Surgical Technique

Autologous blood-assisted scleral fixation of intraocular lens

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In this technique, the lamellar scleral tunnel is fashioned to cover IOL haptics and autologous blood is used to close the conjunctiva, which alleviates the need for fibrin glue. The cornea is marked at four and 10'O clock meridian, and 2 mm incision is made on the conjunctiva. A lamellar scleral tunnel is fashioned 2 mm superior on one side and 2 mm inferior on the other side of this mark. The IOL is inserted into the anterior chamber and the haptics are exteriorized using bent 26-gauge hypodermic needle, flanged, and buried in the tunnel. A visible conjunctival blood vessel is punctured, allowing the blood to pool underneath the conjunctiva. The conjunctiva is approximated with the help of blood coagulum and allowed to remain dry for 3 min. Lamellar scleral tunnels give adequate cover to haptics, and autologous blood can be used to glue the conjunctival flaps instead of fibrin glue.

Key words: Aphakia, fibrin glue, flanged IOL, glued IOL, scleral fixation

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Website: www.ijo.in

DOI: 10.4103/ijo.IJO_129_20

Quick Response Code:

Scleral fixation of IOL (SFIOL) has always fascinated surgeons, and the methods of SFIOL fixation have undergone several modifications and innovations over recent years. Although sutured SFIOLs are commonly performed, suture-related complications like suture disintegration, knot exposure, and IOL tilt are not unusual.[1] In the recent past, the three-piece IOL has gained popularity as a glued IOL which utilizes fibrin glue to oppose the scleral flaps with conjunctiva.[2] Though the suture-related complications are not encountered in glued IOL (GIOL), the use of fibrin glue adds on to the cost of the procedure as well as increases rare chances of transmission of viral infections. Besides, the proper storage, reconstitution, and availability of the glue are also limiting factors.

In the original Yamane's technique, the haptic of three-piece IOL is exteriorized using transconjunctival needle.[3] This technique does not require fibrin glue, but it is still difficult to assess the exact entry point of the transconjunctival needle, which ultimately affects the centration of IOL. Conjunctival ballooning and difficulty in haptic exteriorization are other issues faced while performing the procedure. The modifications described in this technique address two critical issues faced with current methods of SF IOL fixation. First, a small incision on the conjunctiva and the construction of a partial-thickness scleral tunnel not only gives adequate cover to the flanged end of the haptic but also accurate markings for IOL exteriorization on the sclera, results in the adequate intrascleral length of haptic and a well-centered IOL with minimal tilt. Second, this technique alleviates the need for fibrin glue and replaces it with a few drops of autologous blood.

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The institutional ethical approval was obtained for the surgical modification. In this modified technique, after surgical draping, the horizontal meridian of the cornea was marked at four and 10'O clock with a toric marker [Video 1]. A 2 mm incision was given on the conjunctiva, and the two points were marked on sclera 2 mm from limbus on this meridian. 2 mm lamellar scleral tunnel was made at 3'O and 9'O clock 2 mm superior and 2 mm inferior from this mark [Fig. 1a asterisk]. The anterior chamber maintainer was used, and other retinal procedure if required, was done. The IOL (Alcon MA60 AC) was placed into the anterior chamber after making a clear corneal entry. The leading haptic of IOL was placed on the inferior iris, and trailing haptic was kept outside the corneal entry.

A bent 26 G needle was passed into the globe 2 mm behind the limbus through this lamellar scleral tunnel. The leading haptic of IOL was tucked into the needle with an intraocular forceps (Alcon Maxigrip) passed through a side port entry and needle was exteriorized. The leading haptic was disengaged from the needle lumen with a smooth forceps. The end

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Received: 19-Jan-2020 Revision: 03-Apr-2020
Accepted: 24-Apr-2020 Published: 26-Oct-2020

Cite this article as: Oli A, Balakrishnan D. Autologous blood-assisted scleral fixation of intraocular lens. Indian J Ophthalmol 2020;68:2479-81.

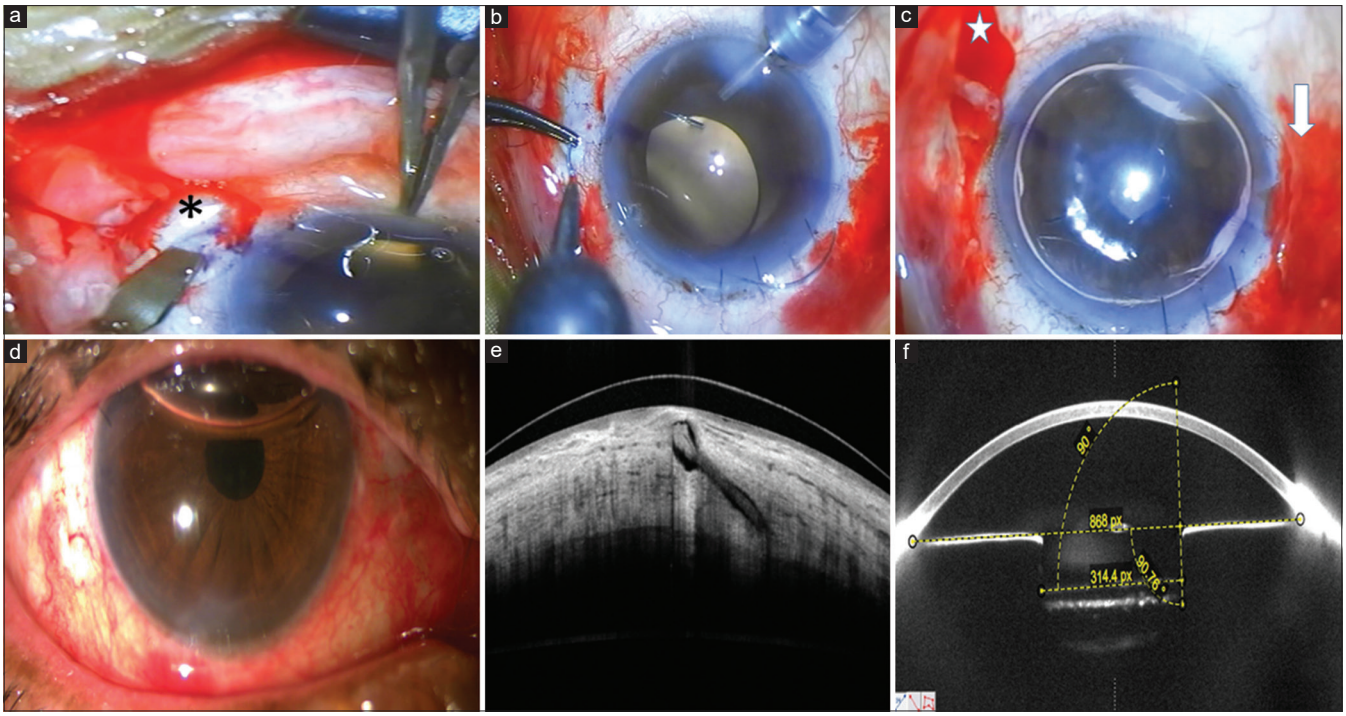

Figure 1: (a) Lamellar scleral tunnel (asterisk) (b) The haptic is exteriorized and flanged (c) Conjunctiva glued with blood (Arrow) and blood is allowed to pool on sclera (star) (d) Postoperative day one slit-lamp image shows a well-centered IOL (e) Anterior segment optical coherence tomography shows haptic with flanged bulbous end well covered by sclera and conjunctiva. (f) At 6-month follow-up, the scheimpflug image shows a well-centered IOL

of the haptic was heated with a heat ball cautery and was flanged [Fig. 1b]. The trailing haptic was also exteriorized in a similar manner using bent 26 G needle, and the end was flanged with heat cautery. The flanged haptic was gently pushed into lamellar scleral tunnels.

The surgical field was dried with a cotton bud. A visible conjunctival blood vessel was punctured with 26 G needle, and the drop of blood was allowed to pool over the bare sclera and conjunctival flap [Fig. 1c]. The conjunctiva was approximated with a smooth forceps and allowed to be glued. The field was kept dry for 3–4 min, and the eye was patched with a drop of betadine.

Postoperative day one slit lamp image showed a well-centered IOL [Fig. 1d]. The conjunctiva was well opposed. Anterior segment optical coherence tomography showed haptic with flanged bulbous ends well covered by sclera and conjunctiva [Fig. 1e]. At 6-month follow-up, the scheimpflug image shows a well-centered IOL without tilt [Fig. 1f].

Results

In the current series of 6 patients with a mean follow up of 7.48 months, the mean best-corrected visual acuity improved from logMAR 0.74 (.61) to 0.33 (0.26) with the reduction in spectacle power ($P < 0.05$). No unusual complications like conjunctival retraction, dellen, AC inflammation, glaucoma, retinal detachment and cystoid macular edema were noted in any of the cases.

The IOL was stable and well centered on clinical examination and analysis of slit-lamp images. At the final follow-up, scheimpflug images were analyzed for IOL tilt, which was calculated as angle between IOL plane and Iris plane. The mean tilt was 2.29° (range: 0.76°–3.76°). Scleral cover over the flanged haptic was found to be adequate on anterior segment OCT images. No cases of haptic exposure or nonhealing of scleral tunnel were noted.

Discussion

In this technique, the fibrin glue was replaced with a few drops of the patient's blood, taken from conjunctival blood vessels (which is a natural autologous source of fibrin) and utilized to glue the conjunctiva over the lamellar scleral tunnel. Proper surgical markings on the sclera ensured a well- centered IOL with adequately covered haptics. Further, it reduces chances of conjunctival or scleral erosion and haptic exposure. This technique holds the promising attributes of being a genuinely sutureless and glueless procedure, scoring over the traditional glued IOL using fibrin glue in terms of safety and cost. Besides, the lamellar scleral tunnel helps in avoiding flap-related complications like intraoperative avulsion of flaps or delayed nonhealing. The use of intraocular forceps in glued IOL may lead to deformation of haptics, which may have sharp edges and can erode the conjunctiva or sclera.[4] On the contrary, with the use of a needle in this technique, the smooth contour of haptics is well maintained, as the haptics are tucked into the needle lumen and exteriorized. The entry track of the needle is oblique and additionally covered by lamellar scleral tunnel, which closes automatically with build-up of IOP reducing postoperative hypotony, as noted in traditional glued IOL.[5,6] The technique is promising, considering the universal availability and safety of autologous blood.

Moreover, although the exact incidence of undetected viral diseases transmitted through fibrin glue is not known, the product description always carries a warning for the same. The patient is likely to be more at ease in using his own blood product for therapeutic purpose. As opposed to fibrin glue, the sterility of blood from conjunctival blood vessels within the sterile surgical field would be superior. The use of same fibrin glue over multiple sessions in different patients due to practical economic or logistic reasons in the real-world situation may jeopardize the sterility and can lead to endophthalmitis.

The distinct advantage of this technique over the trans-conjunctival Yamane technique is creating a lamellar scleral tunnel under direct visualization so that the adequate intrascleral length of haptic is ensured, to avoid inadvertent slippage of haptic during manipulation. In addition, scleral cover reduces the chances of haptic exposure as the flanged haptic is formally buried under direct visualization into the scleral tunnels. The intraoperative difficulties like conjunctival ballooning and exact entry and exit points of haptic are well defined, reducing the degree of IOL tilt. Similarly, it is important to understand that the IOL stability in this technique does not depend on the use of autologous blood, but the flanged haptic of IOL under the scleral tunnel provides the IOL stability. The conjunctiva also remains attached from one end and the autologous blood is used to glue just the other end; hence, the biodegradation of blood possibly will not affect the IOL stability.

However, none of the patients in this study were on antiplatelets or anticoagulants. The procedure may be complicated in such patients, as the clotting of blood would be altered. We recommend well-structured prospective randomized controlled studies in comparative models to assess the efficacy and long-term IOL stability.

Conclusion

The described technique of using autologous blood may find broader applicability as it does not require any specialized IOL or fibrin glue, which is pertinent in underprivileged areas where the cost of health care is a concern.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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