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Research Article

A clinical study to evaluate therapeutic efficacy of soft contact lenses in corneal diseases

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ABSTRACT

Background: Therapeutic contact lenses have a wide range of uses. This study was planned to evaluate therapeutic efficacy of soft contact lenses in various corneal diseases for providing and promoting relief of pain, epithelial healing, protection, improving visual acuity.
Methods: This study was conducted in ophthalmology department of a tertiary care teaching hospital after taking permission from the institutional ethics committee. Before subjecting the patient to treatment of therapeutic hydrophilic contact lens therapy for various corneal diseases, a detail clinical history and thorough local examination and certain investigations were performed and treatment given for each condition was standard. Evaluation of patient was done daily in admitted patients and after 3 days in discharge patients, then weekly for first month then follow up was done depending on underlying condition; maximum for 6 months. Patients were monitored for amelioration of signs and symptoms, improvement in visual acuity and slit lamp examination finding and change in intraocular pressure was also recorded.
Results: Total 50 enrolled cases were divided in eight groups. Improvement in patients was 70% for bullous keratopathy group, 80% (Corneal perforation and descemetocoel group), 70% (corneal ulcer group), 40% (dry eye syndrome group), 66.67% (lid abnormalities group), 100% (filamentary keratitis and superior limbic keratoconjunctivitis group), 66.67% (recurrent corneal erosion group), and 100% in drug delivery group. Superficial corneal neovascularisation (10%) was found more common complication followed by infectious keratitis (6%) and lensopathy (4%).
Conclusions: Soft contact lenses can be safely advocated as a part of therapy along with adjuvant conventional management with well expected improvement in the ocular corneal diseases.

Keywords: Corneal diseases, Slit lamp examination, Soft contact lenses, Visual acuity

INTRODUCTION

The concept of blinding or applying a bandage in case of injury or diseases probably dates back to pre-historic times.[1] Contact lenses are most commonly worn as an alternative to spectacles in the correction of refractive errors. Therapeutic contact lenses have a wide range of uses.[2] All over the world there are approximately 32.4 million blind people. Out of 32.4 million one fourth are blind due to corneal diseases. Among different countries of the world, India contributes to the largest proportion of blindness due to corneal disorders.[3] Therefore, in our country it is necessary to take such measures which will arrest corneal disorders at such a stage that the person can be prevented from becoming blind and thus sustain a good social and economic life.

There have been many modifications in contact lenses from first corneal plastic lens to the introduction of present hydrogel lens by Wichterle and Linn 1960, its routine use for corneal disorders came into use.[4] Due to advent of contact lenses technology, new materials have

been developed covering not only the correction of optical error but also a variety of therapeutic purposes.

Therapeutic lenses may be fabricated from hydrogels, silicon or collagen. Most lenses are hydrogels that consist of acrylic polymer matrix capable of absorbing substantial amount of water. These hydrophilic lenses are composed of up to 80% water depending on the type of lens and oxygen permeable. Initially hydoxy-ethyl methacrylate (HEMA) was the hydrogel materials used for therapeutic lenses.[1]

More recently other polymer like poly HEMA, vinylprolidine, glyceryl methacrylate and diacetone anylamide are being used. With the recent advances in material technology, today's bandage contact lenses provide benefits with enhanced convenience, improved healing and increased corneal health. Contact lenses have evolved as an adjuvant to medical treatment available so far for corneal disease.[5] This study was planned to evaluate therapeutic efficacy of soft contact lenses in various corneal diseases for providing and promoting relief of pain, epithelial healing, protection, improving visual acuity.

METHODS

The present study was conducted on patients attending the out-patient department of ophthalmology in a tertiary care teaching hospital for a period of one year after taking ethical permission. Hydrophilic contact lenses were used. Before subjecting the patient to treatment of therapeutic lens therapy, a detail clinical history and thorough local examination was done and certain investigations were performed and treatment given for each condition was standard.

Since keratometry was not possible in diseased cornea, trial fitting were given in the patients of corneal disease. After instillation of 4% xylocaine eye drops in patient's conjuctival sac, after the interval of 2 minutes the therapeutic lens was applied to the patient's diseased cornea. Lens fit was examined 60 minutes later and after 24 hours (as fit may be altered with a change in hydration). After fitting of contact lens depending as the condition of corneal disease either patient will admitted in ward or may be discharged at same time.

Evaluation

Evaluation of patient was done daily in admitted patients and patients were monitored for amelioration of signs and symptoms, improvement in visual acuity and slit lamp examination finding and change in intraocular pressure was also recorded.

Patients remain admitted in wards till satisfactory cure condition was achieved, if any complications occurred; lenses were removed. Discharge patients were called up for evaluation after 3 days, then weekly for first month then follow up was done depending on underlying condition and that was maximum for 6 months in present study. All the data were recorded in percentage.

RESULTS

Total 50 cases were enrolled in our study during the study period of 1 year. Out of 50 patients, there were 20 male and 30 female and male/female ratio was 2:3. Most of the patient age was ranged from 41-80 years. These cases were divided in eight groups. In present study most of the patients were in group I and group II (Table 1).

Table 1: Demographic profile of the patients.

Groups	Disease	Male	Female	Total (%)
I	Bullous keratopathy	4	6	10 (20%)
II	Corneal perforation and descemetocoel	6	4	10 (20%)
III	Corneal ulcer	3	4	7 (14%)
IV	Dry eye syndrome	1	4	5 (10%)
V	Lid abnormalities	2	4	6 (12%)
VI	Filamentary keratitis and Superior limbic kerato-conjunctivitis	2	4	6 (12%)
VII	Recurrent corneal erosion	1	2	3 (6%)
VIII	Drug delivery	1	2	3 (6%)
Total		20	30	50

Table 2 shows effect of soft contact lenses on various disease of cornea.

Out of 10 patients of bullous keratopathy group, 5 patients were given bandage contact lenses along with hypersol-5% and results were more favourable in this group (80%) as compared to without hypersol-5% (60%). In cases of lid abnormalities contact lenses were found more effective in trichiasis (75%) as compared to entropion (50%).

In case of drug delivery mean reduction of IOP in right eye (topical pilocarpine 2% TDS) was 16% while in left eye (pilocarpine presoaked soft contact lens) was 30%. Superficial corneal neovascularisation (10%) was found more common complication followed by infectious keratitis (6%) and lensopathy (4%). Giant papillary conjunctivitis and corneal oedema was not noted in any case (Table 3).

Table 2: Effect of soft contact lenses on various groups of corneal disease.

Conditions		No. of cases	Evaluation of patients			Results in %
			Changes in visual acuity (Increased)	Sign and symptoms (Decreased)	Slit lamp examination (Improved)	
Bullous keratopathy		10	7	7	7	70
Corneal perforation		5	3	4	4	80
Descemetocoel		5	3	4	4	80
Corneal ulcer		7	5	5	5	70
Dry eye syndrome		5	2	3	2	40
Lid abnormalities	Trichiasis	4	3	3	3	75
	Entropion	2	1	1	1	50
Filamentary keratitis		2	1	2	2	100
Superior limbic keratoconjunctivitis		4	3	4	4	100
Recurrent corneal erosion		3	2	2	2	66.66
Drug delivery		3	0	3 (Fall in IOP)	0	100

Table 3: Complications of bandage contact lenses in various groups of corneal disease.

Complications	Number of patients (%)								Total (n=50)
	I (n=10)	II (n=10)	III (n=7)	IV (n=5)	V (n=6)	VI (n=6)	VII (n=3)	VIII (n=3)	
Infectious keratitis	-	1 (10%)	-	1 (20%)	-	-	1 (33.3%)	-	6%
Corneal oedema	-	-	-		-	-	-	-	-
Superficial corneal neovascularisation	1 (10%)	2 (20%)	2 (28.8%)		-	-	-	-	10%
Giant papillary conjunctivitis	-	-	-		-	-	-	-	-
Lenspathy lens deposit/ damage to lens	-	-	1 (14.2%)	1 (20%)	-	-	-	-	4%

DISCUSSION

Contact lens devices have a wide range of therapeutic applications in modern ophthalmology practice. These lenses help in relief of pain, promotion of corneal healing, mechanical protection and structural support, control of corneal hydration, apposition of wound margins, maintenance of fornices, and drug delivery.[2,5]

In present study most of the patients were in age group 41-80 years in both sexes. This could be due to the fact that the patients in this age group were more cooperative for the study. In present study 80 % visual improvement was found in bullous keratopathy patients. 10 % cases had developed superficial neovascularisation. Study done in 12 cases by Gasset and Kaufman in 1970 had given 100% results of improvement by using HEMA contact lenses in bullous keratopathy cases.[6] In 1971, Gasset and Kaufman done the study on 49 patients and they had reported improvement in 41 cases.[7] Most of the studies have concluded that soft hydrophilic lenses are useful in case of bullous keartopathy and it is more useful when it is used with hypertonic saline 5%. Bandage contact lenses give relief from pain, originating from ruptured bullae as soft contact lenses protect the exposed nerve endings,[8] though lens does not alter pathophysiology of disease for that reason lens should be worn permanently.

Improvement by using soft contact lens on descemetocoel and corneal perforation in our study was found in 80% of cases. 20 % cases reported neovascularisation. Mondino BJ studied 9 cases. In his study improvement was in 3 cases and 6 cases remained same.[9] This is in agreement with our study that soft contact lenses are useful in majority of corneal perforation and descemetocoel as they cause rapid reformation of anterior chamber and

healing if uses temporarily. In present study improvement in case of corneal ulcer was reported in 70 % cases. Out of 7 cases 2 cases showed superficial neovascularisation and in one case lens deposition (lensopathy) was noted. Gasset and Kaufman reported relief in 60 % cases[6] and Buxton and Clyde reported 100 % improvement in all. He also observed that epithelisation is slow in aphakics compared to phakic patients.[10] Mondino BJ also reported improvement in patients of corneal ulcer.[9] The results of our study are comparable with the studies done by other workers that contact lenses promote healing by rapid epithelisation of ulcer.

Less than 50% cases of dry syndrome were found to be improved by using soft contact lenses. It was tested by Shirmer's test and TFBUT (tear film breakup time). In one case infectious keratitis was developed and in one drying of lens. Kaufmann and Leibowitz have concluded low incidence of success of contact lenses or not effective in case of dry eye.[6,11]

Lindsy and Farus have reported minimal effect of contact lenses on dry eye.[12] The reason for less effectiveness in dry eye could be recurrent fall of lenses, improper lens fitting, and continuous use of supplement artificial tears. Bandage lens does not eliminate the frequent application of artificial tears as it may require additional amount of topical medication to maintain hydration, moist chamber goggles, punctum occlusion and solid tear substance are important aspects to be used as treatment.

Soft contact lenses were found effective in 67 % cases of lid abnormalities and it was found more effective in trichiasis as compared to entropion. Leibowitz has also reported protective role of contact lenses in trichiasis.[12] This could be because during the stage of epithelisation, cornea is protected from lid trauma and it can occur fast. So contact lens acts as a temporary physical barrier protecting the already compromised corneal surfaced from theses mechanical forces until lid abnormalities are corrected.

Contact lenses were found 100 % effective in all cases of filamentary keratitis and keratoconjunctivitis. Sugar J et al in 1988 and Lindahl KJ et al in 1991 have also found contact lenses very helpful in these cases.[13,14] Bandage contact lenses along with adjuvant therapy were found effective in all the cases of recurrent corneal erosion. Other studies have also shown similar results.[13,15,16] This could be because bandage contact lenses provide a mechanical protective effect shielding the epithelium and corneal nerves from shearing actions of lids. They also facilitate re-establishments of basement membrane complexes with concomitant healing and firm attachment of epithelium.

In all the 3 cases of our study where soft contact lenses used as drug delivery, were found more effective as compared to topical drops. Krejci L et al have conclude that IOP lowered more by using drugs in contact lense.[17] Friedmann Z et al have also use delivery of acetazolamide and methazolamide by contact lenses and they have found it more effective in lowering IOP.[18] So it can be concluded with above studies that bandage contact lenses can be act as drug delivery system, especially in case of primary open angle glaucoma where patients compliance is poor.

CONCLUSION

Soft contact lenses can be safely advocated as a part of therapy along with adjuvant conventional management with well expected improvement in the ocular corneal diseases which we considered in present study.

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