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Corneal Abscesses: Diagnostic And Therapeutic Challenges (Based On 120 Cases)

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Abstract:
Severe corneal abscess is an infectious emergency in daily ophthalmology due to the proliferation of microorganisms in the cornea. Serious and potentially blind pathology despite considerable therapeutic progress, we wanted to review their epidemiology, clinical and bacteriological aspects through a retrospective survey conducted between January 2021 and December 2022 in the ophthalmology department of the 20 August Hospital in Casablanca, involving 120 patients affected, hospitalized and followed for a severe corneal abscess. Our results were comparable to the majority of recently published series of severe corneal abscesses. The prevalence of this condition is constantly increasing. The mean age was 43 years old. The mean time to onset of functional signs before hospitalization was 16 days. These signs were dominated by redness, ocular pain and decreased visual acuity. Ocular trauma was the most frequent risk factor in our series. The majority of patients received broad-spectrum antibiotic therapy with therapeutic success in 42% of cases. When faced with a severe corneal abscess, only good diagnostic and therapeutic management can reduce the risk of an unfavorable evolution. Similarly, prevention of this pathology is fundamental through the elimination of the factors that contribute to it.
Keywords : *Corneal ulcer, Infectious keratitis, Ocular trauma, Risk factors, Topical antibiotics, Pseudomonas aeruginosa, Morocco.*

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I. Introduction:

Severe corneal abscess is an emergency condition in daily ophthalmology practice. It involves the proliferation of microorganisms within the cornea, leading to tissue destruction through inflammation and infection.

In emerging and developing countries, severe corneal abscesses are considered a major cause of blindness and are most often post-traumatic. In developed countries, bacterial causes are becoming more prevalent due to the increasingly widespread use of contact lenses [1], longer life expectancy, and corneal surgeries.

The prevalence of this condition is steadily increasing and varies by country: 11 per 100,000 people per year in the United States and up to 799 per 100,000 people per year in Nepal. The incidence and prevalence of this type of infection are not clearly known, but clinical experience confirms its frequency.

The cost associated with this condition represents a major economic burden: expensive fortified eye drops; prolonged hospitalizations; multiple follow-up visits; and limited functional recovery.

Clinically, a corneal abscess should be suspected in any case of a red, painful eye accompanied by decreased visual acuity. The clinical presentation is extremely variable and often misleading. Hence the importance of a comprehensive etiological investigation, which may prove difficult but is necessary, as both therapeutic management and visual prognosis depend on it.

A definitive diagnosis requires microbiological evidence. Close collaboration between the ophthalmologist and the laboratory technician should help increase the positive rate of specimens.

The advent of confocal microscopy has made it possible to precisely study the anatomo-clinical manifestations of corneal-conjunctival epithelial lesions in various ocular surface diseases.

Corneal abscesses are of threefold interest in our context:
• First, due to their epidemiological significance, given the considerable prevalence of this condition, which is constantly increasing,
• Second, due to their etiological diversity, which is partly explained by the significance of predisposing factors,
• Finally, due to the need for rapid implementation of effective treatment, guided by microbiological diagnosis, without overlooking the fundamental role of individual and collective prophylaxis—prevention that involves eliminating predisposing factors.

II. Materials And Methods:

We conducted a retrospective descriptive study analyzing the medical records of 120 patients hospitalized for severe corneal abscess at the 20 Aout Hospital from January 2021 to December 2022. The objective of this study is to clarify the epidemiological and microbiological characteristics, as well as the clinical course and prognostic factors, of cases of severe corneal abscess that led to patient hospitalization over a 2-year period. Clinical and laboratory data, as well as therapeutic management, were all identified from medical records. To facilitate data collection, we developed a data collection form. We included all cases of clinically confirmed severe corneal abscesses that required hospitalization in the department. We excluded incomplete records, patients with incomplete follow-up, abscesses deemed non-severe according to the aforementioned criteria, or cases managed on an outpatient basis.

Hospitalization for severe corneal abscess was indicated if the patient presented at the initial examination with at least one local or systemic severity factor, such as central location of the lesion, an abscess with a diameter greater than 2 mm, a depth exceeding 50% of the corneal thickness, intraocular inflammation/endophthalmitis, a preperforative condition, or involvement of a monophthalmic eye, extreme ages, bedridden patients, higher-level cognitive impairments, severe systemic comorbidities, or an unfavorable socioeconomic environment

For the patients in question, we analyzed epidemiological data (age, sex, local risk factors, length of hospital stay, and season of onset) and clinical data (pre-existing corneal or ocular surface conditions, history of corneal surgery, associated eyelid conditions, history of corneal trauma or foreign body injury, general risk factors leading to immunosuppression or bedridden status, location, dimensions, and depth of the infiltrate, shape, number of abscesses, corneal thickness, the presence of edema, old opacities, active or phantom neovessels, secretions, signs of inflammation such as retrocorneal precipitates suggestive of associated uveitis) and microbiological (swabbing or mechanical debridement of the margins and base of the abscess, for bacteriological, viral, or parasitic analysis depending on the initial etiological orientation, without instillation of anesthetic eye drops and before any antibiotic treatment or after a 48-hour therapeutic window, direct examination, Gram staining, and culture on specific media

Quantitative variables are expressed as their mean, standard deviation, and median along with the 25th and 75th percentiles. Qualitative variables are expressed as percentages (%).

III. Result:

There was a predominance of males, with a male-to-female sex ratio of 1.30. The mean age of our study population was 43 years (ranging from 19 to 96 years), with a predominance in the 40–59 age group (42%). 65% of patients were from rural areas and 35% were from urban areas. 64% were covered by the Ramed health insurance program, 7% by private health insurance, and 29% had no health insurance coverage. The prevalence of this condition peaked in March, July, and August.

Among the risk factors, ocular trauma was the most significantly observed, affecting nearly half of the patients. The majority of these patients were men. Ocular surface abnormalities were found in 25 cases (21%), including 14 cases of trichiasis, 10 cases of lagophthalmos, and 1 case of ocular rosacea. Regarding contact lens use, 14 cases were identified, all involving young women with a mean age of 22 years. Immunodeficiency conditions were present in 10 patients (8%), including 7 with diabetes, 2 on long-term corticosteroid therapy, and 1 case of Hodgkin's lymphoma.

The clinical symptoms were dominated by the triad of pain (81%), redness (83%), and decreased visual acuity (70%), often with a sudden onset, sometimes progressive, in an eye whose surface was already pathological. The average time from the onset of symptoms to hospitalization was 16 days, ranging from 1 to 60 days.

Analysis of the results did not reveal a preference for one eye over the other (51% right eye and 49% left eye). The size of the ulcer was estimated to be greater than half the corneal surface area and thickness in all patients in our series, with a mean size of 4.2 ± 2.7 mm. Examination of the anterior chamber revealed a Tyndall effect in 46 cases (38.4%) and hypopyon in 68 cases (56.6%).

Regarding paraclinical examinations, a combination of orbital radiography and ocular ultrasound was performed in 28 patients with ocular trauma (figure 1). Based on clinical presentation and therapeutic needs, blood tests appropriate for each case were ordered. Corneal abscess scraping for etiological purposes was performed in 92 patients, with one case of aqueous humor sampling and one case of vitreous sampling via anterior chamber puncture. 32% tested positive versus 47% negative. The microbiological study, which was positive in 38 cases, identified Pseudomonas aeruginosa after culture in 14 cases, Staphylococcus in 8 cases, Streptococcus in 6 cases, Moraxella in 3 cases, Neisseria in 2 cases, 1 case of Aerococcus viridians, 1 case of Bacillus spp., and 3 cases of suspected fungal infection following direct examination.

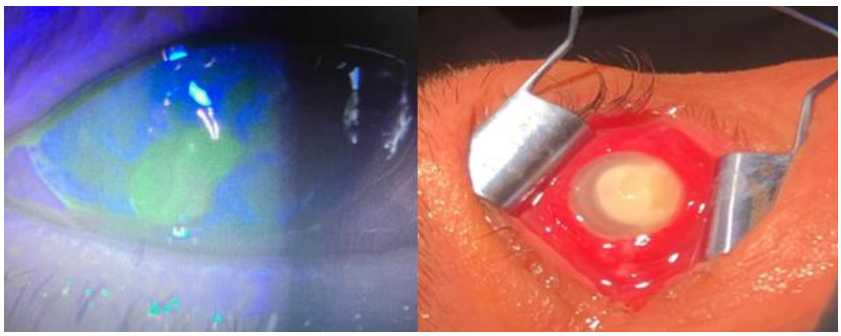

Figure 1 : Corneal abscess following trauma from a plant thorn
Figure 2 : Candida Albicans abscess in a patient self-medicating with topical corticosteroids

Medical treatment consisted of a synergistic combination effective against Gram-positive and Gram-negative bacteria, at dosages effective on the cornea. Thus, 90% of patients received first-line probabilistic broad-spectrum antibiotic therapy with potent eye drops containing a combination of vancomycin and ceftazidime, instilled hourly for the first 48 hours. In 86.5% of cases, systemic antibiotic therapy was combined with local treatment. The initial antibiotic regimen was then modified based on the results of direct examination, culture, and antibiotic susceptibility testing. In addition to antibiotic therapy, multiple daily eye washes with saline solution using sterile compresses were recommended.

In 45% of cases, probabilistic systemic antiviral therapy was prescribed as a precaution against corneal herpes. Among these patients, 52.8% received corticosteroid therapy, which was initiated on average at 7.5 days. This most often consisted of corticosteroid eye drops combined with subconjunctival injections of dexamethasone. Antifungal treatment was administered for fungal keratitis using oral fluconazole in 36 cases (30%) and amphotericin B and/or 1% voriconazole eye drops in 8 cases (6.7%). The average duration of antimicrobial treatment was 2.33 weeks, ranging from 2 to 4 weeks.

Certain complications arose, notably anatomical loss of the eye in 21 patients (17.5%), endophthalmitis in 15 patients (12.5%), scarring-related corneal opacity in 30% of patients, and superficial and deep corneal neovascularization in 6 patients (5%).

Surgical treatment thus consisted of a cold corneal transplant in 16 patients in our series, an amniotic membrane transplant in 2 patients, and conjunctival coverage in 4 others. Patients with corneal neovascularization received subconjunctival injections of bevacizumab combined with corticosteroid therapy….

The clinical course of our patients was marked by an improvement in visual acuity in 42% of patients. A lack of improvement or a decline in vision occurred in 58%, due primarily to the initial severity of the lesions, as well as low baseline visual acuity (figure 3)

Figure 3 : Favorable outcome of fungal keratitis following

IV. Discussion :

The global incidence of keratitis is on the rise, with 2 million new cases each year. In Morocco, the incidence of severe corneal abscesses remains unknown due to the lack of epidemiological studies. In our series, corneal abscesses appear to affect more men than women. This male predominance is also reported by several authors, such as Keay in Australia, Ormerold in Malaysia, and E. Ancele in France.

The patients in our study had a mean age of 43 years, which is similar to the studies conducted by Ormerold and Vajpayee, where the mean age was 44.5 years and 45 years, respectively. In our series, a red eye was the primary presenting symptom of corneal disease in 83% of cases, followed by eye pain in 98 patients (81.70%). Corneal trauma is the leading risk factor in our study; it appears in most series with a frequency ranging from 9% in the Netherlands to 62% in Malaysia. The presence of a corneal condition is also the second risk factor in the French and British series; its rate varies across the different series, from 14% in the Tunisian study to 23.7% in the British study. This latter figure is relatively consistent with ours, which is around 21%.

The use of contact lenses is a particularly significant factor in our series; it is the third leading cause of corneal abscess, accounting for 12% of cases, whereas in recent studies conducted in industrialized countries, it remains the leading cause in France (49%), the Netherlands (39.7%), and England. Diabetes-related immunosuppression accounts for 7 cases (5.8%) in the reported cases. It varies across series from 9.8% to 24%.

In our series, the bacterial isolation rate is lower than that of the French, British, Malaysian, and even Tunisian series. This could be explained by the frequent self-medication of our patients prior to their arrival at the hospital, specifically the prior use of antibiotics, which can sterilize the site of the corneal biopsy. In our series, we note a high prevalence of Gram-negative bacilli, primarily P. aeruginosa, which aligns with the results of the French and Malaysian series. The treatment regimen proposed in our study is consistent with that reported in the literature. The remaining challenge is the delay in initiating treatment and the control of these infections despite well-adjusted therapy. Topical therapy is the preferred approach. The use of topical corticosteroids is a subject of controversy in the treatment of infectious keratitis. Surgical treatment in our series is often indicated in cases with an unfavorable course. In terms of visual acuity, 42% of patients experienced an improvement in visual acuity, while 58% experienced no improvement or a decline in vision. The rate of visual acuity improvement reported by Bourcier is 66%, which is similar to our study. In terms of anatomical complications, 21 cases (17%) resulted in anatomical loss of the eye. Prevention is fundamental and must be the ophthalmologist's primary therapeutic goal.

V. Conclusion

A corneal abscess is an ophthalmic emergency. It is the fourth leading cause of visual impairment and blindness worldwide (WHO). A thorough preliminary analysis of risk factors, appropriate testing for the causative pathogens, and early diagnostic and therapeutic management are key to a favorable visual prognosis. In our setting, corneal trauma remains the primary risk factor; it is associated with a poor prognosis, characterized by prolonged hospitalization, followed by ocular surface diseases and then contact lens wear. Patients with pre-existing keratopathy, a history of corneal surgery, and/or a general risk factor have a very guarded visual prognosis. They most often require medical and surgical treatment. Prevention remains a fundamental element, achieved through the elimination of various contributing factors.

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