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Original Article

Outcome of Paediatric Microbial Keratitis in Tertiary Eye Center in Nepal

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Abstract

Introduction: Corneal diseases are important ocular morbidity in childhood in developing countries and microbial keratitis is a common cause for it.

Methods: It is a retrospective study of 50 microbial keratitis occurring in children of < 18 years presenting in tertiary eye center in 18 months' period.

Results: Average age of the patients having non-viral infective keratitis was 10.25 years. Sixty-four percent were males. Ninety percent of cases were from rural regions. Patients visited tertiary center at average duration of symptoms of 13.2 days. Twenty-five (50%) cases had history of trauma, of which 16 had trauma while playing. Topical steroids, as risk factor was present in 12 (24%) cases. Six (12%) cases had history suggestive of herpetic keratitis as predisposing factor for microbial keratitis. Thirty-one cases underwent diagnostic corneal scraping. Seven cases showed bacterial growth and three cases fungal growth. Twenty percent of cases had infiltrate size > 25% of corneal surface. Eleven (22%) were with hypopyon. Two cases were perforated at presentation. In total, 37 (74%) of the ulcers healed after treatment, five (10%) underwent therapeutic keratoplasty and eight (16%) were lost to follow up. Out of those healed, 17 had vision of ≥ 6 / 18 and 7 had vision < 3 / 60.

Conclusions: Awareness is important for care-takers to avoid trauma in eyes of children. Paediatric microbial cases present late in the tertiary center in our context. Timely referral is important to prevent complications and to avoid need of keratoplasty.

Introduction

Microbial keratitis is a serious ocular condition, more common in developing countries.[1] A hospital based study done in Nepal showed that corneal ulcer constitute 47.8% of corneal problems in children.[2] Children are prone to ocular disorders due to their inquisitive and curious and mobile nature.

The management of microbial keratitis in children is difficult because children may be unable to cooperate during examination (Including microbiological examination) and also there may be the lack of proper information.[3] Delay in diagnosis and treatment may result in complications like perforation and endophthalmitis and sequel like corneal scarring leading to amblyopia, secondary glaucoma and phthisis.

This current study is undertaken to know the predisposing factors, laboratory and clinical findings and outcome of microbial keratitis in children presenting in a tertiary eye care center in Nepal.

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Methods

This is a retrospective study based on our previous descriptive study of non-viral infective keratitis presenting in Tilganga Institute of Ophthalmology between November 2013 and April 2015 (18 months' duration).[4] Descriptive data of paediatric microbial keratitis (PMK) occurring in the age group < 18 years were segregated from 602 non-viral microbial keratitis presenting within that period.[4] Demographic parameters, risk factors and clinical features (Size of ulcer, presence of hypopyon, perforated or impending to perforate) and microbiology of the ulcers were studied. Outcome of the ulcers was evaluated on the basis of how many responded to medical treatment and healed and how many underwent surgical interventions. Visual outcome was evaluated for those ulcers that healed. Bacterial ulcers (Culture proven or presumed bacterial) were treated with either monotherapy (Ofloxacin or moxifloxacin) or combination therapy (Fortified topical cefazoline and amikacin). In cases of fungal ulcers (Culture proven or presumed fungal), combination of topical natamycin 5% and fluconazole 0.3% was given hourly. Oral antifungal, fluconazole 75 to 150 mg once a day was started for large ulcers, deep ulcers, ulcers not responding to topical antifungals alone and ulcers extending in the limbus. Slow tapering of the antibacterial or antifungals was done as ulcer showed signs of improvement. Infection was categorized as (a) "Healed" when there had been resolution of infiltrate, hypopyon and epithelial defect; (c) "Ulcers not responding to treatment" when they did not show any signs of improvement and that needed therapeutic penetrating keratoplasty (TPK) or evisceration (d) "Lost follow up" when patients did not further come for checkup and fate of the ulcer is unknown. The study was commenced after taking ethical approval from Institutional Review Board of the institute.

Results

Out of 602 cases with presumed microbial keratitis presented within the study period of 18 months, the number cases that occurred in children <18 years was 50 (8.3%). Sixty-four percent were male children. Average age was 10.25 years (Range: Four months to < 18 years). Forty-five cases (90%) were from rural regions, two (4%) were from city area and three (6%) were from India. The average time at which patients sought medical help was six days after onset of symptoms and the place where they first visited for treatment is shown in Table 1. Thirty-three patients who were referred to our institute had an average duration of symptoms of 13.2 days (Median = 6.5 days). Thirty-eight children (76%) had at least one risk factor for ulcer. 25 (50%) had history of trauma. Fifty-six percent of trauma (N = 14) was due to organic matter. In 64% (N = 16), trauma occurred during playing and 20% of trauma (n = 5) was accidental. Topical steroid as risk factor was present in 12 (24%) cases. Six (12%) cases had history suggestive of herpetic keratitis as predisposing factor for microbial keratitis. Past surgery (Past penetrating keratoplasty) was present as risk factor in four (8%) cases. Other risk factors (one case each) were dry eyes, dacryocystitis, band shaped keratopathy and lagophthalmus.

Thirty-one out of 50 cases (62%) underwent diagnostic corneal scraping. There was growth in 10 cases (Culture positive rate 32.2%). Seven cases had bacterial growth and three cases had fungal growth (Table 2). Three cases showed organism only in smears. Culture was not done in 19 cases due to i) small size ulcer (< 2 mm size) (10 cases), ii) deep ulcer (Two cases), perforated at presentation (Two cases), uncooperative nature of the child (Five cases).

Regarding clinical characteristics, 40 (80%) had infiltrate size ≤ ¼ of corneal surface area. Two cases (4%) had size of infiltrate covering > ½ of the corneal surface area. The remaining eight (16%) had size of infiltrate of > ¼ to ½. Eleven (22%) cases were with hypopyon. Visual axis of the cornea was involved by the infiltrate in 28 cases (56%).

In total, 37 (74%) of the ulcers healed after treatment, five (10%) underwent TPK and eight (16%) were lost to follow up. Out of five who had TPK, one case was perforated ulcer due to Streptococcus pneumonia, one was non-healing ulcer due to Curvularia and in other three, organism was not known. One of the cases which was lost to follow up had case of Streptococcus viridians in the culture. Visual acuity of cases that had healed with medical treatment is shown in the Table 3.

Table 1: Places where the cases were first taken for treatment

Place of first visit	Number (%)
TEC* (Tertiary Eye care)	17 (34.0%)
Ophthalmologist / trained eye care worker	16 (32.0%)
Pharmacy shop	13 (26.0%)
General health assistant	4 (8.0%)
Total	50 (100%)

*Tilganga Institute of Ophthalmology

Table 2: Type of organism isolated from corneal culture

Bacteria	Number
Streptococcus pneumonia	3
Streptococcus viridians	1
Cornybacterium species	1
Staphylococcus aureus	1
Nocardia species	1
Fungus	Number
Curvularia	1
Unidentified hyaline fungus	1
Unidentified dematiaceous fungus	1
Smears showed organism but culture negative	Number
Gram positive cocci, culture negative.	1
Fungal hyphae	2

Table 3: Vision of cases which had healed from medical treatment

Vision	Number (%)
≥ 6/18	17 (45.9%)
< 6/18 ≥ 6/60	4 (10.8%)
< 6/60 ≥ 3/60	0
< 3/60	7 (18.9%)
Unable to document	9 (24.3%)
Total	37 (100%)

Discussion

PMK accounted for 8.3% of total presumed microbial keratitis in our institute. Like in our study, there was male preponderance (57.4 to 62.8%) in some of the studies from Asian countries.[5-7] But in studies of Hong Kong and Taiwan, PMK occurred more in female.[8,9]

In our study 76% had at least one risk factor. Other studies mentioned presence of risk factor in 57.2% to 92.6% of PMK.[5-7] Fifty percent had history of trauma in our study. In other studies, trauma was reported as predisposing factor in children in 26 to 74%.[5,6] But in developed countries like Hong Kong and Taiwan, contact lens was the risk factor present in 40.7% to 83.3% of PMK.[8-10] The type of contact lens implicated in their study was ortho-keratolog.[8,9] In Saudi Arab, only 16.1% had history of contact lens wear.[5] In India it was even less (1.2% to 1.9%).[6,7] There were no contact lens wearers in our study. After trauma, second important risk factor was systemic illness (in Saudi Arab), vernal keratoconjunctivitis (in North India), topical steroids (in our study) and ocular surface conditions like allergy, viral keratitis, xerophthalmia (in South India).[5-7]

In this study as well as in a study done in China, 90% of children were from rural area.[11] The median duration from the onset of symptoms to time of presentation to our tertiary hospital was 6.5 days. In North India, this figure was five days and in South Indian, median was four days.[6,7] In the report of Al Otaibi et al corneal ulcer was centrally located in 58.8% of the eyes which was similar (56%) to our study.[5]

Diagnostic corneal scraping is always a challenge in young children. 62% of children in our study and 79.5% in the study of Aruljyothi et al had corneal culture done.[7] But in the study of Singh et al and Al Otaibi et al, all children underwent corneal culture, some were done under general anesthesia.[5,6] The rate of culture-positive specimens varied and ranged between 48 – 87% in different studies.[3] In our study, culture positive rate was even less 32.2%. This could be because of prior treatment with topical antimicrobials, especially in our set up.

Like in our study, Al Otaibi et al also reported Streptococcus pneumoniae as the commonest organism isolated but it was Staphyloccous in the study by Singh et al.[5,6] Pseudomonas was isolated as the commonest organism in studies where contact lens was the major risk factor.[8] In the study from South India, fungi was the most common infectious agent isolated in culture (54.2%) and Fusarium species was the most common among the fungus isolated.[7]

In the study of Singh et al, TPK was required in 12.5% of PMK, clinical resolution on medical treatment occurred in 80.7% and 6.7% were lost to follow up.[6] In the study of Aruljyothi et al, successful healing of the keratitis with appropriate medical therapy occurred in 92.9% of cases, while 7.1% required TPK.[7] Their healing rate was better than ours (74%) because the median time of the ulcers presenting in hospital was shorter in their study, compared to ours.[7] None of the 108 cases of PMK had to undergo TPK in a study done in the United States.[10] In the study of Aruljyothi et al, 61.2% of children (whose documentation of vision was possible) had vision better ≥ 6 / 18.[7] This was similar to our study in which 17 (60.7%) out of 28, whose vision could be taken, had final visual acuity of ≥ 6 / 18. In the study of Young et al, 76.5% had best-corrected visual acuity of 20 / 40.[8] We have to acknowledge the limitations of the present study. Being a retrospective nature of study conducted in a single centre with

relatively smaller sample size, generalization of these results may not be feasible. Hence, further, prospective, multi centric studies are warranted for getting more conclusive evidence in the field of paediatric microbial keratitis.

Conclusions

In our context, PMK cases are presenting late in the tertiary care centre which is resulting in corneal blindness in young eyes, which in turn cause amblyopia if untreated. Treatment of corneal blindness in paediatric patients through keratoplasty surgery is more challenging than in adults. Hence, awareness is important in care-takers, guardians, and in schools regarding prevention of ocular trauma and need of immediate evaluation and management of corneal injury. PMK patients should to be referred to proper place timely in order to reduce the complications and sequel associated with it.

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