

**Assessment of Bandage Soft Contact Lenses as a Primary Treatment for Traumatic Corneal Abrasions (TCA): A Prospective Study**Jyoti<sup>1</sup>, Sachin Kumar<sup>2</sup>, Pradeep Karak<sup>3</sup>, Rajnandani<sup>4</sup><sup>1</sup>Senior Resident, Department of Ophthalmology, Nalanda Medical College and Hospital, Patna, Bihar, India<sup>2</sup>Assistant Professor, Department of Ophthalmology, Nalanda Medical College and Hospital, Patna, Bihar, India<sup>3</sup>Associate Professor and HOD, Department of Ophthalmology, Nalanda Medical College and Hospital, Patna, Bihar, India<sup>4</sup>Junior Resident, Department of Ophthalmology, Nalanda Medical College and Hospital, Patna, Bihar, India

Received: 06-04-2023 Revised: 11-06-2023 / Accepted: 28-06-2023

Corresponding author: Dr. Sachin Kumar

Conflict of interest: Nil

**Abstract****Aim:** The aim of the present study was to use bandage soft contact lens (BSCL) as a primary treatment for traumatic corneal abrasion [TCA].**Methods:** The present prospective study was conducted on 100 patients with TCA attending the out-patient department of Ophthalmology for one year. Hydrophilic therapeutic BSCLs were used. Before subjecting the patient to therapeutic BSCL therapy, informed consent has been obtained, a detail clinical history and thorough local examination was done, all patients diagnosed and treated for a superficial TCA after fulfilling the following criteria.**Results:** The commonest cause of injury was direct minor trauma (80% of cases), with cosmetic & optical contact lenses related problems accounting for 20% of presentations, visual acuity was documented correctly in 90% of adult and pediatric group and difficult to documented in children less than 6-year-old 10%. Traumatic corneal abrasion treated with bandage soft contact lens has an apparent advantage over the traditional pressure patch in terms of reduced pain, speedier healing, and an advantage of faster rehabilitation, facilitation epithelial healing, and proper surface hydration.**Conclusion:** Our study advised that the therapeutic BSCL is the first-line approach is a safe and effective modality for treating TCAs & significantly shortens the time to resume normal activities. While BSCLs were applied for straightforward TCA & suitable continuation nursing for TCAs was strongly effective. We concluded that the results support the hypothesis that BSCLs used in the primary treatment of TCAs offer certain advantages over conventional PP.**Keywords:** Traumatic corneal abrasion; Bandage Soft contact Lens; Recurrent Corneal Erosion; Visual Acuity; Preservative Free; Eye Drop; Pressure Patch

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

**Introduction**

Eye injuries have emerged as a significant and common injury pattern. Extreme temperatures, high winds, and excessive blowing dust all contribute to eye problems for people working in these environments. [1] Traumatic corneal abrasions represent a substantial proportion of the problems presenting to the eye casualty department. Traumatic corneal abrasion [TCA] is a blemish in the epithelium and does not pierce the Bowman membrane. [2] When small TCA happens, sound cells soon seal the defect to prohibit vision hurt, infection, or unequal refraction. If TCA infiltrates

cornea more profoundly, the recovery prolonged. [3]

Simple corneal abrasions, although not eye-threatening injuries, can significantly reduce the patient's functional status because of accompanying pain, reduced visual acuity, and other associated symptoms.<sup>1</sup> TCA is very common in both the adult and pediatric population and account for a significant proportion of the workload of most emergency cases. The incidence of these often work-related eye injuries has been reported as high as 15 per 1,000 people per year of which 87% were TCAs. [4] Symptoms can be worsened by

exposure to light, blinking, and rubbing the injured surface against the inside of the eyelid. Most TCA cure within 1 to 3 days and seldom proceed to erosion or infection. [5]

Traditionally the management of corneal abrasions consists of topical lubricants, mydriatics, antibiotics, and pad and bandage. Various studies display that PP does not assist and may prohibit recovery. PP can lead to disadvantages such as loss of binocular vision, discomfort from the patch itself, and reduced corneal oxygenation. [6] Instead of that, TCA can be effectively handled with BSCL to outfit pain release & work as a splint to reinforce epithelial cure & to preserve the binocular seeing. [7,8] The use of a bandage contact lens (BSCL) has been shown to be both safe and effective in the ophthalmology clinic environment for a number of corneal problems, including the healing of incisions from refractive surgery and traumatic corneal abrasions. BCLs have been observed to reduce pain, to maintain binocular vision, [9,10] to maintain depth perception, and to allow a quicker return to normal activities. [11,12,13] BSCLs provide benefits with enhanced convenience, improved healing, and increased corneal health. BSCL has evolved as an adjuvant to medical treatment available so far for corneal disease. [14]

The aim of the present study was to use bandage soft contact lens (BSCL) as a primary treatment for traumatic corneal abrasion [TCA] instead of traditionally use pressure patch (PP).

### Materials and Methods

The present prospective study was conducted on 100 patients with TCA attending the out-patient department of Ophthalmology in Nalanda Medical College and Hospital, Patna, Bihar, India for one year. Hydrophilic therapeutic BSCLs were used. Before subjecting the patient to therapeutic BSCL therapy, informed consent has been obtained, a detail clinical history and thorough local examination was done, all patients diagnosed and treated for a superficial TCA after fulfilling the following criteria: the abrasion was of a surface area of greater than 2 mm, the area of abrasion was measured by the slit-lamp gated beam, the age range between 5 to 35 years, there was no evidence of secondary infection or retained foreign body or coincidental ocular disease, and no previous treatment had been given.

The present study aimed to evaluate the therapeutic BSCL as a primary treatment for TCA. The disposable BSCL Bio54 tinted soft contact lenses (Triopolymer 46%, water 54%) in a buffered 0.9 normal saline, 14.2 mm diameter were used, it too covers the whole cornea, sclera to sclera, and fits all eyes. BSCL provides various objects in the treatment of TCA. It is applied instead of PP for pain comfort, corneal preservation & drug transmission. The improvement in contact lens

processing made the BSCL unharmed & suitable to use in an eye which is comparatively exposed to hazard by abrasion. [15] BSCL permit synchronous use of eye drops, expand the contact time of eye drops, attend as a block to moreover epithelial disturbance & nerve excitation by clipping power of the upper lid through blinking, let the ophthalmologist to monitor the eye without take off the dressing, permit the patient to have applicable seeing in the injured eye & display superior cosmetic with a capacity to put on sunglasses as required.

### Diagnosing Corneal Abrasion

TCA indicated from a story of novel eye injury & following intense eye soreness. Symptoms comprise light scare, ache with eye activity, extreme tearing, lid cramp, sandy feeling, blurred seeing & occasionally lid puffiness.

Before the examination of the patient with a TCA, it is essential to install a topical anesthetic agent such as proparacaine 0.5% eye drop (ED) This not only helps the examiner to carry out a comprehensive assessment but also puts the patient at ease and alleviating pain. The examination should be carried out systematically, begin with an examination of the eyelids and adnexa for signs of ocular inflammation and trauma, and evert the upper eyelid to check for the presence of a foreign body. The diagnosis of TCA can be proven by seeing the cornea by slit-lamp after put anesthetic ED & fluorescein strip, which will give rise to abrasion to manifest as green color. [16] Eye drops aim to decrease injury effect & prohibit complications. Small TCA can be managed on an outpatient basis. Ice compresses should be used for 24-48 hs to reduce edema. Antibiotic ED used to prevent infection, cycloplegic ED can reduce pain and photophobia & preservative free [PF] lubricant ED. All patients received proparacaine 0.5% ED before the examination, the onset of action is in 1 min, the anesthetic effect lasts up to 15-20 min., then applied fluorescein strip in lower cul de sac then examine the patients by slit lamp with blue cobalt light to confirm the diagnosis, after that we wash the fluorescein by PF lubricant EDs then the BSCL inserted, then measure visual acuity [VA] by Snellen chart, antibiotic moxifloxacin ED & Homide 2% ED were administered. Proparacaine 0.5% ED should never be prescribed for patients to use for pain relief at home because they delay wound healing and increase the risk of corneal ulcer formation. [16]

Moxifloxacin ED is a broad-spectrum bactericidal effect, it used hourly on the first day then 4 to 6 times for fourteen days, and Preservative free lubricants hourly at first day then 4times for two weeks. Homide 2% ED, causes relaxation of the muscles of ciliary body & iris to decrease pain, it is used once daily for the first 3 days then stop it. It

induces mydriasis in 10 to 30 min and cycloplegia in 30 to 90 min; effects last up to 10 to 48 hours, the rationale behind their use was that they relieved ciliary muscle spasm and therefore helped with the pain associated with TCA. PP was not lead to recovery rates or decrease ache & likely to rise pain.<sup>16</sup> Furthermore, the review concluded that PP results in an acute loss of binocular vision, which impacts driving, work, and other day-to-day activities. Therefore, PP should be avoided for patients with simple TCA. [17]

The patients were reviewed after 24 hours with much less pain, photophobia, redness, and blur. With the lens in place, VA was done. Slit-lamp examination revealed that the lens was well-centered with minimal lens movement.

Each case was assessed to determine the documentation of the following criteria:

1. Age.
2. (VA).
3. Lid examination.
4. Treatment.
5. Discharge plain.

The patients were reviewed after 24 hours and an assessment of their pain, photophobia, tearing & VA was done & slit-lamp examination was done to assess the abrasion & BSCL, the abrasion appeared much improved, with a smaller epithelial defect and less edema, after 3 days and after 1 week the VA done and slit-lamp examination of patient was done, and the abrasions considered healed and local punctate keratitis only could be observed on slit-lamp biomicroscopy of the injured site. The BSCL on the cornea was put for 7 days to permit epithelial movement & connection without the

intervention of the clipping power of the upper lid. Those treated with a BSCL noted dramatic relief of pain and lid spasm with rapid comfort in the injured eye and could open the sound eye more comfortably. BSCL elaborations are ideally either self-acting from the near conjunction between BSCL & eye exterior or inflammatory reaction from adhering wrack beneath the lens. Since the BSCLs are applied on the disclosed eye surface, a prudent proceeding is demanding. The patients are examined after 24 hours & then after 72 hours. Recommend The patient is recommended to preclude light, or to wear sunglasses. The main outcome measures were subjective symptoms that were monitored (VA, pain, photophobia & foreign body sensation), evaluation of corneal abrasion & determination of adverse events. The treatment was continued until complete corneal abrasion area reduction (complete re-epithelialization or epithelial regeneration line) could be observed. The primary outcome measure was the reduction in corneal abrasion area from the time of abrasion to 24 h, 3 days, and 1 week later. To avoid corneal ulcer occurrence the patient with TCA should encounter continuation nursing until recovery is perfect & negative fluorescein stain.

After 1-week slit-lamp examination revealed a completely healed corneal abrasion with no epithelial defect then BSCL was discontinued. RCE is a periodic, unprompted disarrangement of corneal epithelium, can happen in corneal tissue debilitated by TCA months or years previously. Symptoms of RCE comprise pain, sandy-gritty feeling & scare from light.

## Results

**Table 1: Patient demographics**

Gender	No. of cases (%)
Male	64 (64)
Female	36 (36)
Age	
= or < 12	72 (72)
= or > 12	28 (28)

There were 64 male and 36 females. 72 cases were adult patients (> 12 years of age) and 28 cases were pediatric.

**Table 2: Causes of traumatic corneal abrasion**

Causes of traumatic corneal abrasion	N
Grit in the eye	8
Baby pocked finger in the eye	22
A sheet of paper in the eye	4
Cigarette in eye	6
Contact lens wear	10
Fell off motorcycle	4
Tacking out makeup	6
Foreign body hitting the eye	12
Punched in eye	10
Scratched in the eye by bird's claw	4
Pencil pocked in eye	14

The commonest cause of injury was direct minor trauma (80% of cases), with cosmetic & optical contact lenses related problems accounting for 20% of presentations, visual acuity was documented correctly in 90% of adult and pediatric group and difficult to documented in children less than 6-year-old 10%. Traumatic corneal abrasion treated with bandage soft contact lens has an apparent advantage over the traditional pressure patch in terms of reduced pain, speedier healing, and an advantage of faster rehabilitation, facilitation epithelial healing, and proper surface hydration.

### Discussion

The bony orbit defense most of the eyeball. The eyebrow & eyelash partly cover the eye from small chips. Eyelids shut promptly and reactively when eye risk is felt. The cornea is usually protected by the eyelids yet is susceptible to injury, especially from trauma. A tear response attempts to wash away anything that reaches the ocular surface. Tears also lubricate the eye and prevent tissue dryness.<sup>18</sup> When small TCA happens, sound cells soon seal the defect to prohibit vision hurt, infection, or unequal refraction. If TCA infiltrates cornea more profoundly, the recovery prolonged. [19] Profund slash can cause scarring which hurt vision to the degree corneal graft required. TCA is very common in both the adult and pediatric population and account for a significant proportion of the workload of most emergency cases. TCA produces considerable impairment & sick leave. The incidence of these often work-related eye injuries has been reported as high as 15 per 1, 000 people per year of which 87% were TCAs. [20]

The commonest cause of injury was direct minor trauma (80% of cases), with cosmetic & optical contact lenses related problems accounting for 20% of presentations, visual acuity was documented correctly in 90% of adult and pediatric group and difficult to documented in children less than 6-year-old 10%. Traumatic corneal abrasion treated with bandage soft contact lens has an apparent advantage over the traditional pressure patch in terms of reduced pain, speedier healing, and an advantage of faster rehabilitation, facilitation epithelial healing, and proper surface hydration. BSCLs may offer these conditions more reliably than an PP, just as they are helpful in the management of many corneal surface diseases. The study suggests that the primary treatment of TCAs with BSCLs has an apparent advantage over the traditional PP in terms of reduced pain during healing and speedier healing. A comparison of the healing time in the literature [21,22] revealed similar rates for the therapeutic BSCLs and the traditional PP. Another major advantage of BSCLs is rapid rehabilitation and a short time to resumption of normal activities, besides, the binocularity level is preserved. We did not record

any cases of corneal infection. It is important to note that patient compliance is necessary since the treatment involves topical anesthetic, antibiotic, cycloplegic, lubricant EDs, and follow-up examination until removal of the BSCL.

A review of the literature on infectious keratitis associated with therapeutic BSCL wear in traumatic corneal abrasion revealed that only 1 of the 13 patients studied by Salz et al [23] developed this complication, which cleared with topical antibiotic treatment and without visual loss. Vandorselaer, et al [24] reported no complications during treatment for TCA in 176 patients, and this consistent with results in our study. Treatment of TCAs varies according to local protocol. One report has shown chloramphenicol to be no more effective than Fucithalamic in promoting corneal healing, or in reducing local side effects or signs of local infection. We use moxifloxacin ED. Cycloplegic agents have traditionally been used as 2% Homide in TCA to even though there is no scientific evidence to support this. [25]

Soft contact lenses are an important risk factor for the development of infected corneal ulcers, but traumatic abrasions are also a risk factor, and we believe that with properly fitted BSCLs, and with the use of a prophylactic broad-spectrum antibiotic, the risks are minimal over such a short period. In our study, all BSCLs removed after one week from injury, and no infection seen in all patients. In most patients, the abrasion healed within three days, but the lens stays in the eye till 1week then removed. No problems of corneal edema were observed in our patients and the risk of corneal hypoxia does not appear to be important. This is reflected in the increased healing of the abrasion in the BSCLs patients possibly because these patients have greater oxygen exposure during the day when their eyes are open than those in the PP, who may be relatively hypoxic all the time.

### Conclusion

Our study advised that the therapeutic BSCL is the first-line approach is a safe and effective modality for treating TCAs & significantly shortens the time to resume normal activities. While BSCLs were applied for straightforward TCA & suitable continuation nursing for TCAs was strongly effective. We concluded that the results support the hypothesis that BSCLs used in the primary treatment of TCAs offer certain advantages over conventional PP. A BSCL permit the synchronous usage of eye drops, permit the ophthalmologist to watch the eye without taking off the dressing, permit the patient to have an applicable seeing in the influenced eye and displays safely superior fairness forever with the capability to wear sunglasses as wanted, a rapid & more convenient recovery time. Mild to large TCAs in even contact

lens wearers can be successfully managed with BSCLs, antibiotics, cycloplegics, & PF lubricant EDs.

#### References

1. Kanpolat A, Ucakhan OO: Therapeutic use of Focus Night & Day contact lenses. *Cornea* 2003;22:726–34.
2. Verma A. Senior Consultant, Department of Ophthalmology, Dr. Daljit Singh Eye Hospital, India.
3. Dua HS, Forrester JV. Clinical patterns of corneal epithelial wound healing. *Am J Ophthalmol.* 1987; 104: 481-489.
4. Wong TY, Lincoln A, Tielsch JM, Baker SP. The epidemiology of ocular injury in a major US automobile corporation. *Eye.* 1998 Sep;12 (5):870-4.
5. Lim CH, Turner A, Lim BX. Patching for corneal abrasion. *Cochrane Database of Systematic Reviews.* 2016(7).
6. Flynn CA, D'Amico F, Smith G. Should we patch corneal abrasions? A meta-analysis. *Journal of family practice.* 1998 Oct 1;47:264-70.
7. Arrington GE. A history of ophthalmology. MD Publishers, New York. 1959.
8. Weiner BM. Therapeutic bandage lenses. In: Silbert JA, ed. *Anterior Segment Complications of Contact Lens Wear.* Churchill Livingstone, New York. 1994; 455-471.
9. Acheson JF, Joseph J, Spalton DJ. Use of soft contact lenses in an eye casualty department for the primary treatment of traumatic corneal abrasions. *British journal of ophthalmology.* 1987 Apr 1;71(4):285-9.
10. Salz JJ, Reader AL, Schwartz LJ, Van La K. Treatment of corneal abrasions with soft contact lenses and topical diclofenac. *Journal of Refractive Surgery.* 1994 Nov 1;10(6):640-6.
11. Vandorselaer T, Youssfi H, Caspers-Valu LE, Dumont P, Vauthier L. Treatment of traumatic corneal abrasion with contact lens associated with topical nonsteroid anti-inflammatory agent (NSAID) and antibiotic: a safe, effective and comfortable solution. *Journal Francais d'Ophthalmologie.* 2001 Dec 1;24(10):1025-33.
12. Donnenfeld ED, Selkin BA, Perry HD, Moadel K, Selkin GT, Cohen AJ, Sperber LT. Controlled evaluation of a bandage contact lens and a topical nonsteroidal anti-inflammatory drug in treating traumatic corneal abrasions. *Ophthalmology.* 1995 Jun 1; 102(6):979-84.
13. Gilad E, Bahar I, Rotberg B, Weinberger D. Therapeutic contact lens as the primary treatment for traumatic corneal erosions. *IMAJ-RAMAT GAN.* 2004 Jan 1;6(1):28-9.
14. Christie CL. Therapeutic contact lenses. *Cont Lens Anterior Eye,* 1999; 22: S20–S25.
15. Morrison R, Shovlin JP. A review of the use of bandage lenses. *Metabolic, pediatric, and systemic ophthalmology.* 1982 Jan 1;6(2):117-21.
16. Shahid SM, Harrison N. Corneal abrasion: assessment and management. *InnovAiT.* 2013 Sep;6(9):551-4.
17. Lewis R. Patch Unnecessary for Corneal Abrasions, August 03, 2016 Chris HL Lim, Angus Turner, Blanche X Lim, Patching for corneal abrasion, First published: 26 July 2016, Editorial Group: Cochrane Eyes and Vision Group.
18. MD SA, MD AL. Management of corneal abrasions. *American family physician.* 2004 Jul 1;70(1):123-8.
19. Dua HS, Forrester JV. Clinical patterns of corneal epithelial wound healing. *American journal of ophthalmology.* 1987 Nov 1;104(5): 481-9.
20. Wong TY, Lincoln A, Tielsch JM, Baker SP. The epidemiology of ocular injury in a major US automobile corporation. *Eye.* 1998 Sep; 12 (5):870-4.
21. Arbour JD, Brunette I, Boisjoly HM, Shi ZH, Dumas J, Guertin MC. Should we patch corneal erosions?. *Archives of ophthalmology.* 1997 Mar 1;115(3):313-7.
22. Salz JJ, Reader AL, Schwartz LJ, Van La K. Treatment of corneal abrasions with soft contact lenses and topical diclofenac. *Journal of Refractive Surgery.* 1994 Nov 1;10(6):640-6.
23. Salz JJ, Reader AL, Schwartz LJ, Van La K. Treatment of corneal abrasions with soft contact lenses and topical diclofenac. *Journal of Refractive Surgery.* 1994 Nov 1;10(6):640-6.
24. Vandorselaer T, Youssfi H, Caspers-Valu LE, Dumont P, Vauthier L. Treatment of traumatic corneal abrasion with contact lens associated with topical nonsteroid anti-inflammatory agent (NSAID) and antibiotic: a safe, effective and comfortable solution. *Journal Francais d'Ophthalmologie.* 2001 Dec 1;24(10):1025-33.
25. Boberg-Ans G, Nissen KR. Comparison of Fucithalamic viscous eye drops and Chloramphenicol eye ointment as a single treatment in corneal abrasion. *Acta Ophthalmologica Scandinavica.* 1998 Feb 1;76 (1):108-11.