Intrusion of Silicone Band; How and When to Proceed?

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ABSTRACT

Objective: To describe the management strategy for scleral band intrusion, a complication of scleral buckling.

Material and Methods: A prospective study conducted at the X Hospital, between 2012 and 2018, included 13 patients (11 males, 2 females) with a mean age of ± 20 years. All patients, young individuals with myopia, underwent scleral buckling for rhegmatogenous retinal detachment and developed band intrusion. A detailed history and examination were performed. Band intrusion-related complications, such as redetachment, indicated the need for surgical intervention.

Results: The duration between scleral buckling and band intrusion ranged from ± 6 years. All buckles were placed in the intrascleral postition. Among the 13 patients, 6 had band intrusion with shallow retinal detachment. Of these, 3 patients underwent external band removal and laser treatment before and after surgery; 1 patient had retinal redetachment with a giant retinal tear (GRT) and underwent pars plana vitrectomy with internal band removal; 2 patients received laser treatment only. The remaining 7 patients were observed. The retina was flat in all patients, and visual acuity remained stable.

Conclusion: Scleral buckle intrusion, though rare, can cause serious complications like redetachment, vitreous hemorrhage, uveitis, and endophthalmitis. Surgical intervention may salvage the eye but may not improve functional status. Intervene only if the eye's integrity is at risk; otherwise, the intruding buckle may be left alone. Meticulous scleral buckling and lifelong follow-up are essential to avoid buckle-related complications.

Keywords: scleral buckling, band intrusion, redetachment, pars plana vitrectomy.

INTRODUCTION

Scleral buckling is a surgical technique often used to manage rhegmatogenous retinal detachment. It is a safe and effective procedure with a few complications such as restrictive eye movements, anterior segment ischemia, globe perforation, band erosion, band extrusion, band intrusion, and anterior migration of band[1,2].

Through reducing the band circumference around the eye, we induce buckling or indentation of the eye wall, this is similar to the tightening of a belt. This leads to a reduction in the diameter of the globe under the band, which facilitates the contact of the retinal pigment epithelium (RPE) with the neurosensory retina. It also promotes the closure of retinal breaks and alleviates vitreoretinal traction. Once the

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retinal break is sealed, barrage 360-degree laser and laser around the retinal break is applied post-operatively.

Intrusion of the encircling band occurs due to implanted episcleral materials, including but not limited to non-absorbable sutures. The incidence of band intrusion has decreased over the years, through improved surgical technique however this complication may still occur in old cases operated successfully some years ago. The incidence of band intrusion is between 3.8–18.6%[3,4]. In most cases, this complication has been observed with scleral buckling[5].

A band intrusion is often seen in cases of staphyloma, especially when the band is excessively tight and when scleral diathermy has been previously conducted. The initial signs include pain due to indentation by a sharp-edged scleral buckle in cases of a thin sclera which also becomes easily visible upon examination. Intrusion may cause low intraocular pressure (hypotony), vitreous hemorrhage, retinal detachment, and endophthalmitis. In certain cases, band intrusion may be asymptomatic. One method of stopping intrusion of the band is by cutting the band without removing it, the scleral indentation will remain intact due to a layer of episcleral scarring that develops around the band. Another method of limiting the incidence of band intrusion is by restricting the indentation to 2mm and avoiding scleral diathermy.

The decision of surgical intervention for band intrusion depends on the associated complications such as raised intraocular pressure (IOP), restrictive eye movements, uveitis, endophthalmitis, vitreous hemorrhage, cystoid macular edema, and for cosmetic purposes[6].

In the management of band intrusion, we can leave the intruding buckle. The band can be removed after identifying the location where the ends are tied. The precise location must be accurately identified through dissection, and it should be cut and removed without attempting to slide it out. Pars plana vitrectomy (PPV) can be done for intrusion-related complications[5]. We can cover the scleral defect with cyanoacrylate glue or scleral patching[4,5].

The low incidence of intrusion of bands is primarily due to the softness of the implants and their long radius. The indentation is due to the effect they have in inducing inverse curvature in the globe. Contrary to polyethylene implants described by Schepens[7], it is rarely observed that silicone implants develop hardness even several years after being buried in the tissue.

Thus patients, undergone buckling are at risk of developing the complication of band intrusion throughout their lives, hence a lifelong follow-up is necessary for them.

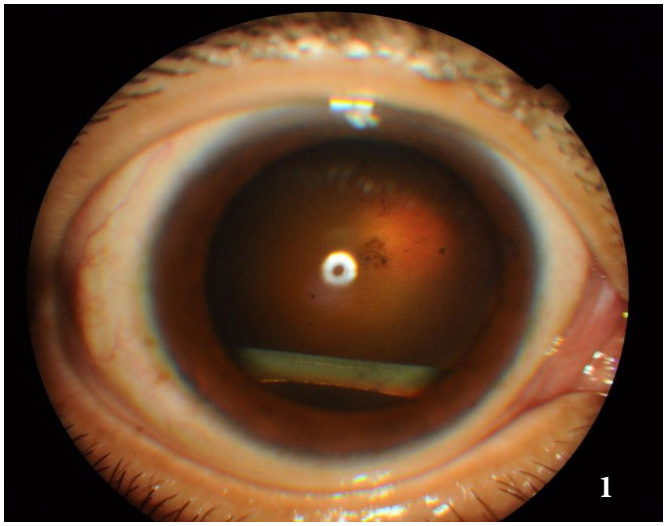
MATERIALS AND METHODS

After ethical approval from the hospital ethical committee board, a prospective study was carried out at the Department of Ophthalmology, X, from 2012 to 2018. A total of 13 patients, 11 males and 02 females, with a mean age ± 20 years were included in this study. All the patients were young myopes and underwent scleral-buckling treatment for RRD (rhegmatogenous retinal detachment) and developed a band-related complication; band intrusion. A detailed history and examination were done. All patients were examined and treated by a single retinal surgeon. Band intrusion-related complications such as redetachment was an indication for surgical intervention. Patients were followed after every 03 months for 03 years.

In all the cases Silicone bands type 40 (2mm) and type 41 (3.5mm) were used.

RESULTS

The duration from the scleral buckle placement and the occurrence of intrusion ranged from± 6 years. All the buckles were intrascleral in location. Out of 13 patients, 6 patients had band intrusion with shallow retinal detachment, in 3 patients the band was removed externally and treated with barrage laser before and after surgery, 1 patient got retinal redetachment with giant retinal tear (GRT) and underwent pars plana vitrectomy with band removal internally. 2 patients were treated with barrage laser treatment only. At the same time, the other 7 patients were put under observation. The retina was flat in all patients and the visual acuity remained consistantduring the entire follow-up period. Some case examples can be seen through figures 1-8.



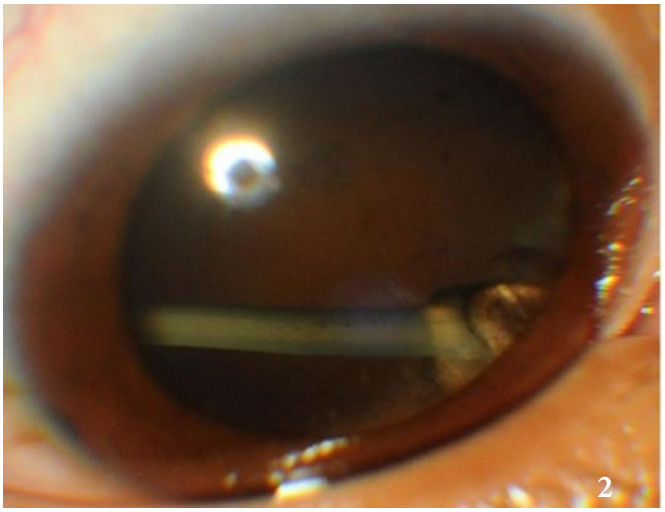


Fig 1 and 2: *Shows Scleral band intrusion inferiorly.*

Fig 3 and 4: *Shows Giant Retinal Tear with intrusion of scleral buckle per-operatively.*

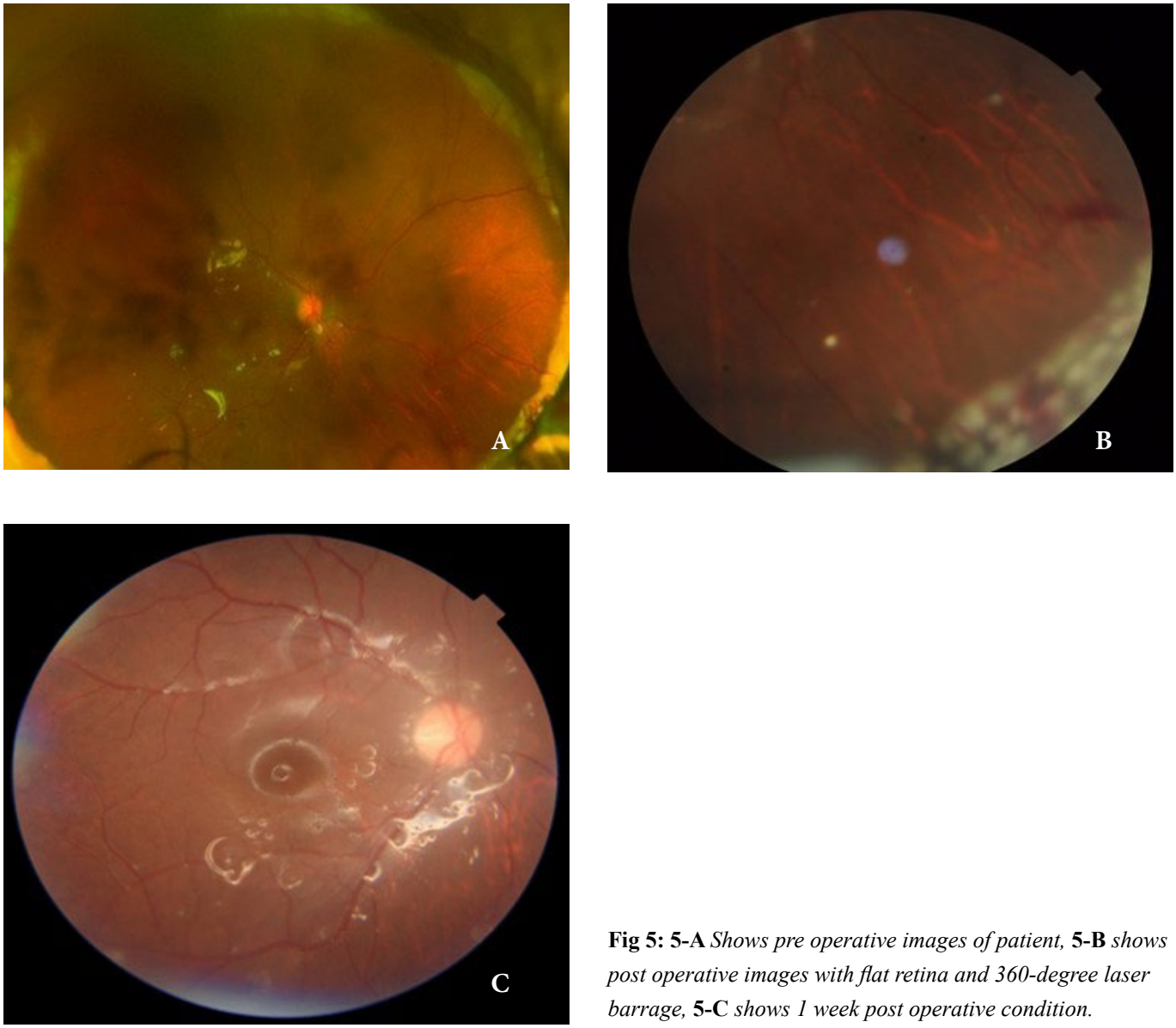


Fig 5: 5-A *Shows pre operative images of patient,* **5-B** *shows post operative images with flat retina and 360-degree laser barrage,* **5-C** *shows 1 week post operative condition.*

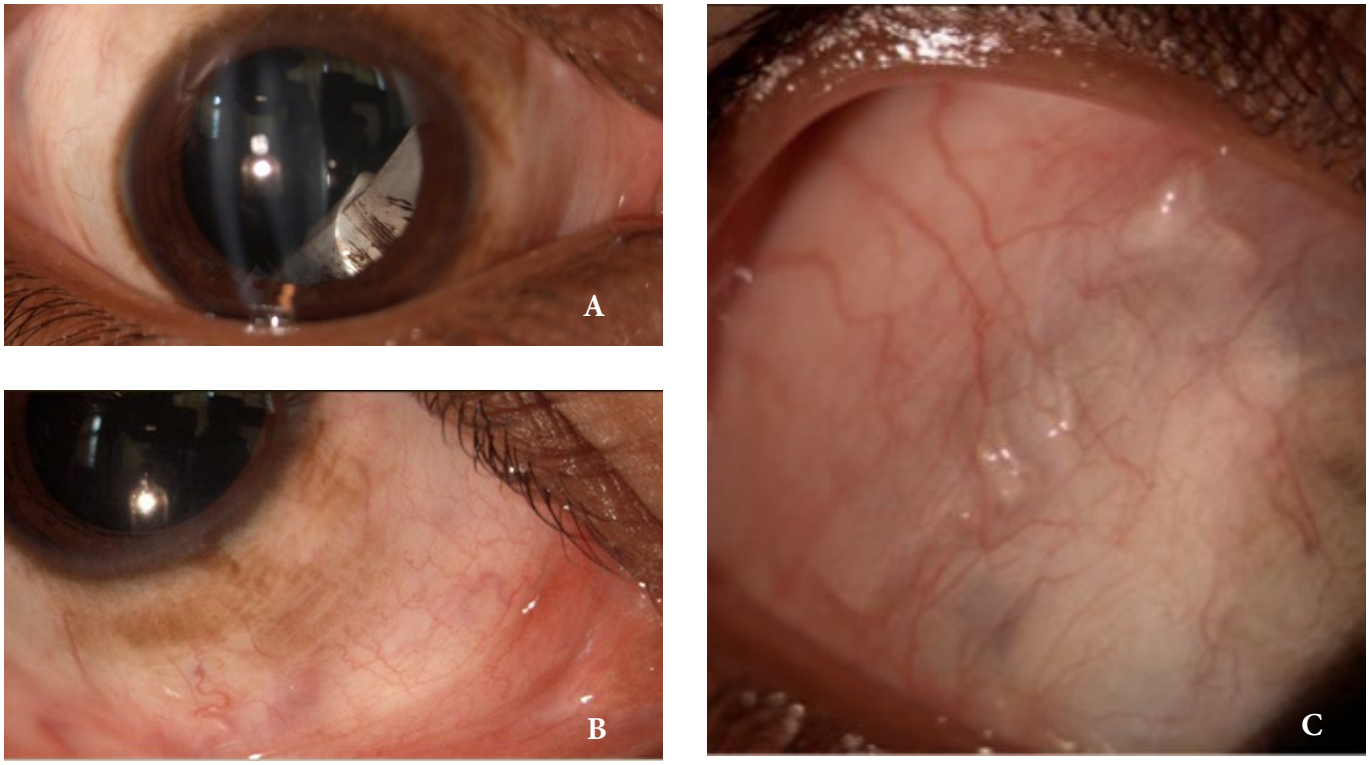


Fig 6: A, B, C *Patient with silicone band intrusion inferiorly.*

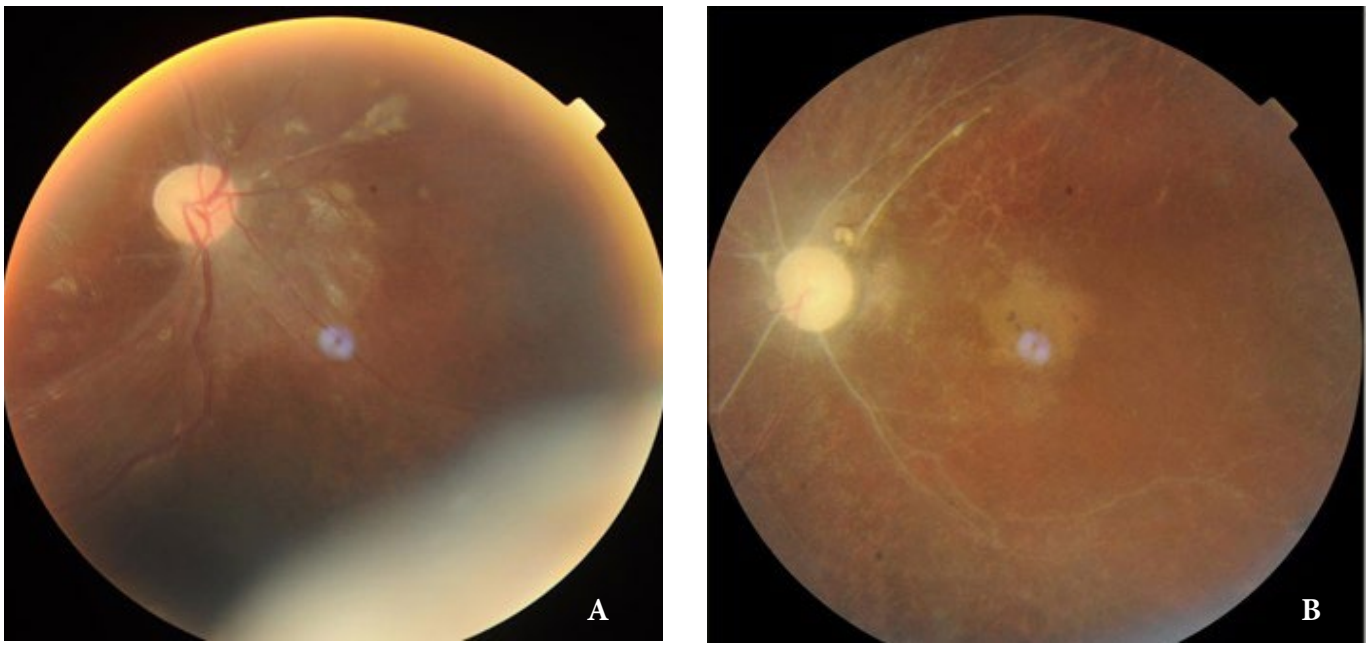


Fig 7: 7-A *Right eye fundas showing Intrusion of silicone band infra nasally and* **7-B** *Left eye showing pale optic disc with sclerosed vessels.*

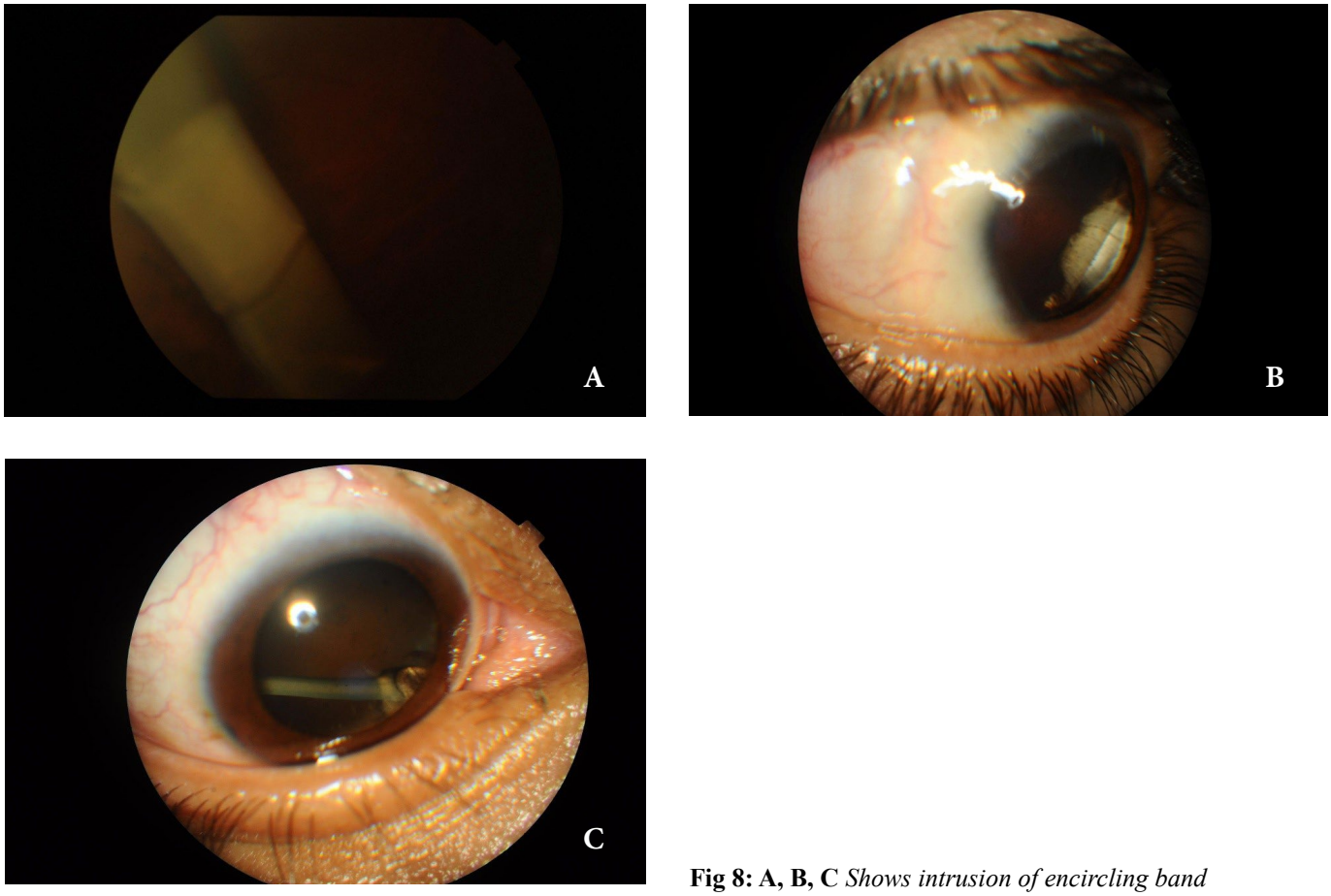


Fig 8: A, B, C *Shows intrusion of encircling band*

DISCUSSION

Scleral buckling was a mainstay of the management of rhegmatogenous retinal detachment but due to the recent advances in the pars plana vitrectomy, a 69% decline in the buckling procedure has been observed from 1997 to 2007[8] which is decreasing further; in 2014 only 5% of patients underwent scleral buckling[9].

In the early decades scleral buckle surgery related complications including band erosion or the intrusion of the buckle elements directly into the eye were very frequent. More commonly the complication was observed when polyethylene tubes were used, furthermore it was seen with the use of Arruga sutures, and intrascleral silicone implants. Now however all these materials can be considered obsolete. The frequency of buckle intrusion has significantly reduced with the advent of the usage of episcleral silicone sponges and rubber elements.

The differences in scleral thickness as well as the changes in surgical steps of scleral buckling procedures (such as cryopexy, diathermy, drainage of subretinal fluid and degree of tightening of the encircling elements) also prove to be a factor determining band related complications. Buckle intrusion occurs in 3.8–18.6% [3,4] of cases. According to another report[10], intrusion was noted in 04 cases out of 4400 patients. Intrusion was more likely if intrascleral implants are used. In our study, all the bands were intrascleral.

Complications caused by band intrusion include retinal detachment and hypotony. Other complications also include vitreous hemorrhage and endophthalmitis. Management is planned accordingly to the complications associated with band intrusion.

Schepens has mentioned that scleral buckle erosion can occur in two stages. In the first stage, sutures hold the implant firmly against the sclera within the scleral flaps as well as the encircling element. There are higher chances of erosion occurring if the implant is placed over a thinned sclera or if it is placed over a dissected scleral bed.

The second stage of erosion occurs shortly after the growth of scar tissue upon the outer surface of the implant thus

integrating it within the eye wall. The same complication of erosion has also been observed in cases where silicone sponge and silicone rubber have been placed on the episclera. The factors that result in erosion include thinning of the sclera, possibly secondarily due to underlying pathology or due to a weakening by intensive treatment. Other causes include Cryosurgery[11], diathermy, or photocoagulation as well as excessive tightening of the encircling band; and co-existing glaucoma, which contributes to the crushing forces in the eroding area.

We reported 13 cases of intrusion of silicone buckling elements. All the patients were young myopes and underwent encircling buckle for rhegmatogenous retinal detachment. The interval between the primary surgery and band intrusion was ± 6 years. Similar to our results, a case series of 22 patients presented after 07 years of scleral buckling[12]. Scleral band intrusion was reported 19 years after the primary buckling surgery[13]. Another study reported intrusion as early as 03 months after the surgery[14].

Hydrogel buckle intrusion was reported; in 05 cases with loss of vision by kokame[15]. They concluded that none of the patients regained their vision, regardless of whether they received intervention or not. Ünlü[14] managed the band intrusion by just cutting the band and leaving it in place without removing it. In our study, recurrent shallow retinal detachment was an indication for surgical intervention in 06 cases. in 03 patients, the band was removed externally and treated with barrage laser before and after surgery, 01 patient got retinal redetachment with giant retinal tear (GRT) and underwent pars plana vitrectomy with band removal internally. 02 patients were treated with barrage laser treatment only. While the other 07 patients were put under observation. In all the patients, the retina was flat and the visual acuity remained stable during the entire follow-up period.

The ideal technique to manage scleral buckle intrusion needs to be modified in each case. Close monitoring is required to assess the severity and extent, of intrusion. The patient's symptoms should be closely monitored.

CONCLUSION

Though a rare complication, scleral buckle intrusion may lead to serious consequences such as redetachment, vitreous hemorrhage, uveitis, endophthalmitis. Surgical intervention has a role in the salvage of the eye but may not necessarily alter the functional status of the eye. Therefore, intervene only if there is a threat to the integrity of the eye structure, otherwise the intruding buckle may be left alone. Scleral buckling should be done meticulously to avoid buckle related complications and patients should be followed for life long.

Conflict of interest:

The author(s) have no conflict of interest to declare.

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