Original Article

Microbiological profile and antibiotic susceptibility of scleral buckle infections in North India

Ankita Shrivastav, Sumit Kumar, Shalini Singh, Manisha Agarwal, Neelam Sapra[1], Arpan Gandhi[1]

Purpose: The aim of this article to study causative organisms for scleral buckle (SB) infections in North India. **Methods:** A retrospective review of records was done for all patients who have undergone SB removal at our institute between January 2009 and December 2017. The records were analyzed for etiological agent of the infected buckle and its antibiotic sensitivity. **Results:** A total of 43 samples were analyzed and a positive culture was noted in 35 (81.40%) cases. The buckle infection rate at our institute was noted to be 2.53%. The commonest organism causing SB infections was *Staphylococcus* – 15 (42.6%) cases, followed by *Pseudomonas* – 6 (17.14%) cases and *Fungi* – 6 (17.14%) cases. The median interval between retinal detachment surgery and buckle explantation was 3 years. **Conclusion:** A large variety of organisms may cause SB infections. The commonest organism found to cause buckle infections in our study was *Staphylococcus* sp.

Key words: Buckle infection, microbiological profile, scleral buckle

Access this article online

Website: www.ijo.in

DOI: 10.4103/ijo.IJO_1094_18

Quick Response Code:

Scleral buckling is an established and effective surgical method for managing patients with retinal detachment (RD) since over 60 years.[1] As the scleral buckle (SB) is an external implant, it is prone to get infected and the infection may set in even years after the primary procedure. The commonest organisms reportedly causing a SB infection are gram-positive cocci (GPC);[2-4] however, in rare cases, a fungal infection may set especially in an immunocompromised host.[5,6] A number of patients need removal of the SB during the course of their follow-up period,[7-9] though the number has significantly reduced due to changing techniques of surgery and higher standards of postoperative care. The indications for removal of a buckle explant are manifold and warrant early intervention to prevent complications such as endophthalmitis and panophthalmitis.[7,10]

Various studies have reported the spectrum of microorganisms in endophthalmitis from the northern and southern parts of India,[11-16] and there exists a difference in the profile of organisms causing endophthalmitis in different parts of the country. We retrospectively analyzed patients who underwent SB removal and studied the microbiological profile and antibiotic susceptibility of these samples. Similar studies have been carried out in South India,[2,4,17] and we aim to understand the differences in the SB infection trends in the northern part of the country as there are no studies in the current literature which analyze the same.

Methods

This study complies with the Declaration of Helsinki and was approved by the institutional review board. A retrospective review was performed of all cases that underwent SB removal at our institute between January 2009 and December 2017. Treatment for all patients in our study group was surgical removal of SB and the patients were managed with oral (ciprofloxacin 500 mg twice a day) and topical antibiotics (moxifloxacin 0.5% eye drop one hourly). Modifications to treatment, if any, were made after the antibiotic sensitivity report was available. Data collected included demographic profile of the patient, date of primary SB surgery, complaints of patient at presentation, ocular examination findings which included visual acuity, slit lamp examination, fundus examination, and ultrasound in cases where fundus examination was not possible, date of buckle removal surgery, time between implantation and explantation of the buckle, microbiological culture on sheep blood agar, chocolate agar, thioglycollate medium, brain–heart infusion broth, and Sabouraud dextrose agar, and antibiotic susceptibility of the isolates determined by Kirby Bauer disk-diffusion method. Microsoft Excel 14.4.0 was used to calculate the proportions (percentages), mean, median, and standard deviation using standard formulae. Pearson correlation coefficient (r) was calculated using Statistical Package for Social Sciences version 21.0.

Results

Forty-three eyes of 43 patients were included in the study. There were 36 males (83.72%) and 7 females (16.28%). The median

Vitreoretina Services and [1]Microbiology Services, Dr. Shroff's Charity Eye Hospital, New Delhi, India

Correspondence to: Dr. Shalini Singh, Vitreoretina Services, Dr. Shroff's Charity Eye Hospital, New Delhi, India. E-mail: drshalini15@gmail.com

Manuscript received: 22.07.18; Revision accepted: 02.01.19

Cite this article as: Shrivastav A, Kumar S, Singh S, Agarwal M, Sapra N, Gandhi A. Microbiological profile and antibiotic susceptibility of scleral buckle infections in North India. Indian J Ophthalmol 2019;67:644-7.

age at which the patients had undergone scleral buckling was 45.5 years (6–76 years) and the mean age of presentation was 54 (9–79 years). The median interval between retinal surgery and buckle explantation was 3 years (range 3 months–14 years). A total of 554 scleral buckling procedures were done between January 2009 and December 2017 and patients included in the study had a median follow-up period of 2 years. The SB infection rate at our institute was 2.53% during the period of the study.

The explanted buckle material was solid silicon in 42 eyes and 1 eye had a sponge buckle. The most common presenting complaint of the patient was pain, followed by redness, discharge, watering of eyes, foreign body sensation, diminution of vision, and lid swelling [Table 1]. Two patients presented for a routine ocular examination and were found to have an exposed SB. Majority of the eyes (95%) presented with an exposed buckle. Conjunctival congestion was noted in 81% eyes, whereas purulent conjunctival discharge was seen in 51% eyes. Buckle suture exposure without buckle exposure was seen in two eyes [Table 2]. Eight eyes had a detached retina at presentation, of which four eyes had a polymicrobial infection and two eyes had a fungal infection. None of the patients presented with endophthalmitis. None of the patients developed RD post-buckle removal.

Of the 43 samples of explanted buckle, a microbiological growth was identified in 35 cases. Thus, in our series, we had a culture positivity rate of 81.40%. No correlation was noted between absence of a positive growth pattern and the age (r = 0.19), sex (r = −0.19), and interval between SB implant and removal (r = 0.23). The positive culture in 35 eyes identified 43 microbiological isolates. Polymicrobial infection was noted in seven eyes. GPC were identified in 17 culture-positive isolates (39.53%), gram-negative cocci (GNC) in 2 isolates (4.65%), gram-positive bacilli (GPB) in 7 isolates (16.28%), and gram-negative bacilli (GNB) in 8 isolates (18.60%). Fungal infection was noted in six cases (13.95%). The most common organisms found to infect SBs was *Staphylococcus* sp. (15 isolates, 42.6%), followed by *Pseudomonas* sp. (6 isolates, 17.14%) and *Bacillus* sp. (5 isolates, 14.29%) [Table 3].

GPC were found to be most sensitive to vancomycin (sensitivity of 94%), amikacin (88%), and moxifloxacin (88%). GNC were 100% sensitive to amikacin, cefazolin, chloramphenicol, ciprofloxacin, gatifloxacin, gentamycin, and moxifloxacin. Gram-positive bacilli showed 100% sensitivity to amikacin and gentamycin, whereas GNB had a maximum sensitivity to imipenem (71%). Acid-fast organisms were most susceptible to amikacin, ciprofloxacin, gatifloxacin, gentamycin, and moxifloxacin (67% each) [Table 4].

Table 1: Presenting complaints of patients

Pain	30 (69.77%)
Redness	22 (51.16%)
Discharge	20 (46.51%)
Watering	19 (44.19%)
Foreign body sensation	15 (34.88%)
Diminution of vision	9 (20.93%)
Lid swelling	2 (4.65%)
Routine examination	2 (4.65%)

Table 2: Clinical presentation of buckle infection in patients

Buckle exposure	41 (95.35%)
Conjunctival congestion	35 (81.40%)
Purulent discharge	22 (51.16%)
Buckle suture exposure	2 (4.65%)

Table 3: Microbiology profile of organisms identified as causative agents of buckle infection

Culture positivity rate	83.33%
Polymicrobial infections	7
GPC	17
Staphylococcus	15
Streptococcus	2
GNB	8
Pseudomonas	6
Proteus	1
Serratia	1
GPB	7
Bacillus	5
Corynebacterium	2
Fungi	6
Aspergillus	3
Curvularia	1
Gliocladium	1
Scopulariopsis	1
Acid fast organism	3
Atypical mycobacteria	2
Nocardia	1
GNC	2
Neisseria	2

Discussion

Extrusion of buckle explants or suture is one of the common complications of this surgery, with an incidence of 1.3–24.4%.[7,9,18]

Inadequate conjunctival closure can predispose to early buckle exposure.[19] Two eyes presented with buckle infection without any buckle or suture exposure. This could most likely result from a biofilm formation by microorganisms over the buckle.[20]

The most common presenting complaint was pain and redness similar to other studies.[21] Two patients had presented for a routine eye examination and were found to have an exposed buckle suture. One patient had a sponge buckle and present with an exposed buckle and redness 13 years after the primary surgery. The explanted buckle showed growth of *Corynebacterium* sp.

Our study had a culture positivity rate on 81.40% which is much higher than the 35% positivity reported by Wirostko *et al*.[22] but similar to other recent studies[4,17,21] which report a culture positivity of 80.95%, 83.3%, and 83.33% [Table 5].

The most common organism responsible for buckle infection in our series was *Staphylococcus* sp. (34.88%). Varying rates of

Table 4: Antibiotic susceptibility of microorganisms infecting scleral buckle

	A (%)	Ce (%)	Cf (%)	Ch (%)	Ci (%)	Ga (%)	Ge (%)	Im (%)	M (%)	P (%)	V (%)
GPC (*n*=17)	88	76	59	76	71	71	76	nd	88	nd	94
GNC (*n*=2)	100	100	50	100	100	100	100	nd	100	nd	50
GPB (*n*=7)	100	86	43	57	71	86	100	nd	86	nd	71
GNB (*n*=8)	38	0	38	38	38	57	14	71	38	57	0
AFO (*n*=3)	67	33	33	0	67	67	67	nd	67	nd	33
Fungus (*n*=6)	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

A=Amikacin, Ce=Cefazolin, Cf=Ceftazifime, Ch=Chloramphenicol, Ci=Ciprofloxacin, Ga=Gatifloxacin, Ge=Gentamycin, Im=Imipenem, M=Moxifloxacin, P=Piperacillin, V=Vancomycin, nd=Not done, AFO=Acid fast organism

Table 5: Comparison of microbiological isolates of our series with other published reports on scleral buckle infection

	Smiddy *et al.*[3]	Pathengay *et al.*[17]	Chhablani *et al.*[4]	Mohan *et al.*[21]	Kazi *et al.*[2]	Our series
Number of eyes	45	55	132	24	102	43
Polymicrobial infection	32.70%	21.20%	3.92%	5%	16.60%	20%
Most common isolate						
1	*Staphylococcus*	*Staphylococcus*	*Staphylococcus*	Acid fast organism	*Staphylococcus*	*Staphylococcus*
2	Acid fast organism	Acid fast organism	Acid fast organism	*Staphylococcus*	*Pseudomonas*	*Pseudomonas*
3	Proteus	*Corynebacterium*	*Corynebacterium*	*Corynebacterium*	*Corynebacterium*	*Bacillus*
Fungi	2.33%	15.1%	15.32%	19.05%	2.94%	13.95%
Culture positivity	73.30%	83.30%	80.95%	83.33%	83.30%	81.40%

incidence of *Staphylococcus* infection of buckle material have been found in different studies. Kazi *et al*.[2] have reported an incidence as high as 55.9%, whereas Pathengay *et al*.[17] had an incidence of 35.6%. A much lower staphylococcal infection was noted by Chhablani *et al*.[4] (20%) and Mohan *et al*.[21] (19%).

We had a high incidence of GNB, including *Pseudomonas* sp. and *Neisseria* sp., and they were found to be most sensitive to imipenem, piperacillin, and gatifloxacin. Our study showed a 13.95% incidence of *Pseudomonas* sp., which is the highest in the reported literature.[2,4,17,21]

The incidence of fungal infections noted in our series was 13.95%, which was similar to the incidence reported by other studies.[4,17,21]

We also observed a number of unique infections which are rarely known to cause buckle infection such as *Curvularia*,[5] *Gliocladium*,[6] and *Serratia*[23] species [Fig. 1].

The current study has significant limitations of any retrospective study. We did not analyze the size of buckle used, types of peritomies, and suturing of peritomies. Analysis of any ocular surgery after SB surgery and before infection was not done. The systemic condition of the patient has also not been recorded, which itself can predispose the patient to infections.

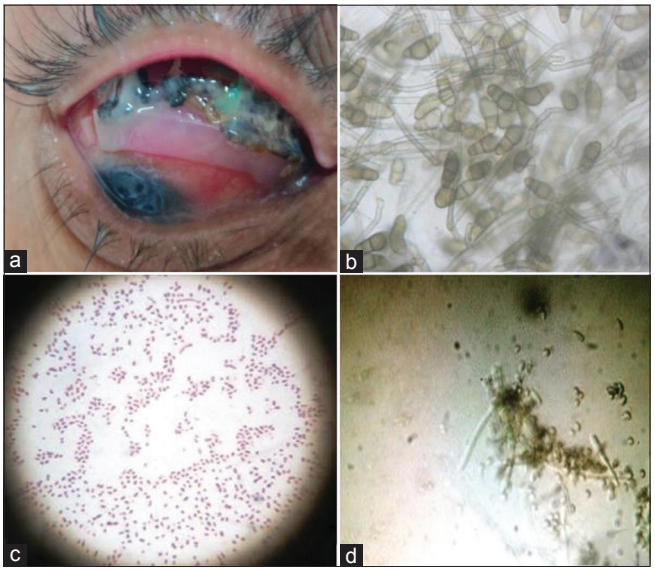

Figure 1: A 45-year-old male presented with redness, discharge, foreign body sensation, and an exposed infected buckle infected with black deposits (a), which on microbiological examination revealed *Curvularia* species (b); other unusual isolates seen in our series include *Serratia* species (c) and *Gliocladium* species (d)

Conclusion

SB infection is a potential complication of SB surgery and absence of suppuration does not exclude infection. Patients need to be continuously monitored for any symptoms and signs suggestive of infection. RD following buckle removal is uncommon and we did not notice any case of RD following buckle removal. Though *Staphylococcus* sp. has been identified as the commonest cause of buckle infection in various studies and a similar trend was seen in our series, our study reports a higher incidence of gram-negative organisms as opposed to other studies, which are mainly from South India. We also found a number of unreported organisms causing buckle

infection. Our results highlight the importance of being aware of the variety of organisms that may cause buckle infections.

Author's contribution

AS and SK collected the data and prepared the manuscript, SS and MA provided clinical care to the patient, and NS and AG analyzed the microbiology of specimens. All authors have read and approved of the final manuscript. Each author believes that the manuscript represents honest work.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Custodis E. Treatment of retinal detachment by circumscribed diathermal coagulation and by scleral depression in the area of tear caused by imbedding of a plastic implant. Klin Monbl Augenheilkd Augenarztl Fortbild 1955;129:476-95.
2. Kazi MS, Sharma VR, Kumar S, Bhende P. Indications and outcomes of scleral buckle removal in a tertiary eye care center in South India. Oman J Ophthalmol 2015;8:171-4.
3. Smiddy WE, Miller D, Flynn HW Jr. Scleral buckle removal following retinal reattachment surgery: Clinical and microbiologic aspects. Ophthalmic Surg 1993;24:440-5.
4. Chhablani J, Nayak S, Jindal A, Motukupally SR, Mathai A, Jalali S, *et al*. Scleral buckle infections: Microbiological spectrum and antimicrobial susceptibility. J Ophthalmic Inflam Infect 2013;3:67.
5. Singh S, Shrivastav A, Agarwal M, Gandhi A, Mayor R, Paul L. A rare case of scleral buckle infection with Curvularia species. BMC Ophthalmol 2018;18:35.
6. Venkatesh R, Gurav P, Agarwal M, Sapra N, Dave PA. Ocular infection with Gliocladium species—report of a case. J Ophthalmic Inflam Infect2017;7:9.
7. Tsui I. Scleral buckle removal: Indications and outcomes. Surv Ophthalmol 2012;57:253-63.
8. Hilton GF, Wallyn RH. The removal of scleral buckles. Arch Ophthalmol 1978;96:2061-3.
9. Deutsch J, Aggarwal RK, Eagling EM. Removal of scleral explant elements: A 10-year retrospective study. Eye (Lond) 1992;6:570-3.
10. Han DP, Covert DJ, Wirostko WJ, Hammersley JA, Lindgren KE. Scleral buckle removal in the vitrectomy era: A 20-year clinical experience. Retina 2013;33:387-91.
11. Das T, Hussain A, Naduvilath T, Sharma S, Jalali S, Majji AB. Case control analyses of acute endophthalmitis after cataract surgery in South India associated with technique, patient care, and socioeconomic status. J Ophthalmol 2012;2012:298459.
12. Anand AR, Therese KL, Madhavan HN. Spectrum of aetiological agents of postoperative endophthalmitis and antibiotic susceptibility of bacterial isolates. Indian J Ophthalmol 2000;48:123-8.
13. Jambulingam M, Parameswaran SK, Lysa S, Selvaraj M, Madhavan HN. A study on the incidence, microbiological analysis and investigations on the source of infection of postoperative infectious endophthalmitis in a tertiary care ophthalmic hospital: An 8-year study. Indian J Ophthalmol 2010;58:297-302.
14. Gupta A, Gupta V, Dogra MR, Pandav SS, Ray P, Chakraborty A. Spectrum and clinical profile of post cataract surgery endophthalmitis in North India. Indian J Ophthalmol 2003;51:139-45.
15. Lalitha P, Rajagopalan J, Prakash K, Ramasamy K, Prajna NV, Srinivasan M. Postcataract endophthalmitis in South India: Incidence and outcome. Ophthalmology 2005;112:1884-9.
16. Satpathy G, Nayak N, Wadhwani M, Venkwatesh P, Kumar A, Sharma Y, *et al*. Clinicomicrobiological profile of endophthalmitis: A 10 year experience in a Tertiary Care Center in North India. Indian J Pathol Microbiol 2017;60:214-20.
17. Pathengay A, Karosekar S, Raju B, Sharma S, Das T. Hyderabad Endophthalmitis research group. Microbiologic spectrum and susceptibility of isolates in scleral buckle infection in India. Am J Ophthalmol 2004;138:663-4.
18. Russo CE, Ruiz RS. Silicone sponge rejection. Early and late complications in retinal detachment surgery. Arch Ophthalmol 1971;85:647-50.
19. Moisseiev E, Fogel M, Fabian ID, Barak A, Moisseiev J, Alhalel A. Outcomes of scleral buckle removal: Experience from the last decade. Curr Eye Res 2017;42:766-70.
20. Holland SP, Pulido JS, Miller D, Ellis B, Alfonso E, Scott M, *et al*. Biofilm and scleral buckle-associated infections. A mechanism for persistence. Ophthalmology 1991;98:933-8.
21. Mohan N, Kar S, Padhi TR, Basu S, Sharma S, Das TP. Changing profile of organisms causing scleral buckle infections: A clinico-microbiological case series. Retina 2014;34:247-53.
22. Wirostko WJ, Covert DJ, Han DP, Connor TB, Kim JE, Hammersley J, *et al*. Microbiological spectrum of organisms isolated from explanted scleral buckles. Ophthalmic Surg Lasers Imaging 2009;40:201-2.
23. Venkatesh R, Agarwal M, Singh S, Mayor R, Bansal A. Scleral buckle infection by Serratia species. Oman J Ophthalmol 2017;10:36-37.