbus oculi may cause severe pain and permanent loss of vision, and thus require emergency intervention through accurate and rapid diagnosis (Adamantos and Garosi, 2011; Aiello, 2016; Belknap, 2015; Betbeze, 2015; Giuliano, 2005; Mandell, 2011; Özba and Kılıç, 2004; Ressel et al., 2016; Sansom and Labruyère, 2012; Tetas et al., 2016). Eye anatomy should be well known in emergency interventions (Figure 1). The main objectives of such interventions are a) prevention of loss of vision, b) prevention of loss of bulbus oculi, c) reduction of pain, d) prevention of long-term complications (Aiello, 2016; Mandell, 2011; Özba and Kılıç, 2004). As there are also head traumas in most of the cases, it may be necessary to start treatment of such lesions before starting eye eye treatment (Mandell, 2011; Ressel et al., 2016). Clinical examinations start with checking whether there is discharge in the eyes, blepharospasm,

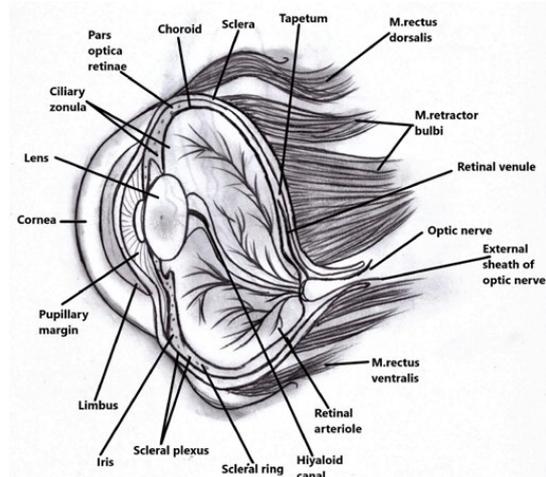


Figure 1. The ocular anatomy of the dog eye (drawing).

photophobia, strabismus, third eyelid protrusion, and changes in the bulbus oculi in the temporal or medial direction. The orbita is examined for rim fractures; bulbus oculi for its position within the

orbita and exophthalmus; periorbital structures for swelling, bleeding, discoloration, scratches, and injuries; the conjunctiva for bleeding and tears; the sclera and cornea for integrity, opacity, ulcers, foreign bodies, injuries and tears; and the anterior chamber is examined for anterior uveitis and hyphema (Betbeze, 2015; Giuliano, 2005; Mandell, 2011; Tetas et al, 2016).

Systematic eye examinations should be initiated by examining the loss of vision. The size of the pupil and pupillary light reflex are determined by using a light source. The opacity of the ocular layer and the size and symmetry of the pupil are examined directly by using an ophthalmoscope. By setting it to +20 dioptrics, the eyelids, bulbar and palpebral conjunctiva are checked. When examining the conjunctiva, the surface of the nictitating membrane is also checked. Again, the transparency and structural integrity of the cornea is assessed by setting it to +20 dioptrics; the color and shape of the uvea is assessed by adjusting it to +10 dioptrics; the transparency, position and stability of the lens are assessed by setting it to  $+10 \pm 5$  dioptrics; and the position, tapetal reflection and vascular system of the corpus vitreous and the retina are assessed by setting it to  $0 \pm 3$  dioptrics. In the emergency eye clinic, each animal should undergo Schirmer's tear test I and intraocular pressure measurement with a tonometer (Barrie and Williams, 2002a). If the lens, corpus vitreous, retina and sclera cannot fully be assessed, the assessment can be performed with B-mode ultrasonography by using a 7.5–12 MHz probe (Betbeze, 2015; Mandell, 2011; Sansom and Labruyère, 2012).

Eyelid injuries, traumatic proptosis, traumatic retrobulbar hemorrhage, foreign body pricking into the cornea and deep tissues, deep corneal ulcers, descemetocele, iris prolapse, corneal tears, acute glaucoma, anterior lens luxations, traumatic anterior uveitis, optic neuritis, retinal detachment, hyphema, chemical burns are the most common cases in emergency eye clinics (Aiello, 2016; Betbeze, 2015; Giuliano, 2005; Mandell, 2011; Özba and Kılıç, 2004; Wilkie, 2003).

#### Eyelid Injuries

Such injuries are usually caused by the effect of vehicle traumas bites or cutting tools (Figure 2A). The time elapsed after injury, the prevalence of bacterial contamination, the extent of injury to the puncta lacrimalis and ductus nasolacrimalis, and the degree of tissue loss should be taken into consideration during the assessment in terms of prognosis. As the irritation of the eyelid will lead to damage to the cornea, intervention should be made as quickly as possible. The treatment begins with the cleansing of the area and irrigation of the area by using physiological saline solution or Ringer's

lactate solution. The antisepsis of the skin is ensured by using 1% povidone iodine solution, an attempt is made to prevent wound contamination by using antibiotic eye drops (Mandell, 2011; Özba and Kılıç, 2004; Şaroğlu, 2013; Wilkie, 2003). Eyelid injuries with loss of material caused by trauma or iatrogenesis cause ulceration and fibrosis with severe and chronic corneal irritations in the long term. Therefore, it should be avoided to remove tissue from irregular wounds on the eyelid boundary. If more than 1/4 of the eyelid tissue has material losses, it is necessary to use blepharoplasty techniques to protect the normal eyelid anatomy (Özba and Kılıç, 2004; Şaroğlu, 2013; Wilkie, 2003).

In full-level injuries, the skin should be sutured after the conjunctival layer (Figure 2B). The conjunctival layer is sutured with 5/0–7/0 absorbable sutures (PGA, PGLA); the skin is sutured with 4/0–5/0 absorbable sutures (PGA, PGLA) or silk and nylon sutures in the form of simple separate sutures. Attention should be paid to bury the knots in the subconjunctival area at the conjunctival layer, and to leave the ends of the knots at a length preventing them to touch the cornea (Figure 2C). While the eyelid edges are aligned to be parallel to each other, attention should be paid to make the edge contours proper and reciprocal (Figure 2D) (Özba and Kılıç, 2004; Şaroğlu, 2013).

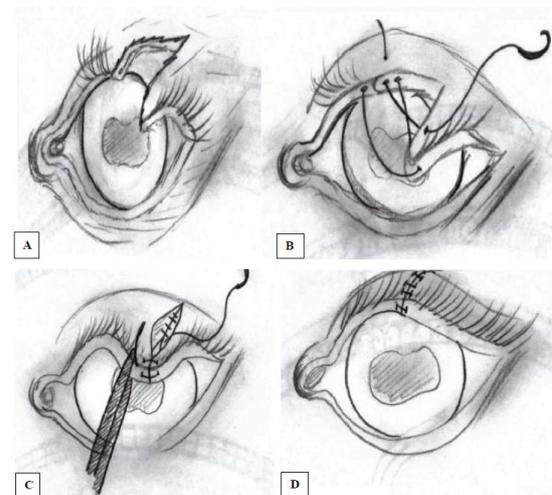


Figure 2. The suture application in the eyelid injury (drawing). A. Upper eyelid injury. B. A figure-eight suture at the conjunctival layer. C. The ends of the knots should be left at a length that prevents them to touch the cornea. D. The eyelid edge contours should be proper and reciprocal.

There is no need for local antibiotic use when using broad-spectrum systemic antibiotics such as amoxicillin/clavulanic acid in the postoperative period (Mandell, 2011).

#### Traumatic Proptosis

This is the case in which the bulbus oculi is located outside the eyelids and orbita at varying degrees (Figure 3). Its etiology is always traumatic,

but the brachycephalic dog breeds are more prone to it (Betbeze, 2015; Gilger et al, 1995; Özba and Kılıç, 2004; Ressel et al, 2016; Şaroğlu, 2013; Wilkie, 2003).

The prognosis depends on the size and reflexes of the pupil, the duration of exposure to trauma, the extent of damage to the bulbus oculi and the orbita, and the trauma that the body is exposed to. After the correct treatment, approximately 40 to 60% of dogs gain the ability to see again, while few cats continue to have eyesight (Aiello, 2016; Ressel et al, 2016). In the treatment, corneconjunctival tissue is moistened primarily by using artificial tears, contact lens solution, lactated ringer or normal saline (Aiello, 2016; Özba and Kılıç, 2004; Wilkie, 2003). Before the bulbus oculi is placed in the orbita, in order to facilitate the process and to prevent pressure in intraocular tissues, the lateral canthotomy procedure is performed after the animal is subjected to general anesthesia (Aiello, 2016; Betbeze, 2015; Gilger et al, 1995; Özba and Kılıç, 2004; Şaroğlu, 2016; Wilkie, 2003). After the placement of the bulbus oculi in the orbita, tarsorrhaphy or blepharorrhaphy is performed. The eyelid edges are sutured with 2–3 horizontal U-shaped stitches. Sponge pieces can be used as stents in order to prevent from ischemic necrosis. Local and systemic antibiotics with retrobulbar injections of methylprednisolone or triamcinolone should be used for 5–7 days. After intraorbital swelling is gone (7–21 days), the sutures are removed (Aiello, 2016; Şaroğlu, 2013). Corneal ulceration, enophthalmus, optic nerve atrophy, keratoconjunctivitis sicca and musculus rectus medialis injuries are the most common complications (Aiello, 2016; Betbeze, 2015; Özba and Kılıç, 2004).

#### Traumatic Retrobulbar Hemorrhage

Traumas that hit the orbita and bulbus oculi create a retrobulbar hemorrhage by damaging the orbital veins and cause exophthalmos, iridocyclitis and lagophthalmos. The hemorrhage is seen mostly in dogs, horses and cats. Due to the exophthalmos and lagophthalmos, the blinking reflex is affected and accompanied by acute ulcerative keratitis. Subconjunctival and intraocular bleeding can also accompany, and intraocular bleeding prevents detailed eye examination. In this case, examination should be performed by using a B-mode USG to detect retinal detachment (Aiello, 2016; Betbeze, 2015; Louhgran et al, 2016; Ressel et al., 2016).

In the treatment, topical and systemic antibiotics, corticosteroids, mydriatics, when necessary, to dilate the pupil, and temporary tarsorrhaphy are administered to protect the cornea until the blink reflex recurs. Although the prognosis is suspected due to secondary glaucoma

and phthisis bulbi complications, bleeding is often absorbed in the case of intraocular bleeding (Aiello, 2016).

#### Foreign Bodies Pricking into the Cornea and Deep Tissues

Although it varies according to the size, length and sharpness of the foreign body (Figure 3), clinical findings (pain, blepharospasm, lacrimation, varying degrees of secondary iridocyclitis, and so forth) are similar in most cases (Barnett, 2006; Belknap, 2015; Crispin, 2005; Labelle et al, 2014; Tetas et al., 2016).

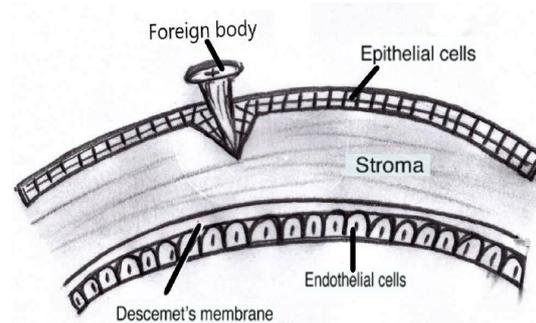


Figure 3. Foreign body pricking into the cornea (drawing).

Foreign bodies pricking into the cornea and corneal injuries should be removed immediately, as they can become a complicated case, causing corneal stromal abscess. The facial foreign bodies in the cornea can be removed with foreign body forceps a few minutes after the application of topical local anesthetic (proxymetacaine hydrochloride 0.5%) (Figure 4).

Plain foreign bodies, such as thorns and metal chips, are difficult to remove when they penetrate into deep tissues from the cornea and require general anesthesia. Foreign bodies penetrating into deep tissues are removed by slowly and carefully pulling in the same direction as the input angle using a 25–30-gauge needle or foreign body needle. The use of tissue forceps may cause foreign bodies to penetrate deeper (Belknap, 2015; Crispin, 2005; Cullen and Grahn, 2005).

#### Chemical Burns

Chemical burns are not common in eye cases of animals requiring urgent intervention. Chemical burns may occur in eyes due to exposure to alkaline chemicals such as ammonium hydroxide, sodium hydroxide, calcium hydroxide, potassium hydroxide and magnesium hydroxide, and acidic chemicals such as sulfuric acid, acetic acid and hydrochloric acid (Belknap, 2015; Barrie and Williams, 2002b; Dohlman et al, 2011; Özba and Kılıç, 2004; Şaroğlu, 2013).

The chemicals that cause the most severe ocular damage are the ones with alkaline properties, and burns caused by ammonium hydroxide found in ammonia-based fertilizers,

detergents and refrigerants are the most common chemical burns (Barrie and Williams, 2002b; Şaroğlu, 2013). The most important factor among alkaline and acidic chemicals affecting the depth and severity of lesions is the coagulation mechanism of proteins in the epithelial layer. Because the high pH of alkaline chemicals does not denature surface proteins, it does not cause a coagulative change. Thus, it penetrates deeper and causes more destruction of epithelial layer and stroma, and deep burns. Because it rapidly destroys all the cells that it is in contact with, including the stem cells of the corneal epithelium, it leads to chronic ulcers that do not heal. In chemical burns caused by acids, coagulation that is formed prevents the chemical agent from penetrating deeper, and the depth of burns remains limited (Barrie and Williams, 2002b; Belknap, 2015; Özba and Kılıç, 2004).

The first 1–3-minute intervention after an accident is crucial. It should not be attempted to go for neutralization with acids in alkaline burns and neutralization with alkalines in acid burns. In this case, the resulting heat after the reaction can cause more damage to the eye (Şaroğlu, 2013). Normal saline is the most suitable solution for washing the eye, but chemical factors in the corneal or conjunctival sac are also removed by using plenty of water or lactated ringer. Washing should be maintained for at least 30 minutes (Belknap, 2015; Özba and Kılıç, 2004; Şaroğlu, 2013; Dohlman et al., 2011). Epithelial rashes can be removed using a cotton swab, but topical anesthesia should be applied before that (Özba and Kılıç, 2004). Topical broad-spectrum fluoroquinolone-type antibiotics (ofloxacin 0.3%), and oral doxycycline are used (Barrie and Williams, 2002b; Belknap, 2015). To ensure the regeneration of epithelial tissue, artificial tear, soft contact lens, epidermal growth factor, sodium hyaluronate and fibronectin applications are being tested. The use of corticosteroids in the acute period of chemical burns is not appropriate. Their use in this period may cause the inhibition of fibroblast and collagen synthesis through keratocyte migration. Nonsteroidal anti-inflammatory drugs (NSAIDs) should be used instead of corticosteroids to control inflammation (Gelatt, 2012; Şaroğlu, 2013).

#### **Deep Corneal Ulcers, Descemetocele, Iris Prolapse**

They develop mostly in the center of the cornea and can severely affect the vision (Figure 4). It is more common in dogs, cats and horses. Dogs with keratoconjunctivitis sicca and brachycephalic breeds are more prone to it. Schirmer's tear test and fluorescein test should be used in diagnosis, and the anterior segment should be examined in

detail. Secondary anterior uveitis, ocular hypotonia and hypopyon are common findings. Central corneal ulcers require more time for recovery and vascularization (Aiello, 2016; Gelatt, 2012; Wilkie, 2003).

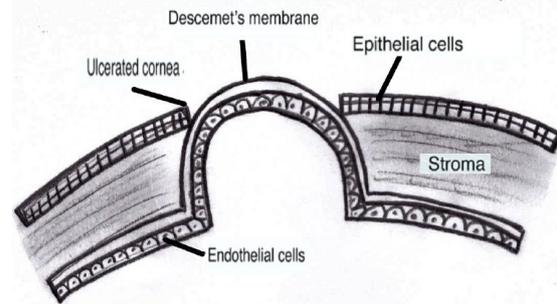


Figure 4. Descemetocele (drawing).

In the medical treatment of uncomplicated corneal ulcers, ofloxacin or the ternary combination of neomycin, polymyxin and gramicidin can be administered at intervals ranging from 2 hours to 6 hours per day depending on the severity of ulceration. In the treatment of deep and severe ulcers, the topical use of ciprofloxacin 0.3% is beneficial. As a mydriatic-cycloplegic agent, atropine 1% topical application should be used without exceeding a 6-hour interval. The use of artificial tears for moisturizing the corneal surface also supports the treatment (Kim et al., 2009; Wilkie, 2003).

In cases where there is no response to medical treatment, the stromal depth is deeper than 50% or if there is a risk of corneal perforation, operative treatment should be performed. Operative procedure is performed using lamellar (with partial thickness) or penetrating (full-thickness) keratoplasty techniques with conjunctival grafts. Conjunctival autografts can originate from bulbar and palpebral conjunctiva. Deep corneal ulcer, descemetocele or iris prolapse is coated with bulbar conjunctival grafts in the style of 180°, 360°, bridge or pedicle (Aiello, 2016; Belknap, 2015; Hansen and Guandalini, 1999; Kim et al, 2009; Wilkie, 2003). While the lamellar keratoplasty technique is used in the treatment of deep corneal ulcers with high risk of perforation, the penetrating keratoplasty technique is used when a full-thickness keratectomy is needed in the case of descemetocele tears or to excise an unrecoverable cornea which has become infected, degenerated or infiltrated during the operation (Wilkie, 2003).

#### **Corneal Tears**

It is most common in horses and dogs and is less common in cats (Figure 5). Bites, traumas caused by the animal itself, and other accidents can

tear the cornea partially or deeply. Partial corneal tears show only pain, while deep corneal tears show signs of pain, blepharospasm, corneal defect and varying levels of iris prolapse. In deep tears (Figure 5), hyphema, miosis and distorted pupil may exist together and the size of the prolapsed iris is larger than that of the corneal tear (Aiello, 2016; Ressel et al., 2016). The prognosis depends on the position and size of the corneal tear, the exposure of close ocular tissues, gender (horses), the age of the animal, the elapsed time and other systemic injuries. B-mode USG should be used if the clinical examination cannot fully be performed (Aiello, 2016; Belknap, 2015; Tetas et al, 2016).

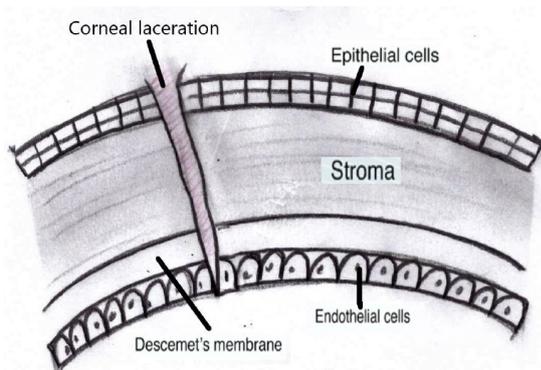


Figure 5. Deep laceration in the cornea (drawing).

Corneal tears are treated with simple separate sutures using the 7/0, 8/0, 9/0 absorbable sutures by matching the healthy tissues and suturing them. In partial tears, the torn part should be sutured without removal. To support and protect, the sutured area is protected by a third eyelid flap, bulbar conjunctival graft or temporary tarsorrhaphy. To control secondary iridocyclitis, topical and systemic antibiotics, nonsteroidal anti-inflammatory drugs and mydriatics are used in the postoperative period. Corneal wound scar, cataract with posterior synechia, secondary glaucoma, phthisis bulbi and bacterial endophthalmitis are complications seen after operation (Aiello, 2016; Belknap, 2015; Braus et al., 2017).

#### Acute Glaucoma

Glaucoma is an increase in intraocular pressure as a result of the obstruction of the flow of aqueous humor. It damages retinal ganglion cells and axons, as well as loss of irreversible vision. It is divided into two as primary and secondary. Primary glaucoma is shaped based on the reduction in the flow of aqueous humor due to the abnormality of iridocorneal angle trabecular network, whereas secondary glaucoma is caused by a pre-existing reason in the bulbus oculi (Curto et al, 2014; Wilkie, 2003; Wilkie, 2010). The situation in which intraocular pressure (IOP) in animals reaches 40–60

mmHg is considered glaucoma. It shows clinical findings in the form of buphthalmia, mydriasis, corneal edema, episcleral venous congestion and varying degrees of pain and may result in blindness if no attempt is made in the first few hours (Aiello, 2016; Barrie and Williams, 2002c; Curto et al, 2014; Maggio, 2015). In dogs, German shepherd dog, miniature poodle, American cocker spaniel, beagle, Siberian wolf, malamute, Dalmatian, chow chow, chihuahua, and Shar-Pei breeds are more susceptible to primary glaucoma (Aiello, 2016; Barrie and Williams, 2002c; Maggio, 2015; Wilkie, 2003). Glaucoma in cats is often accompanied by anterior uveitis, whereas there is more predisposition to glaucoma in Appaloosa-breed horses and those over 10 years of age. Although it can be detected in buphthalmia dogs in the early period, it may be missed during the period until glaucoma is detected in cats and horses. Diagnosis is made by considering clinical findings and measuring the IOP with Tono-Pen® or TonoVet® applanation tonometers (Aiello, 2016; Curto et al, 2014; Maggio, 2015; Spiessen et al, 2015; Wilkie, 2016). Prognosis in acute primary glaucoma is appropriate but requires lifelong treatment and follow-up (Curto et al., 2014; Wilkie, 2003). The aim of the treatment is to quickly reduce the IOP and prevent loss of sight. The first intervention in medical treatment involves the administration of mannitol (1–2 g/kg, IV), topical  $\beta$ -blockers, carbonic anhydrase inhibitors, systemic carbonic anhydrase inhibitors and prostaglandin analogues or miotic (pilocarpine, demecarium) agents (Aiello, 2016; Crispin, 2005). The benefit of topical applications is often not seen until the IOP drops below 30 mmHg. If the mannitol treatment does not drop the IOP within 2–4 hours, it may be necessary to go for the anterior chamber paracentesis under general anesthesia. In the operative treatment, laser cyclophotocoagulation, cyclocryotherapy and anterior chamber bypass formation methods are used, and the treatment should be initiated in the early period (Aiello, 2016; Maggio, 2015; Wilkie, 2003; Wilkie, 2010). The long-term treatment of glaucoma is continued with topical and systemic ocular hypotensive applications (Aiello, 2016).

#### Anterior Lens Luxations

Trauma occurs as a sequela of anterior uveitis, chronic glaucoma, chronic cataract and intraocular tumors (Braus et al, 2017; Wilkie, 2003). It is most common among middle-aged dogs, especially in Terrier breeds, and is rarely seen in horses (Aiello, 2016; Barrie and Williams, 2002d; Colitz and O'Connell, 2015; Fife et al, 2006; Gialletti et al, 2018; Wilkie, 2003). Acute primary anterior lens luxations show clinical findings in the form of pain, superficial anterior chamber, widespread corneal

edema, iridodonesis and the lens that appear as half-moon after it shifts from the axial plane (Crispin, 2005; Braus et al., 2017; Wilkie, 2003). In the affected eye, the pupillary light reflex is checked, intraocular pressure (IOP) is measured, and fundus is examined. Loss of pupillary light reflex gives a negative indication about prognosis (Wilkie, 2003). The lens is often located in front of the pupil and entirely in the anterior chamber. The medical treatment is mostly initiated by lowering the IOP to normal level using 1–2 g/kg IV of mannitol. After moderate dilatation is provided, phenylephrine 10% is used to regenerate the transpupillary flow of aqueous humor (Aiello, 2016). The lens is removed through phacoemulsification or intracapsular extraction in operative treatment (Aiello, 2016; Braus et al., 2017; Fife et al., 2006). In the postoperative period, corticosteroids are used with topical and systemic antibiotics. IOP is closely monitored and reduced to normal value using topical  $\beta$ -blockers, carbonic anhydrase inhibitors, systemic carbonic anhydrase inhibitors and prostaglandin analogues in case of elevation. Postoperative complications such as ocular hypertension, anterior uveitis, secondary glaucoma, synechia, retinal detachment and hyphema may be seen in the long term (Aiello, 2016; Braus et al., 2017; Fife et al., 2006; Wilkie, 2003).

#### Traumatic Anterior Uveitis

Anterior uveitis, also called iridocyclitis or red eye, is common among dogs, cats and horses but is rare in other animal species. It can be confused with other inflammatory diseases of the cornea and conjunctiva. Clinically, changes in lens such as acute photophobia, pain, blepharospasm, episcleral and conjunctival hyperemia, corneal edema and posterior synechia, as well as decreased IOP and miosis are seen. Moreover, aqueous flashing, hypopyon or hyphema can be seen depending on the increase in the aqueous humor proteins and inflammatory cells (Aiello, 2016; Giuliana, 2005; Renwick and Petersen-Jones, 2009; Volk et al., 2018). In addition to trauma, immune-related diseases such as systemic diseases (especially when affected bilaterally), cataract, primary or metastatic tumors, uveodermatologic syndrome can be involved in the etiology (Aiello, 2016; Renwick and Petersen-Jones, 2009; Tetas et al., 2016). Although the prognosis of acute anterior uveitis is favorable, the prognosis of anterior uveitis arising from immune-related diseases such as the uveodermatologic syndrome is doubtful. In the treatment, mydriatic cycloplegics (atropine 1% and phenylephrine 10%), topical and systemic antibiotics, corticosteroids (prednisolone acetate, dexamethasone) or Nonsteroidal anti-inflammatory

drugs are used (Aiello, 2016; Renwick and Petersen-Jones, 2009; Volk et al., 2018).

#### Hyphema

It is the accumulation of blood in the anterior chamber of the eye (Figure 6). Blood can come from iris, ciliary body, choroid or retina (Mandell, 2011; Özba and Kılıç, 2004; Telle and Betbeze, 2015; Wilkie, 2003). It can be caused by systemic causes, as well as originating primarily from blunt and perforation traumas to the eye (Colitz and O'Connell., 2015; Jins et al., 2018; Şaroğlu, 2013; Telle and Betbeze, 2015; Turner, 2008; Wilkie, 2003). Therefore, the patient should be examined in terms of bleeding in other organ systems (Wilkie, 2003). In the clinical examination, the blood accumulation that varies from bright red to black in the anterior cavity of the eye attracts attention (Şaroğlu, 2013; Turner, 2008). During the diagnosis, the fundus should be examined in terms of retinal hemorrhage and detachment, and IOP should be measured to check for secondary glaucoma, which is commonly encountered as a sequela. If the IOP is low, atropine 1% should be started twice a day and should be monitored at frequent intervals to prevent the synechia (Jinks et al., 2018; Mandell, 2011; Telle and Betbeze, 2015). To assess the position of the lens, retina and posterior wall and other intraocular structures, 10–15 MHz ophthalmic USG should be used in 3–4 cm focal range (Telle and Betbeze, 2015; Wilkie, 2003).

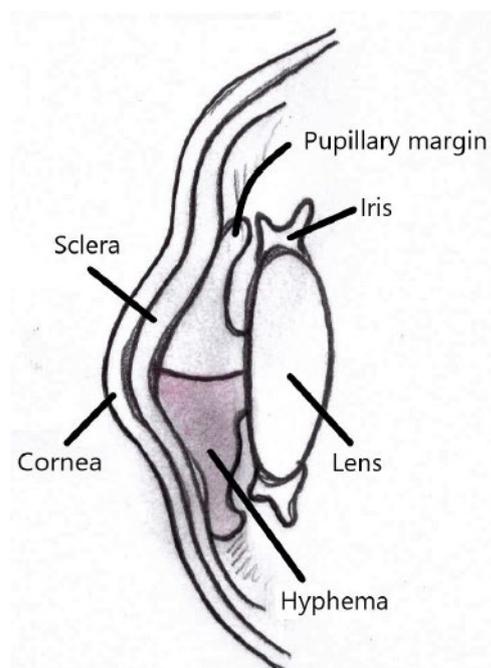


Figure 6. Blood accumulation in the anterior chamber (drawing).

Mild to moderate cases of hyphema caused by trauma are mostly accompanied by anterior uveitis and dissolve in a range of 1–3 weeks if no damage is

observed in other intraocular tissues. If damage has occurred in other intraocular tissues, sequelae such as cataract, posterior synechia, glaucoma, retinal detachment and blindness may be observed (Jinks et al, 2018; Mandell, 2011; Turner, 2008; Wilkie, 2003).

In mild and moderate hyphema cases, dexamethasone 1% or prednisolone acetate 1% is used every 6–8 hours to reduce the inflammation. If the IOP is low or normal, atropine 1% is applied to expand the pupil, and pilocarpine 2% is administered to facilitate fibrinolysis and aqueous drainage by expanding the iris surface. The animal should be rested in case of re-bleeding (Özba and Kılıç, 2004; Telle and Betbeze, 2015; Wilkie, 2003).

If a large blood clot is formed that may cause secondary glaucoma, 25-50 µg tissue plasminogen activator (TPA) can be injected into the anterior chamber to achieve thrombolysis. Dipivefrine 0.1%, a sympathomimetic agent, can be used twice a day, if the IOP is high and the pupil has narrowed. In order to control the IOP, topical applications such as dorzolamide and timolol should also be started, and the eye should be examined at intervals of 24–48 hours (Mandell, 2011; Telle and Betbeze, 2015; Wilkie, 2003).

## Conclusion

Eyelid injuries, traumatic proptosis, traumatic retrobulbar hemorrhage, foreign body pricking into the cornea and deep tissues, deep corneal ulcers, descemetocoele, iris prolapse, corneal tears, acute glaucoma, anterior lens luxations, traumatic anterior uveitis, hyphema, and chemical burns are the most common cases in emergency eye clinics. As the delay in the intervention of eye cases in the emergency clinic will cause loss of vision, pain and significant complications, medical treatment or surgery intervention should be made immediately after diagnosis.

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