Medical and Surgical Management of Keratomycosis

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Abstract

Background: Fungal keratitis is a diagnostic and therapeutic challenge to the ophthalmologist. If not treated energetically it results in marked ocular morbidity and permanent visual loss.

Methods: Twenty five patients of fungal keratitis were studied for their response to management and final visual outcome.

Result: Males outnumbered females. Medical treatment was successful in 72% cases, while 28% required surgical intervention. Keratoplasty was done in five patients out of which graft was clear in four after one year of follow up. Three of these underwent optical keratoplasty since therapeutic grafts became opaque.

Conclusion: Early recognition of the disease and institution of prompt therapy is the key to successful management in fungal keratitis. Occasionally surgical management is required to preserve anatomical integrity of the globe and to salvage useful vision.

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Key Words: Fungal keratitis; Keratomycosis; Keratoplasty

Introduction

Infective keratitis is an important cause of corneal blindness and fungal keratitis is a major subgroup accounting for around 30% of all cases. Fungal keratitis remains a diagnostic and therapeutic challenge to the ophthalmologist and is associated with significant ocular morbidity. Management remains a problem due to poor ocular penetration of antifungal drugs. We conducted a study to assess the efficacy of various drugs in keratomycosis, efficacy of surgical management and the final visual outcomes after combined medical and surgical management.

Materials and Methods

Twenty five consecutive cases of keratomycosis reporting to our department were studied. Diagnosis was based on history of ocular trauma especially with organic matter, clinical signs more than symptoms, ulcers with feathery margins, satellite lesions and presence of convex hypopyon. Corneal scrapings were taken and stained with Grams, potassium hydroxide (KOH), lactophenol blue and inoculated onto blood agar and Sabouraud's medium. Only those cases were included whose laboratory samples were positive for fungal elements or fungal growth. Thereafter, antifungal drugs were instituted and patients were followed up for a period of minimum three months after recovery from infection. However, those managed surgically were followed up for one year.

The corneal ulcers were classified into mild, moderate or

severe depending upon degree of corneal involvement. Mild ulcers: <1/3rd superficial stromal involvement. Moderate ulcers: 1/3rd-2/3rd stromal involvement. Severe ulcers: >2/3rd stromal involvement, ulcer near limbus, impending perforation or perforated ulcers.

Medical management included topical 5% natamycin drops, 1% itraconazole drops or 0.15% amphotericin B drops. The drops were instilled at 15 minute intervals for the first two hours, then hourly round the clock and then tapered off once clinical improvement occurred. Efficacy of medical management was assessed biomicroscopically by evaluating edge of infiltrate, density of suppuration, cellular infiltrate and oedema of surrounding stroma, and hypopyon

The cases with poor response to medical management, were taken up for surgery. Wherever possible anterior chamber paracentesis was done and 10 µgm of reconstituted amphotericin B in 0.1ml of 5% dextrose was injected into the anterior chamber. In patients with impending perforation or perforated cornea, therapeutic keratoplasty was done using fresh or preserved donor cornea and where required this was followed in turn by optical penetrating keratoplasty. In all cases donor corneal button with 0.5mm oversize was used. Postoperatively patients were kept on oral and topical antifungals with other supportive measures.

Results

Out of 25 patients studied, 19 (76%) were males and six (24%) were females. Eighteen (72%) belonged to a rural background and seven (28%) to an urban background. Twenty

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two (88%) were between 20-60 years of age with mean age of 37.32 years. Fourteen (56%) gave history of ocular trauma out of which four (16%) had injury with organic matter. Another four cases had other predisposing factors like ocular surface disease and diabetes mellitus. In seven (28%) no predisposing factor could be found. Occupationally eight (32%) were agricultural workers and four of them gave history of injury with organic matter.

Fungal elements were seen in 19 samples of corneal scrapings on KOH mount, in 12 samples on Grams stain and in 15 samples on lactophenol blue staining. Grams stain revealed mixed bacterial elements in five samples. *Aspergillus* was grown in six and *Fusarium* in one out of the 25 corneal scrapings sent for culture. Fungal hyphae were seen in tissue sections in two out of the five corneal buttons sent for histopathology. Two cases had mild, 15 moderate and eight had severe corneal ulcer. 17 (68%) had a central corneal ulcer, three (12%) had a peripheral ulcer and in five (20%) there was diffuse corneal involvement. Eighteen (72%) patients were managed successfully with medical treatment while seven (28%) required surgical intervention (Table 1). Of the eight cases of severe corneal ulcer only one responded to a combination of multiple antifungal drugs and the rest required surgical intervention. Final outcome is given in Table 2.

Of the 18 patients managed medically, 14 were treated with topical natamycin and four were treated with topical itraconazole eye drops. In the natamycin group 12 healed with formation of corneal opacity. Of the remaining two, one needed addition of topical 0.15% amphotericin B and the other needed systemic itraconazole 200mg once daily for healing to occur. All four patients of the itraconazole group healed with formation of corneal opacity. Four patients presented within the first week of onset of symptoms, seven between one to two weeks and 14 after two weeks. Final visual outcomes in these patients is given in Table 3.

Patients, who required medical management only, had

Table 1
Surgical procedure required

Surgical procedure	Number of patients
Anterior chamber wash with amphotericin B*	3 (12%)
Therapeutic keratoplasty**	5 (20%)
Optical keratoplasty	3 (12%)
Evisceration	1 (4%)

*2 out of 3 patients required penetrating keratoplasty.

**3 out of 5 patients required optical keratoplasty.

Table 2
Final outcome

Final outcome	Number of patients
Corneal opacity	18 (72%)
Adherent leucoma	1 (4%)
Phthisis	1 (4%)
Evisceration	1 (4%)
Keratoplasty	5* (20%)

*In one patient eye went into phthisis after keratoplasty

better visual acuity as compared to those who required surgical intervention (Table 4). The relationship of final visual outcome vis a vis severity of ulcer is given in Table 5.

Discussion

In our study, male patients (76%) outnumbered female patients (24%). Majority of the patients were from a rural background (72%), of a middle age group and engaged in agricultural work (32%). These findings are in accordance with those of Gopinathan et al [1] and Bharathi et al [2]. Trauma was a risk factor in 56% of our patients and injury with vegetative matter occurred in 16%. This is similar to that reported by Srinivasan et al [3].

In our study, infiltration was limited to superficial two thirds of stroma in 68% of cases and the same number had a central corneal ulcer. Agarwal et al [4] found central corneal ulceration in 92.5% of their cases. This underlines the fact that central corneal ulcers are predominant.

In our study, medical management was successful in 72% and surgical management was required in 28%. Forster et al [5] reported medical management to be

Table 3
Relation of visual results with time of presentation

Time of presentation	Visual outcome	Number of patients
< 1 week	6/6-6/12	4 (16%)
1-2 weeks	6/6-6/12	5 (20%)
	6/18-6/60	2 (8%)
> 2 weeks	6/6-6/12	3 (12%)
	6/18-6/60	7 (28%)
	<6/60	4 (16%)

Table 4
Relation of visual outcome with treatment modality

Treatment modality	Visual outcome	Number of patients
Medical	6/6-6/12	11 (44%)
	6/18-6/60	6 (24%)
	<6/60	1 (4%)
Surgical	6/6-6/12	1 (4%)
	6/18-6/60	3 (12%)
	<6/60	3 (12%)

Table 5
Relation of visual outcome with severity of ulcer

Severity of ulcer	Visual outcome	Number of patients
Mild	6/6-6/12	2 (100%)
Moderate	6/6-6/12	9 (60%)
	6/18-6/60	5 (33.33%)
	<6/60	1 (6.66%)
Severe	6/6-6/12	1 (12.5%)
	6/18-6/60	4 (50%)
	<6/60	3 (37.5%)

successful in 75.40% of their cases and the rest needed surgical intervention. These findings suggest that almost one third of cases need surgical management.

We used natamycin alone in 14(56%) cases and achieved healing in 12 (85.7%). Prajna et al [6] at the end of four weeks found improvement with natamycin in 31.81%, achieved complete cure in 59.09% while 9.09% showed no response. Thus natamycin is efficacious in superficial keratitis. Patients with deep keratitis usually need addition of itraconazole or amphotericin B.

In three (12%) patients who did not respond to natamycin or itraconazole, an anterior chamber wash was done with amphotericin B. In one case healing occurred with formation of corneal opacity while the other two required therapeutic keratoplasty. Kuriakose et al [7] reported complete healing in three out of four patients with intracameral amphotericin B. Hence, intracameral amphotericin B has some role in management of keratomycosis.

Five (20%) of our patients needed keratoplasty. In one patient the infection recurred and the eye went into phthisis. In three patients the grafts became opaque with time and they were taken up for optical keratoplasty later on. In all these four patients the grafts were clear at one year of follow up. Xie et al [8] reported clear grafts in 79.6% of their patients on final follow up. In our study the patients presenting early with mild disease had good visual recovery. Increase in severity of ulcer and delay in time of presentation led to poor visual recovery and increased ocular morbidity.

In our study, 12(48%) patients had vision between 6/6-6/12 and nine (36%) had vision between 6/18-6/36. Four(16%) had vision below 6/60. These figures are better than those reported by Naseem et al [9] who reported that 12.5% of their patients gained vision between 6/6-6/12, 18.8% had vision between 6/18-6/36 and 68.7% had vision below 6/60. Forster et al [5], reported 40.98% patients regaining vision better than 20/40 with medical management alone and 46.15% had vision more than 20/70.

Hence it is seen that final visual recovery depends upon severity of ulcer and time of presentation. Medical

management in the form of topical natamycin and Itraconazole is effective for superficial infection.

Deep stromal infiltration needs institution of topical amphotericin B. Systemic antifungals are required in patients with impending/existing perforation, gross hypopyon and inadequate response to topical medical treatment. Medical management is effective in about two third cases and the rest need keratoplasty. Unfortunately because of limited availability of donor corneas surgery is often delayed thereby compromising surgical and visual outcomes. Therefore, early recognition of disease and institution of prompt therapy is the key to successful management of fungal keratitis.

Conflicts of Interest

None identified

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