DIFFERENTIAL DIAGNOSIS OF THE RED EYE

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INTRODUCTION

- Red eye may include a wide range of disorders from mild self-limiting disorders to sight-threatening
- The optometrist must determine whether management is appropriate in optometric practice or if referral is necessary
- If a referral is indicated, the urgency needs to considered. The local guidelines and Clinical Management Guidelines from The College of Optometrists can be used as a reference.

The College of Optometrists – Clinical Management Guidelines

- A wide range of ocular conditions are included
    - Currently approximately 50 different conditions are covered
    - It is constantly updated
- For each condition, guidelines include detail on:
    - Aetiology
    - Predisposing Factors
    - Symptoms
    - Signs
    - Differential Diagnosis
    - Management by optometrist
    - Possible management by an ophthalmologist
    - Evidence base

HISTORY AND SYMPTOMS

- General health and medication
    - Interactions with concurrent medication
    - Recent upper respiratory tract infections (conjunctivitis)
    - Associations between systemic diseases and ocular conditions (e.g. systemic infections from herpes zoster virus).
    - A good history and evaluation of symptoms are essential
        - Must be thorough and accurate
        - e.g. a red eye can occur due to an allergic reaction to the preservative in the eye drops
- Previous ocular history
    - Recurrent or on-going condition
        - Previous treatment/advice?
        - Compliance?
        - Was treatment successful?
    - Contact lens usage. All essential:
        - Lens type
        - cleaning regime
        - replacement frequency
- Duration
    - Acute – less than 4 weeks
    - Chronic
    - Intermittent
    - Onset: gradual or is it a sudden occurrence? e.g. subconjunctival haemorrhage
- Discharge (previously discussed in detail)
    - Viral and acute allergic reactions: watery discharge
    - Bacterial infections: purulent or muco-purulent
    - Vernal or atopic condition: mucous discharge
- Photophobia
    - Corneal involvement e.g. abrasions, oedema
    - Ciliary spasm e.g. anterior uveitis
    - Pain or discomfort on exposure to light.
- Unilateral or bilateral
    - Infections usually bilateral
    - May be asymmetrical

  - Allergies tend to be bilateral
  - Acute glaucoma usually unilateral
- Pain
  - Mild to moderate: conjunctivitis, episcleritis, corneal foreign body
  - Moderate to severe: corneal abrasions or erosions, anterior uveitis, scleritis, acute angle closure glaucoma
  - The effect on the patient's daily tasks or work need to be considered
- Itching
  - May be associated with a large number of conditions
    - Conjunctivitis, viral and allergic, topical drug allergy, contact dermatitis, Contact lens induce papillary conjunctivitis (also called Giant papillary conjunctivitis – GPC)CLIPC
  - May be useful in excluding certain conditions
- Distribution
  - Diffuse and maximum involvement at fornix and papillae or follicles: conjunctivitis
  - Circum-limbal injection: iritis
  - Diffuse or nodular hyperaemia: scleritis or episcleritis
  - Segmental injection: marginal keratitis, corneal foreign body
- Papillae
  - Papillae occur in allergic eye conditions, contact lens associated conjunctivitis, bacterial infections, chronic blepharitis, superior limbic keratoconjunctivitis.
  - Also, atopic reactions and toxic reactions to medication
- Follicles
  - Viral and chlamydial conjunctivitis.
- Anterior chamber activity
  - Cells and flare are indicative of inflammation
  - Flare: protein in aqueous due to a breakdown of the blood-retinal barrier
  - Can be graded by how much iris it obscures:
    - Faint (just detectable) +1
    - Moderate (iris details clear) +2
    - Marked (iris details hazy) +3
    - Intense (Fibrinous exudate) +4
- Intraocular pressure (IOP)
  - Increased in angle-closure glaucoma
  - May be reduced in iritis. It may be increased if associated with trabeculitis
  - IOP can increase due to certaing medications e.g. steroid use
- Corneal involvement
  - Often will result in pain, photophobia and reduced vision.
  - Fluorescein instilled to check for abrasions
  - Corneal sensitivity reduced in herpes simplex and zoster viral disease

SUB-CONJUNCTIVAL HAEMORRHAGE

- Usually unilateral, painless and sudden.
- Cosmetically unappealing. More likely in older individuals.
- Usually idiopathic and resolves within 2 weeks.
- History may include: heavy lifting, coughing, bleeding disorders, clotting problems, recent surgery or trauma, aspirin, warfarin.
- Careful examination to exclude perforation of globe.
- If recurrent, refer routinely for investigation.
  - Blood pressure check

- In all cases always record VA before any investigations are attempted.

CONJUNCTIVITIS

Type of conjunctivitis:

- **Allergic**: vernal, atopic, hay fever.
- **Bacterial**: Staphyloccus aureus, streptococcus pneumoniae, Haemophilus influenzae
- **Viral conjunctivitis**: Herpes simplex, Epidemic keratoconjunctivitis, Pharyngoconjunctival fever.
- **Chlamydial**
- **Toxic**
- **Caused by contact lenses**
- In viral conjunctivitis, epidemic keratoconjunctivitis is more common in adults. Follicles are a sign of this type of conjunctivitis and a subepithelial infiltrate in cornea
- Pharyngoconjunctival fever is more common in children. It is associated with a recent history of sore throat etc

History, symptoms and signs

- History should also include if there are affected family members
- Discharge: viral infections tend to be unilateral and associated with a watery discharge.
- Photophobia, lacrimation, pain and reduced VA are signs associated with viral conjunctivitis.
- Reduced acuity or persistent recurrence may require referral.
- Follicles also occur in chlamydial conjunctivitis
- Bacterial: staphyloccal infection may cause red eyes, irritation and foreign body sensation. It is usually unilateral and the second eye is usually affected 1-3 days after the first eye. There may be a history of recent respiratory infections.
- Diseases that compromise the immune system e.g. diabetes
- Long-term use of steroids may alter ocular resistance to infections.

BACTERIAL CONJUNCTIVITIS

- Acute self-limiting infection
- May improve more quickly with antibiotic treatment. E.g. 0.5% chloramphenicol. (prescription medication)
- Swab may be necessary.
- Referral if severe, chronic, unresponsive.

Bacterial Conjunctivitis Review Article (Oliver et al 2009)

- Primarily self-limiting
- Research suggests that clinical recovery with antibiotics is faster, especially in the first 2 to 5 days after presentation
- Six to ten days after presentation the benefit of antibiotics was less important
- The benefit of topical antibiotics versus placebo was greater on microbiological cure than on clinical cure.

ACUTE ALLERGIC CONJUNCTIVITIS

- History of atopy

- Acute allergic: watery discharge, intense itching, papillae.
- Nasal discharge and sneezing.
- Seasonal or allergen trigger
- Many prescriptions medications available to treat
- Non urgent referral for chronic or non-responsive disease

ALLERGIC CONJUNCTIVITIS

- Conjunctival chemosis
- Mucous discharge
- No staining with fluorescein
- IOP normal
- Treatment with mast cell stabilizers in chronic cases, or antihistamines in acute cases.
- Inform the GP. Review regularly.
- There is a glassy appearance to conjunctiva

Allergic Conjunctivitis Review Article

- A meta-analysis of six trials showed that patients using sodium cromoglycate were 17 times more likely to perceive benefit compared with those using a placebo.
- Five trials indicated that those patients using nedocromil were 1.8 times more likely to perceive their allergy to be moderately or totally controlled than those using a placebo.
- Four trials showed that those using antihistamines were 1.3 times more likely to perceive a 'good' treatment effect than those using mast cell stabilisers, although this beneficial effect was not statistically significant.
- Limited evidence suggests that antihistamines might have a faster therapeutic effect compared to mast cell stabilisers.

DRY EYE

- Common condition
- Symptoms include scratchy eyes, dryness, irritation, burning, foreign body sensation, epiphoria.
- Most common in elderly patients.
- Exacerbated by wind, smoke, low humidity, concentrated work.
- Reduced tear meniscus, tear break-up time (TBUT) or Schirmer strip wetting.
- Punctate staining with fluorescein, blepharitis.
- Rose Bengal staining may be present.
- Dry eye may be caused by anterior or posterior blepharitis
- Severe dry eye is known as Sjogren's syndrome
    - Autoimmune disease resulting in inflammation of skin and lips
    - Inflammation of lacrimal gland leads to reduced tear production

Dry eye treatment

- Wide range of treatments available, including artificial tears, ocular lubricants, punctal plugs.
    - Preservative free treatment available

> Interesting review article by Dogru and Tsubota (2011): **Pharmacotherapy of dry eye.** Expert Opin Pharmacother. 2011 Feb;12(3):325-34. Epub 2011 Jan 10

EPISCLERITIS

- Common, benign and self-limiting condition.
- It occurs in young adults, and is usually recurrent. There may be a history of systemic disease e.g. Crohn's disease.
- Rapid onset, unilateral mild discomfort, irritation, tenderness to touch and watering. Vision normal.
    - Symptoms usually progress for the first 3-5 days then resolve.
- Sectoral or diffuse redness. Congestion of superficial episcleral vessels.
    - Vessels will move over underlying sclera and will blanch on instillation of phenylephrine
- Nodular episcleritis is possible

Treatment

- Artificial tears or ocular lubricants can be used
- A topical vasoconstrictor and antihistamine combination can also be used.
- It is usually self-limiting and resolves in 1-2 weeks
- In more severe or non-resolving cases, topical steroids or oral NSAIDs are indicated.
    - Refer for investigation as soon as possible.
- Longer for nodule episcleritis

Episcleritis review article

- Akpek et al (1999) reviewed 100 cases of episcleritis at a hospital in Massachusetts.
    - The subjects were between 18-76 years, with a mean age of 69 years.
    - Associated systemic diseases were found in 36% of the patients.
    - There was no correlation between severity of inflammation and presence of systemic disease.
    - 28% of subjects experienced recurrence.

SCLERITIS

- Less common than episcleritis
- There is severe orbital pain
- Range from self-limiting to necrotising disease
- May be necrotising or non-necrotising.
    - Necrotising disease has sight-threatening complications such as cataract and glaucoma.
- There may be underlying systemic disease
- Half patients with scleritis will have an underlying systemic disease such as rheumatoid arthritis or gout.

Symptoms, signs and treatment

- Severe, boring pain which may radiate to face and to jaw, forehead and brow
- Gradual onset and reduction in vision
- Inflammation of scleral, episcleral and conjunctival vessels.

  - Dilated vessels cannot be moved with a cotton bud and do not blanch with topical phenylephrine
- Initially treatment with oral NSAIDs.
- Urgent referral to hospital eye service.

Review article on causes and treatment of scleritis by Rachitskaya et al 2010 (see references).

ANTERIOR UVEITIS

Symptoms and signs

- Usually unilateral, red eye, dull aching pain.
  - Though may be bilateral
- Previous episodes
  - Can be associated with ankylosing spondylitis, inflammatory bowel disease
- Pain on attempted accommodation.
- Reduced vision
  - Vision may be just mildly reduced
- Ciliary flush
- Slit lamp exam may reveal cells and flare in anterior chamber
- Posterior synechiae, keratic precipitates or hypopyon
- Recurrences are common especially if associated with an underlying condition
- IOP may be reduced due to inflammation of ciliary body
  - May be increased if trabeculitis in herpetic disease
- Must examine vitreous and retina to exclude intermediate or posterior uveitis.
- Complications include cataract, glaucoma

Treatment

- Treatment to reduce inflammation and prevent complications.
- Direct referral to hospital eye service.
- Cycloplegics to reduced ciliary spasm.
- Topical steroidal treatment.
- Referral to GP for investigation of underlying systemic disease.
- Dose of steroid depends on severity

MARGINAL KERATITIS

- Inflammatory reaction to staphylococcal exotoxins in patients with staphyloccal blepharitis.
- Recurrence common.
  - Patients may give a history of previous episodes
- Presents with acute photophobia, mild pain, red eye and eyelid crusting.
- Multiple bilateral peripheral corneal stromal infiltrates with clear cornea separating them from limbus.
- May be overlying epithelial defect
- Anterior chamber usually quiet.
- Only affected quadrant injected.

- If bilateral, consider underlying conditions such as Wegener's granulomatosis.
- Treat blepharitis with warm compresses, lid hygiene and topical antibiotic.
- If severe, referral is needed as soon as possible and topical steroids.

HERPES SIMPLEX VIRUS (HSV)

- 90% population history of infection (seropositive).
- Ocular disease (HSV1).
- Blepharoconjunctivitis
- Six months to five years
- Typical viral conjunctivitis, watery discharge, tender preauricular lymphadenopathy.
- Skin rash around lid and periorbital area.
- Usually self-limiting but anti-viral therapy recommended.

DENDRITIC ULCERS

- Recurrent HSV corneal disease
- Unilateral red eye, mild to moderate pain, gritty or foreign body feeling and photophobia
- Branching ulcer
- Debridement of ulcer is commonly carried out
- Corneal sensation may be reduced.
- Referral should be done as soon as possible
- Treatment often includes topical aciclovir for 10 days
- Dendritic ulcers may coalesce leading to geographic ulcers

MICROBIAL KERATITIS

- May be associated with contact lens wear, ocular surface disease and topical steroids.
    - Thorough history and symptoms necessary to discuss contact lens wear and care and tap water washing etc
    - Contact lens patients should bring their contact lenses and cases for cultures.
- Symptoms include red eye, mild to severe ocular pain, photophobia, reduced vision and discharge.
- May be associated with stromal oedema, folds in Descemet's membrane, anterior chamber activity, hypopyon, mucopurulent discharge, lid swelling
- White focal infiltrate in stroma
- Immediate referral to hospital
    - Antibiotic treatment should be dispensed hourly during waking hours.
- Broad spectrum antibiotic e.g. ciprofloxacin 0.3%

CORNEAL ABRASION

- History of trauma, sharp pain, photophobia, tearing , blepharospasm.
- Epithelial defect, conjunctival injection and mild anterior chamber activity.
- Antibiotic drops or ointment and cycloplegic for relief from iritis
- Follow-up
- Blepharospasm may make it difficult to examine
  - Local anaesthetic for assessment
  - Location and size documented
  - Risk of fungal keratitis if caused by vegetation, e.g. tree, branch

FOREIGN BODY

- History of trauma
  - Necessary to discuss eye protection
- Foreign body sensation and tearing
- Corneal foreign body, lid oedema, anterior chamber activity, rust ring or surrounding infiltrate
- Assess depth and presence of intraocular damage
- If it is a penetrating injury, there may be intraocular damage resulting in iris tears, lens opacities, anterior chamber shallowing, low IOP
- Dilated fundus exam
  - To exclude intraocular FB, if so, removed by ophthalmologist under local anaesthetic
- Topical antibiotic ointment and cycloplegics which will allow relief from trauma

THYROID EYE DISEASE

- Painful red eye due to soft tissue inflammation, usually in first 3 years of disease.
- Thyroid dysfunction/Ophthalmic Graves' Disease
  - Eye signs may be presenting signs
- It may be unilateral or bilateral, and include symptoms of photophobia, grittiness, lacrimation and discomfort.
- Peri-orbital and lid swelling, conjunctival hyperaemia, chemosis, superior limbic conjunctivitis, kerato-conjunctivitis sicca.
- Other signs of thyroid eye disease that may be present, include proptosis, lid retraction, restriction of ocular movements, optic nerve compression.
- Urgency of referral depends on signs and symptoms present.

PRESEPTAL/ORBITAL CELLULITIS

Preseptal cellulitis

- Infections of lid and soft tissue around eye.
- Usually unilateral.
- Pre-septal does not penetrate the orbital septum and is most commonly secondary to a skin laceration or bite.
- Periorbital swelling, erythema, tenderness.
    - Lid may be difficult to open
    - Associated conjunctivitis
    - Ocular motility, pupils, VA and CV normal
- Oral antibiotics. Direct referral to hospital eye services to differentiate from orbital cellulitis

Orbital cellulitis

- Infection of soft tissue behind septum
- Usually associated with sinus disease
- Unilateral swollen, tender erythematous lid, chemosis, proptosis, restricted motility.
- If severe, reduced VA, RAPD and, colour vision defect.
    - In these cases patient may be systemically unwell
- Emergency admission to hospital eye service – IV antibiotics.
- Surgical drainage for abscesses.

ACUTE ANGLE-CLOSURE GLAUCOMA

- Painful loss of vision
- Incidence increases with age with 60 years being the average age
- Hypermetropes – previous sub-acute episodes
- Haloes around lights, blurred vision, headache, painful eyes, nausea.
- Hyperaemic eye, pupil fixed (mid-dilated position), oedematous cornea, anterior chamber shallow, drainage angle closed.
- Treatment aims to lower IOP before damage occurs to optic nerves. Immediate referral.
- Sub-acute episodes: haloes around lights, blurred vision, headache, painful eyes, nausea

Treatment

- IV and oral acetazolamide, topical beta blockers, pilocarpine and steroid for affected eye.
- Prophylactic pilocarpine to other eye.
- YAG laser iridotomy.
- Cases which do not respond to medical therapy are referred for surgery
- Local guidelines may outline specific protocols.
- Important to build up and maintain good communication with professionals in the hospital eye service.
- When referring directly to eye emergency department, phone and speak to ophthalmologist to report referral.

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