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RESEARCH ARTICLE

WHEN INFECTION MEETS INFLAMMATION: DIAGNOSTIC PITFALL AND STRATEGIC CORTICOSTEROID TIMING IN A CORNEAL ABSCESS COMPLICATED BY CATARRHAL INFILTRATE IN OCULAR ROSACEA

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Corneal abscess; Ocular rosacea; Catarrhal infiltrate; Corticosteroids; Diagnostic challenge

Abstract

Background: Bacterial corneal abscess is a vision threatening emergen cy requiring prompt management. Ocular rosacea is a chronic inflamma tory condition often associated with meibomian gland dysfunction and sterile peripheral corneal infiltrates. The coexistence of infectious and inflammatory mechanisms represents a major therapeutic challenge, particularly regarding the timing of corticosteroid introduction.This case aims to highlight the diagnostic challenge and therapeutic strategy in such dual-mechanism conditions.

Case presentation: We report the case of a 31-year-old patient pres enting with a central corneal abscess associated with ocular rosacea. Initial management with intensive topical antibiotics led to clinical improvement. However, a secondary peripheral infiltrate with corneal neovascularization appeared despite infection control. Careful examinat ion of eyelid margins revealed underlying rosacea with severe blepharit is and meibomian gland dysfunction, supporting the diagnosis of a sterile catarrhal infiltrate.

Management and outcome: After confirmation of infection control, targeted treatment of blepharitis was initiated, followed by cautious introduction of topical corticosteroids. The timing of corticosteroid initiation was based on clear clinical signs of infection control, includin g epithelial healing and stabilization of the central lesion.This resulted in rapid resolution of the inflammatory infiltrate and significant clinical improvement.

Conclusion: This case highlights a diagnostic pitfall between persistent infection and secondary inflammatory infiltrate in ocular rosacea. Caref ul clinical evaluation,particularly of adnexal structures, and appropriate timing of corticosteroid therapy are crucial to optimize visual outcomes However, conclusions should be interpreted with caution given the single-case design.

Introduction:-

Bacterial corneal abscess is a sight-threatening condition requiring urgent and appropriate antimicrobial therapy. Delay or mismanagement may result in irreversible visual loss.Corneal abscesses are among the most severe forms

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of microbial keratitis and require aggressive early treatment to prevent complications.Ocular rosacea is a chronic inflammatory disorder frequently associated with meibomian gland dysfunction, tear film instability, and sterile peripheral corneal infiltrates known as catarrhal infiltrates.It is a multifactorial condition involving immune dysregulation, microbial imbalance, and chronic inflammation of the eyelid margin.The coexistence of an active infectious process and an immune-mediated inflammatory reaction represents a major diagnostic and therapeutic dilemma. The introduction of corticosteroids in such cases must be carefully timed, as premature use may exacerbate infection, while delayed use may worsen inflammatory damage.We report a challenging case illustrating this dual mechanism and the importance of clinical reasoning in guiding management.The objective of this report is to emphasize the importance of distinguishing between infectious and inflammatory components to guide appropriate therapeutic decisions.

Ethicalapproval and consent:
Written informed consent was obtained from the patient for publication of this case report. The study adhered to the principles of the Declaration of Helsinki.

Case Report:-
A 31-year-old patient presented with decreased visual acuity in the right eye. Best-corrected visual acuity was counting fingers at 2 meters in the right eye and 10/10 in the left eye. Intraocular pressure was normal bilaterally.
Slit-lamp examination of the right eye revealed a central oval corneal abscess measuring approximately 3.5 × 2.5 mm, associated with a significant epithelial defect and surrounding stromal edema. No stromal thinning or descemetocele was observed. The left eye was normal.Corneal OCT demonstrated anterior stromal hyperreflectivity without significant thinning or deep cavitation, suggesting preserved structural integrity. B-scan ultrasonography was normal.Examination of adnexal structures revealed severe blepharitis with meibomian gland dysfunction and telangiectasia, associated with active cutaneous rosacea.Corneal scraping did not identify a specific pathogen, likely due to prior self-medication with antibiotic-steroid eye drops.The absence of microbiological identification represents a limitation but does not exclude an infectious etiology given the clinical presentation.

Initial Management and Evolution:-
The patient was treated with intensive topical fortified antibiotics, antiseptic agents, and lubricants.This approach is consistent with current recommendations for the management of severe microbial keratitis.During the first 10 days, clinical evolution was favorable, with progressive reduction of the epithelial defect, decreased stromal edema, and stabilization of the lesion, consistent with infection control.

Secondary Clinical Worsening:-
Between day 10 and day 12, a new peripheral corneal infiltrate appeared, characterized by a small, well-defined whitish lesion associated with superficial corneal neovascularization. Importantly, the central abscess remained stable without signs of worsening.

This raised a critical differential diagnosis:
- Persistent or recurrent infection
- Secondaryinflammatoryinfiltrate

Additional differential diagnoses considered included immune-mediated keratitis and sterile marginal infiltrates associated with ocular rosacea.A detailed examination of eyelid margins revealed signs of ocular rosacea, supporting the diagnosis of a sterile catarrhal infiltrate.

Discussion:-
This case illustrates the diagnostic challenge of distinguishing between persistent infection and secondary immune-mediated inflammation.

Ocular rosacea leads to chronic inflammation through several mechanisms:
- Meibomian gland dysfunction
- Tear film instability
- Increasedmetalloproteinaseactivity
- Release of pro-inflammatory cytokines

These mechanisms contribute to corneal surface instability and promote sterile inflammatory infiltrates, as described in previous studies.These processes promote the development of sterile peripheral infiltrates and corneal neovascularization.

Key distinguishingfeaturesinclude:

- Central location and epithelial defect in infectious keratitis
- Peripheral location and absence of epithelial defect in catarrhal infiltrates
- Poor response to antibiotics but rapid response to corticosteroids in inflammatory lesions

The main therapeutic challenge lies in determining the appropriate timing for corticosteroid introduction. While corticosteroids are contraindicated in active infection, they play a crucial role in controlling secondary inflammation once infection is adequately treated.
In this case, corticosteroids were introduced only after clear evidence of infection control, including epithelial healing and absence of lesion progression, which is consistent with recommended clinical practice.

Therapeutic Strategy:-
Management included:

- Treatment of blepharitis with eyelid hygiene and topical azithromycin
- Oral doxycycline to reduce inflammation and metalloproteinase activity
- Careful introduction of topical corticosteroids after confirmation of infection control

The rationale for this sequential approach was to first eliminate the infectious component before addressing the inflammatory process, thereby minimizing the risk of exacerbating infection.
This approach resulted in rapid resolution of the peripheral infiltrate, regression of neovascularization, and near-complete corneal healing.

Limitations:-

This report is limited by its single-case design, lack of microbiological confirmation, and absence of long-term follow-up data, which may limit generalizability.

Conclusion:-

This case highlights a major diagnostic pitfall in corneal pathology, where infectious and inflammatory mechanisms coexist.A sequential therapeutic approach, combining strict infection control and targeted anti-inflammatory treatment, is essential.Careful examination of adnexal structures and appropriate timing of corticosteroid therapy are key determinants of visual prognosis.These findings emphasize the importance of individualized clinical decision-making but should be interpreted cautiously given the single-case nature of the report.

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