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Review Article

Non-Traumatic Red Eye in Primary Care: Diagnosis and Management

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Abstract

The red eye syndrome is the most common complaint in primary care ophthalmological consults. It is the role of the general practitioner, family doctor and emergency doctor to correctly assess and diagnose the disease, and to manage or refer when necessary. Keratitis, uveitis, primary angle-closure glaucoma and scleritis should be suspected based on the presence of red-flag symptoms, and promptly derived to the specialist, as well as doubtful diagnoses. Regarding non-urgent entities, conjunctivitis and subconjunctival hemorrhage are the most frequent diagnoses. Conjunctivitis should be managed with hygiene measures and in case of a strongly suggesting bacterial cause, antibiotics should be administered. Subconjunctival hemorrhage is a benign cause of red eye and patients should be educated regarding their complaint. Other causes of benign red eye include blepharitis, chalazion, hordeolum and pterygium.

Keywords: Conjunctivitis; Primary care; Red eye; Subconjunctival hemorrhage

Introduction

Ophthalmological consults account for 2% to 3% of primary care and emergency service usage [1]. The red eye syndrome is the main complaint in these scenarios [2]. A diverse range of pathologies, both systemic and ophthalmologic, can manifest with red eye. Some of them should be promptly diagnosed and referred to the specialist in order to prevent further damage. Nonetheless, most of the red eye consults can be managed by the primary care physician and emergency doctor [2]. Due to the broad differential diagnosis and the lack of specific equipment to examine the eye, the correct management can be challenging. An Australian study reported that only 35% to 40% of general practitioners and emergency service doctors correctly diagnosed the entities presenting with red eye, being the viral conjunctivitis and uveitis the most problematic diseases [3]. The objective of this review is to propose an algorithm for red eye evaluation in the primary care setting (Figure 1) and to review the most recent literature regarding the management of these entities.

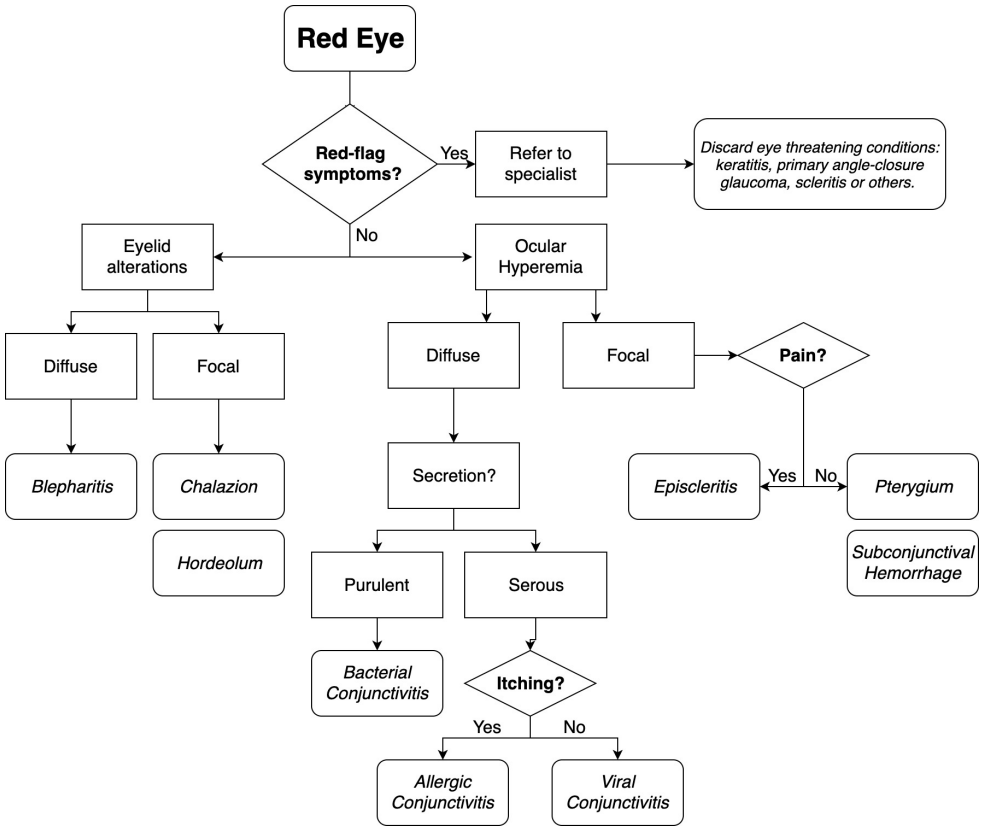

Figure 1: Algorithm for red eye diagnosis in primary care.

Clinical Evaluation

The objective of the clinical evaluation is to distinguish between benign causes from eye-threatening conditions that should be promptly referred and treated in order to avoid complications and visual loss [4]. Clinical history should be directed to determine the time, evolution, number of eyes compromised and associated symptoms such as pain, itching, foreign body sensation or headache. Other ocular and systemic diseases should be asked, as well as use of medications (topic or systemic), associated trauma history, chemical substances exposition and contact lenses usage. It is also of upmost importance to directly discard red-flag sing and symptoms [5] (Table 1). Some of these have been studied and direct photophobia has a likelyhood ratio (LR) of 8.3 for the suspicion of an eye-threatening condition, and indirect photohpbia has a LR of 28.8 [6]. Other symptoms have not yet been studied in this aspect.

Red-flag signs and symptoms of the red eye
Moderate to severe pain*
Photophobia
Diminished Visual Acuity
Foreign body of penetrating lesion
Pupillary alterations
Corneal opacity
Limited ocular movements

***Considered when pain is the main complaint or when associated to nausea, vomiting or headache"**

Table 1: Red-flag signs and symptoms of the red eye.

At physical examination there are four possible distributions of the red eye: (1) palpebral hyperemia; (2) peripheric red eye; (3) perikeratic red eye; and (4) localized red eye. The attending doctor should determine the correct pattern among the above mentioned and also look for pupillary alterations, corneal transparency alterations and evaluate for possible secretion. Photo motor reflexes should also be evaluated, the same as intraocular pressure through direct palpation.

Clinical Entities

Urgent Pathologies that Should Be Referred to the Ophthalmologist

Keratitis (Figure 2A)

It corresponds to the inflammation of the cornea. It can be caused by infectious (viral, bacterial or phungal) or non-infectious disease. The main risk factors are the usage of contact lenses, corneal innate immunity disruption such as trauma or surgery of the cornea, or systemic immunosuppression (HIV, diabetes or corticosteroids) [7]. It is characterized by a painful, perikeratic red eye which can be associated to purulent discharge, foreign body sensation, photophobia and corneal opacity. More severe cases can present with hypopyon.

Uveitis (Figure 2B)

It is an inflammatory process characterized by leukocyte presence in the anterior uveal tract. The main causes are idiopathic [8], viral (herpes virus, zika virus), Toxoplasma and bacterial infections (tuberculosis). It is also closely related to rheumatologic diseases such as spondylarthritis, juvenile idiopathic arthritis, systemic lupus, vasculitis, among others. Diagnosis is suspected based on clinical features, such as pain, photophobia and diminished visual acuity. At examination, a perikeratic red eye can be observed, associated to myosis, dyscoria and hypotony [7,8].

Primary Angle-Closure Glaucoma (Figure 2C)

It is a severe eye-threatening condition that can lead to visual impairment in a few hours. It is responsible for 50% of glaucoma related blindness [9]. Clinical presentation includes eye pain, diminished visual acuity, headache, nausea and vomiting. At physical examination a perikeratic red eye with pupils in fixed mydriasis is characteristic. Other possible findings include corneal opacity and anterior chamber narrowing. Palpation of the intraocular pressure reveals a hard eye. When suspected, miotic eye drops (pilocarpine 2%, 1 drop every 15 minutes for 2 hours and then 1 drop every 6 hours) and carbonic anhydrase inhibitors (acetazolamide 500 mg every 6 hours) should be administered while the patient is referred to the specialist [9,10].

Scleritis and Episcleritis (Figure 2D)

It is the inflammation of the sclera or episclera, respectively. Scleritis is strongly associated to systemic diseases such as Wegener's granulomatosis, rheumatic arthritis and other connective tissue disorders, while episcleritis is usually developed due to exogen factors with no or a very weak relation to systemic diseases [11-13]. Both entities present with perikeratic hyperemia and pain, but scleritis is characterized by a more severe pain, photophobia, diminished visual acuity and epiphora, symptoms that are usually more severe at nighttime [14]. Management of scleritis includes a prompt referral to the specialist as the delay could compromise adjacent structures and eventually produce glaucoma, cataracts or other eye-related problems [15].

Episcleritis, on the other hand, is characterized by moderate pain with peak intensity at 12 hours and a resolution in 2 to 4 days. Recurrence rate is high and with time the episodes tend to be less frequent and completely disappear in a couple of years. At physical examination there is a localized red eye. The first episode can be managed in primary care with cold compresses and the use of artificial tears. In case of subsequent episodes, symptom progress or doubtful diagnosis, the patient should be derived for further study. The use of topical NSAIDs has not demonstrated to be better than placebo [16].

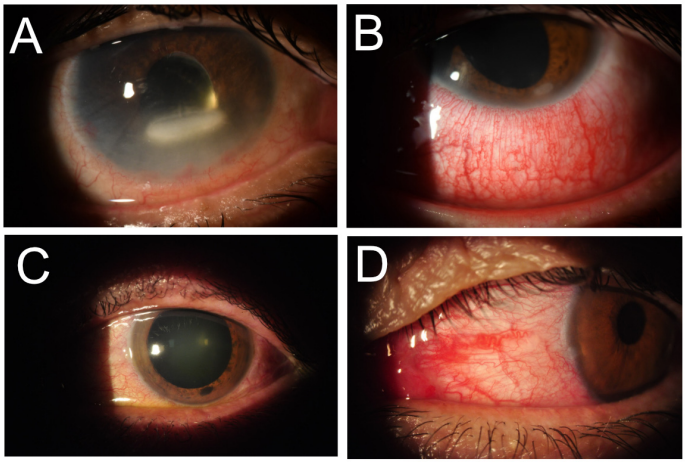

Figure 2: (A) Keratitis **(B)** Uveitis **(C)** Primary angle-closure glaucoma and **(D)** Scleritis.

Pathologies that Can Be Managed in Primary Care

Palpebral Alterations

Blepharitis

It is the chronic inflammation of the eyelid. It can be caused by bacterial infection (*Staphylococcus aureus)* or due to meibomian gland dysfunction. Diagnosis is made solely on clinical appearance, after ruling-out other diseases such as seborrheic dermatitis, eczema and rosacea [2]. Blepharitis is associated to dry eye, chalazion and hordeolum, reason why these should also be ruled-out and treated. Clinical presentation includes itching, foreign body sensation, conjunctival hyperemia, eyelid inflammation and crusts. The eye examination may reveal a shiny oily-looking eyelid border. Treatment consists in the use of commercial preparations for eyelid hygiene or baby shampoo [2,17] associated to the use of warm compresses and eyelid massage in order to facilitate the meibomian gland drainage. Treatment should be maintained until the disease has passed (typically in less than three weeks). In case of unsatisfactory response, topical antibiotics could be considered (erythromycin), which have demonstrated symptomatic relief and

bacterial eradication from the eyelid [18]. In more severe cases, prolonged use (up to three months) of oral antibiotics in low doses has demonstrated some benefits (doxycycline 100 mg every day) [2,19]. Other treatments like topical or oral corticosteroids, may be used, but have inconclusive results in long term studies and are associated to a wide variety of side effects (increased intraocular pressure and cataract formation) [19,20]. Its use can be beneficial for patients who are later going to be treated with artificial tears. The use of calcineurin inhibitors is beyond the scope of this review.

Hordeolum

It is the pustular inflammation of the eyelid border, starting from the collicle of the lacrimal gland, usually caused by *Staphylococcus aureus*. It is commonly painful. It spontaneously resolves in one to two weeks, but the treatment with warm compresses has demonstrated to prevent dissemination and facilitate spontaneous drainage [14,21].

Chalazion

It is produced due to obstruction of the drainage of meibomian glands, which contributes to fat accumulation and its inflammation. It is strongly related to rosacea, seborrheic dermatitis and blepharitis [9]. The patient may refer a history of eyelid mass or nodule, itching, pain to the touch and peripheric red eye. Physical examination may reveal a well-defined nodule with erythematous skin if inflammation is present. If it is not infected, it might not be visible and only revealed to palpation. Treatment consists in the use of warm compresses and drainage massage. In case of unsatisfactory results with conservative treatment or aesthetic issues, the patient may be referred to the specialist for surgical management [9,14,21].

Diffuse Red Eye

Conjunctivitis

It is the most frequent cause of red eye [2]. It is the inflammation of the conjunctiva which can be infectious (viral of bacterial) or allergic. Patient history may include foreign body sensation, ocular burning sensation, mild photophobia and epiphora. Clinical examination may reveal superficial hyperemia, peripheral hyperemia and purulent or serous exudates. Visual acuity cannot be compromised. Palpebral eversion reveals tarsal reaction (Figure 3). Viral conjunctivitis is the most frequent etiology among the three mentioned above. It usually occurs in the context of pharyngoconjunctival fever caused by adenovirus. It is generally bilateral and self-limiting. The history of a close contact may be useful in the diagnosis. Treatment includes hygiene (to prevent dissemination) of hands and to avoid close contact with other individuals. Antibiotics should not be administered.

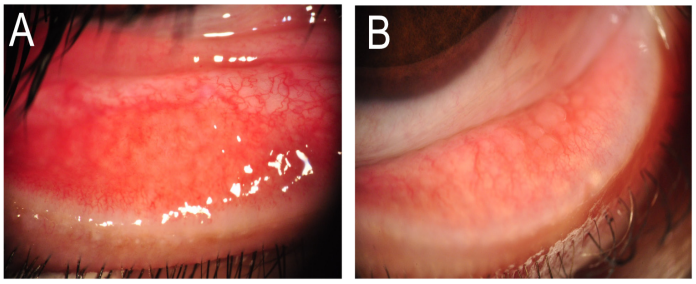

Figure 3: Tarsal reactions in acute conjunctivitis. (A) Follicular and (B) Papillary reactions.

Bacterial conjunctivitis is commonly caused by *Staphylococcus aureus, Streptococcus pneumoniae* o *Haemophilus influenza* [22,23], but the use of contact lenses should open the spectrum to *Pseudomona aeruginosa* y *acanthamoeba spp*., meaning a prompt referral to the ophthalmologist should be considered. Purulent discharge is frequent and has a LR of 3.9, although it is not useful to determine the causing agent [24]. The absence of itching and the presence of sticky eyes has a LR 2.48 to 3.6 [25]. Another sign that increases the probability of bacterial infection is the presence of a complete erythematous tarsal conjunctiva (LR 4.6). On the other hand, the inability to see the red eye at 20 feet (LR 0.2) and the absence of sticky eyes (LR 0.3) lower the probability of bacterial infection.

Treatment includes hygiene measures mentioned above and antibiotics should be considered. These have demonstrated to shorten the symptoms but not their intensity [26]. Thus, cost-effectiveness in mild cases of bacterial conjunctivitis is debatable [27]. A three-day delay in the beginning of antibiotics reduces their need in up to 50%, without increasing the rate of consults compared to early administration of antibiotics [28]. Moreover, early administration is associated to bacterial resistance and higher health costs [29,30]. Our suggestion is to abstain from initiating antibiotics if the patient's history is shorter than three days. Treatment options include drops of gentamycin 0.3%, tobramycin 0.3%, chloramphenicol 0.5% or ciprofloxacin 0.3%. This last one should be reserved for more severe cases. 1 drop should be administered every 2 to 4 hours for 7 days. Another option is the use of chloramphenicol 0.3% ointment, with 1 use every night for 7 days.

Finally, allergic conjunctivitis corresponds to a type I hypersensitivity reaction. It is usually bilateral, and itching is the most common complaint. It is important to identify possible allergens, define if it is stational or not, and directly discard the concomitant presence of atopy, allergic rhinitis and asthma. Pharmacological treatment with artificial tears may be useful [2]. Oral antiallergic drugs are not useful, but topical antihistaminic and masts stabilizers have demonstrated to reduce symptoms [31].

Localized Red Eye

Pterygium

It is the abnormal growth of epithelial and fibrovascular tissue from the conjunctiva over the cornea. Common risk factors include ultraviolet light, viral infections, epigenetic alterations, among others [32]. It is completely asymptomatic. These patients should be observed and eventually referred for surgical treatment in case of diminished visual acuity, astigmatism induction or frequent inflammation.

Subconjunctival Hemorrhage

It is the sudden appearance of blood under the conjunctiva, generally localized and self-limiting. It frequently occurs after valsalva maneuver in patients taking anticoagulant drugs or poorly controlled hypertension. Trauma should be directly ruled-out, the same as scleral lesions [9]. Arterial pressure should be evaluated to discard a possible hypertensive crisis, in which case the patient should be sent to an emergency service [11]. If no major alterations are found at physical examination, the patient should be educated and sent home, as the blood will be reabsorbed in 2 to 4 weeks. Warm compresses may be useful [2]. In case of recurrent hemorrhages, the patient should be referred to the ophthalmologist to discard secondary causes. A recent study that followed patients with subconjunctival hemorrhage demonstrated that those with recurrent bleeding have a higher risk of cerebral infarcts, so these patients should also be referred to an internist [33].

Conclusions

Ocular pathology, and specifically the red eye syndrome, is a frequent cause for ophthalmological consults in primary care. The general practitioner, family doctor and emergency doctor should be prepared to identify, diagnose and determine the most appropriate care for these entities. Keratitis, scleritis, uveitis and primary angle-closure glaucoma should be promptly derived to the specialist, as well as those doubtful diagnoses.

Conflicts of Interest

None.

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None.

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