

Intraocular lens-sling technique: A safe approach for lens implantation in complicated cataract surgery and secondary intraocular lens implantation

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Among 20 million cataract surgeries being performed worldwide every year, approximately 5% are being complicated by posterior capsule rent or zonular dialysis. Intraocular lens (IOL) implantation in such cases with intraoperative complications is quite challenging. Our next course of action is to place the IOL in the ciliary sulcus, however, there is a risk of IOL drop into the vitreous in cases of inadequate support. We have described a novel idea of using a suture material through the dialling hole of a three-piece rigid IOL which can be used as a leash to reduce the risk of IOL drop during implantation in such cases. This technique could also be used during sutureless scleral fixated IOL and retro-pupillary iris claw lens implantation. We found that in 90 consecutive patients where this technique was used, there was no incidence of IOL drop or retinal detachment.

Key words: Complicated cataract surgery, iris claw lens, secondary IOL, sutureless scleral fixated IOL

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Cataract is the most common cause of blindness in the world.^[1] There are approximately 20 million cataract surgeries done worldwide every year. The rate of posterior capsular rent (PCR) in cataract surgery varies from 0.49% to 4.60% and zonular dialysis (ZD) ranges from 0.09% to 0.26% depending on the type of cataract surgery and surgeon experience.^[2-5] Intraocular lens (IOL) implantation in cases with intraoperative PCR or ZD is challenging. Though the sulcus placement of IOL is a viable option, there is a risk of IOL drop into the vitreous in cases of inadequate support. This fear can also lead to avoiding a necessary attempt for primary IOL implantation.

The rate of aphakia in cataract surgery ranges from 0.01% to 0.23% based on surgeon experience.^[5] The recent developments in sutureless scleral fixated intraocular lens (SFIOL)^[6-8] and retro-pupillary iris claw lens implantation techniques^[9,10] have made the rehabilitation of these aphakia cases more efficient. The step of trailing haptic exteriorization in sutureless SFIOL and enclavation in iris claw lens implantation is challenging and demands expertise. It carries the risk of haptic slippage into vitreous; and subsequent use of undue force to retrieve the haptic back may lead to IOL drop into vitreous or retinal detachment.

Hence, there is a need for a technique which can make IOL implantation safer in cases like intra operative PCR, ZD, sutureless SFIOL, and retro-pupillary iris claw lens implantation. Here we describe a simple yet effective technique which helps to prevent IOL drop in such challenging scenarios.

Surgical Technique

Sulcus placement of IOL in complicated cataract surgery

IOL-Sling technique can be employed in manual small incision cataract surgery (MSICS) with intraoperative PCR/ZD [Fig. 1a]. A thorough anterior vitrectomy and residual cortex aspiration is done. A 9-0/10-0 nylon suture (6491N, 6401N Aurolab, Aurolab, India) is cut to get a length of 5–10 cm to use as an IOL-Sling. A rigid three-piece PMMA IOL (B3602 Aurolab, India) is held with either a lens holding or McPherson's forceps and the nylon suture (IOL-Sling) is threaded through the dialling hole of the IOL [Fig. 1b] under microscope as it provides the necessary magnification. The two ends of the suture can also be tied so that the sling does not come out. Viscoelastics is injected between the iris and the capsular remnant to create a space and the IOL is introduced through sclerocorneal tunnel. The leading

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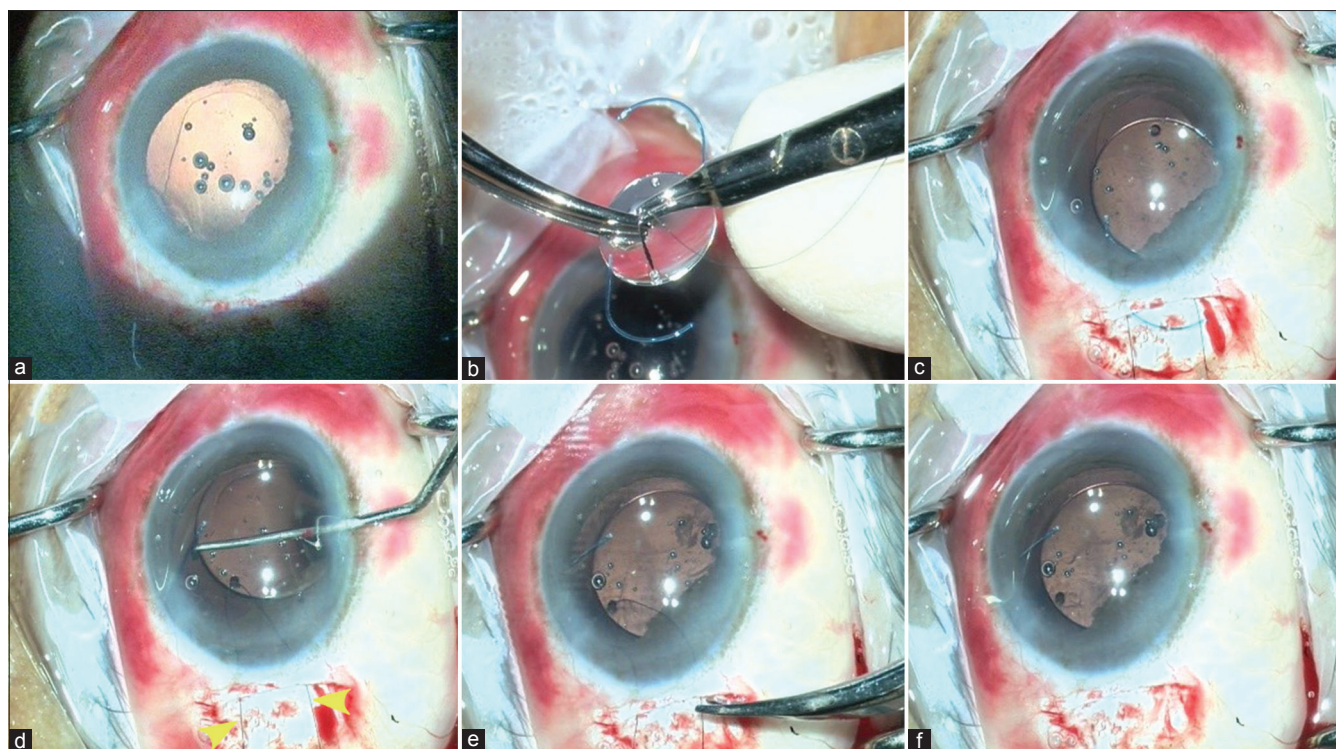


Figure 1: Sulcus placement of IOL in complicated cataract surgery. (a) Intraoperative central large posterior capsular rent. (b) 9-0 Nylon Suture (IOL-Sling) is threaded through the dialling hole. (c) Leading haptic of the IOL is placed in the sulcus. (d) Trailing haptic is dialled in the sulcus. Note that the suture ends are outside the sclerocorneal tunnel (two yellow arrow heads). (e) One arm of the sling is cut with scissors. (f) Stable IOL in the sulcus

haptic of the IOL is placed in the sulcus followed by the trailing haptic [Fig. 1c and d]. During all these steps, the ends of the sling are outside the anterior chamber.

After placing the IOL in sulcus, its stability is confirmed. If the IOL is unstable or starts slipping into the vitreous, holding the suture will prevent the catastrophe of an IOL drop and then the IOL can be explanted out by using two instruments (sinskey hook and cyclodialysis spatula). If it is stable, the sling can be removed. Care should be taken during removing the IOL-Sling at the end. One arm of the sling which lies outside the sclerocorneal tunnel is cut with scissors [Fig. 1e and f] and the uncut suture is pulled out gently and slowly with a non-toothed forceps keeping an eye on the movements of IOL. Mild movement of IOL can be noted but we have not noticed any IOL decentration immediately after suture removal. The diameter of 9/10-0 nylon suture is around 0.02–0.03 mm which easily passes through the dialling hole of the PMMA IOL, the diameter of which is more than 10 times the suture's diameter, measuring around 0.3–0.4 mm. However, as a precaution, sudden and forceful pull of the suture should be avoided as jerky movements of the IOL can lead to IOL decentration.

Applying an additional suture does not provide much of a challenge to the surgeon who is managing a complication. However, the only difficulty is that if the suture is too long, the suture will get entangled and interfere with the surgery during tissue holding. A too short suture will restrict the manipulations of IOL or may pass into the anterior segment of the eye along with the IOL which might be difficult to cut and remove. We found that a suture length of 5–10 cm was ideal.

Sutureless SFIOL

"IOL-Sling technique" is also helpful while performing sutureless SFIOL surgery with a three-piece rigid PMMA IOL (B3602 Aurolab, India) through sclerocorneal tunnel. A superior or temporal sclerocorneal tunnel is fashioned. All the other steps for sutureless SFIOL are performed as described by Gabor *et al.*^[6] Before implanting the IOL, a 9-0/10-0 nylon suture is passed through the dialling hole of the IOL as per the technique mentioned above [Fig. 2a]. The subsequent steps are as per Gabor's technique [Fig. 2b]. After ensuring the centration and the stability of IOL, the IOL-Sling is cut and pulled out of the anterior chamber [Fig. 2c and d].

Retro-pupillary iris claw intraocular lens

Similarly, this technique can be done while implanting retro-pupillary iris claw lens.^[9,10] All the steps are the same as described except that a 9-0/10-0 nylon suture is passed through the trailing haptic [Fig. 3a] of the iris claw IOL (optima iris claw intraocular lens—MIC 5580) as per the technique mentioned above. After confirming that both the haptics are enclaved properly, the IOL-Sling is removed [Fig. 3b and c]. Video 1 shows a compilation of IOL-Sling technique being used in sulcus placement of a 3 piece IOL, sutureless SFIOL and retro-pupillary iris claw lens implantation.

Results

We retrospectively reviewed the data of 90 patients operated between January 2015 and September 2017 where this technique was employed. The PCR and ZD had occurred in MSICS performed by trainees and the author (MN) and all were

managed by the author (MN) using the IOL sling technique with sulcus placement of a three-piece IOL ($n = 27$), sutureless SFIOL ($n = 54$), or an iris claw lens ($n = 9$). All patients were followed up for at least 3 months. Out of 24 PCR cases where sulcus placement of a three-piece IOL was attempted, 5 patients were left aphakic due to IOL tilting after implantation. All these patients underwent sutureless SFIOL surgery 3 months after cataract surgery. Out of 54 SFIOL surgeries, trailing haptic slippage was noted in 10 cases. None had IOL drop, retinal break/detachment, or required second surgery for IOL reballing or explantation due to the beneficial role of the IOL-Sling. All had a stable, centred IOL at 3 months after IOL implantation.

Discussion

In developing countries, there is a huge backlog of cataract surgeries. The rate of IOL drop in cataract surgery is 0.01%.^[2] The added burden of aphakia and vitreo-retinal surgery for IOL drop worsens the scenario in these resource limited settings. Primary placement of IOL and prevention of IOL drop is the

best way to deal with this catastrophic complication. Haripriya *et al.*^[2] reported higher risk of complications in trainee surgeons. This emphasizes the relevance of this technique especially to novice surgeons in the initial stages of their surgical career. Moreover, there is always a challenge during primary IOL implantation in cases with large PCR, minimal capsular support, or difficult to access capsular support due to small pupil. Our technique addresses this concern and adds a margin of safety to IOL implantation. In our study, none of them had IOL drop.

In our experience, the step involving the exteriorization of trailing haptic in sutureless SFIOL is challenging, and the slippage of haptic leading to IOL tilt is also not infrequent. We encountered 10 such cases and 7 of them (70%) occurred during the first 30 surgeries. This reflects the high frequency of haptic slippage during the learning phase. Here, the IOL-Sling has two advantages. Firstly, it prevents further IOL tilting thereby preventing IOL drop. Secondly, it helps to safely manipulate the IOL back to pupillary plane. Then, the haptic can be re-grasped with microforceps. Thus, IOL-Sling acts as “the third hand” for the surgeon. Uncommonly, while attempting to retrieve the trailing haptic, the previously exteriorized leading haptic may slip back into the vitreous cavity. We encountered one such scenario. IOL-sling prevented further slippage of IOL into vitreous. IOL was retrieved back through the superior SICS tunnel and SFIOL was implanted again safely using the IOL-Sling technique.

Similarly, retro-pupillary iris claw lens implantation is also gaining popularity recently. But enclaving the claw lens by a novice surgeon sometimes carries the risk of IOL slippage or drop especially during enclaving the trailing haptic and the risk doubles when one is not sure about the enclavation of the leading haptic. IOL-Sling technique can prevent this catastrophe.

The limitation of our technique is that it cannot be used in foldable IOLs. We have tried using this technique by making a double loop of the suture around one of the haptics and tightening it, before loading it into the injector. The procedure is cumbersome and has the probability of haptic slipping out of the loop. The double loop also makes the removal of suture difficult after IOL implantation.

Conclusion

In conclusion, IOL-Sling is a simple yet effective technique which adds a safety margin in management of challenging

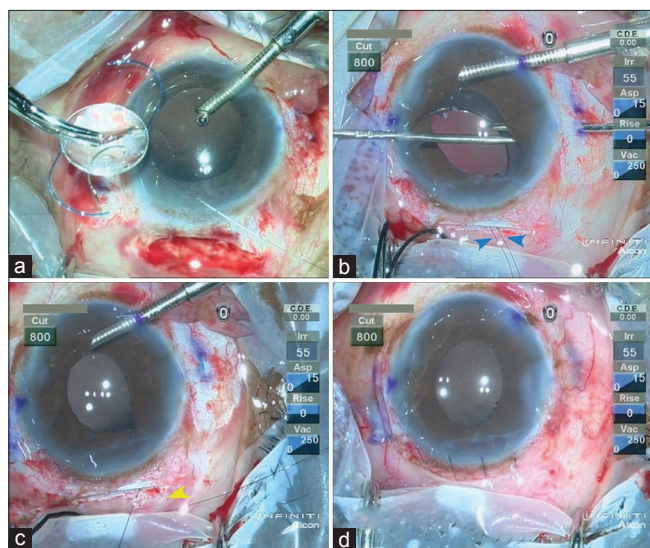


Figure 2: Sutureless SFIOL. (a) 9-0 Nylon Suture (IOL-Sling) is threaded through the dialling hole. (b) Externalization of trailing haptic. Note that the suture ends are outside the sclerocorneal tunnel (two blue arrow heads). (c) One arm of the sling is cut (yellow arrow head). (d) Stable SFIOL

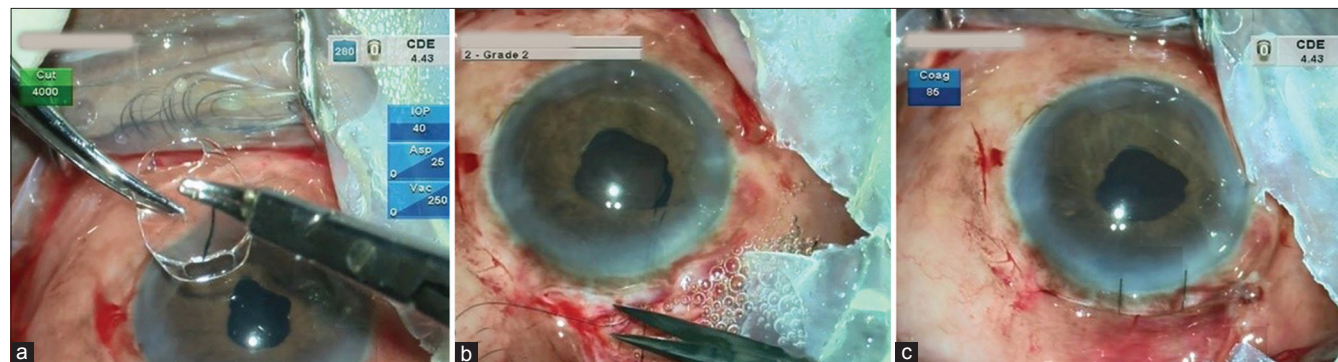


Figure 3: Retro-pupillary iris claw intraocular lens. (a) 9-0 Nylon Suture (IOL-Sling) is threaded through the haptic. (b) One arm of the sling is cut with scissors. (c) Stable retro-pupillary iris claw intraocular lens

case scenarios. Its relevance can never be overemphasized in resource limited settings and for novice surgeons.

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Conflicts of interest

There are no conflicts of interest.

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