Surgical Technique

Alternate iris bypass technique of iridodialysis repair

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We describe a novel technique "alternate iris bypass technique" of iridodialysis repair in four patients experiencing traumatic iridodialysis along with cataract. In these cases, we have combined iridodialysis repair with phacoemulsification and intraocular lens implantation. The main advantage of this technique is that edges of the iridodialysis can be visible till the end of the repair by bypassing the iris tissue in alternate bites which helps in minimizing the corectopia of the pupil and localized iris clumping.

Key words: Iridodialysis repair, iris repair, traumatic iridodialysis

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Iridodialysis is defined as the detachment of iris tissue from its root of attachment.[1] It commonly occurs after blunt and penetrating ocular trauma and complicated intraocular surgeries. Diplopia, glare, photophobia, and cosmetic alterations are the main indications for the iridodialysis repair.

There are various methods described for the iridodialysis repair and each technique may lead to adverse effects like corectopia and angle-closure.[2-6] In this article, we described a new technique; "alternate iris bypass technique of iridodialysis repair" which is inspired from the technique of hand stitching of clothes and has the main advantage of visibility of edge of iridodialysis throughout the surgery which helps in passing the needle of the polypropylene suture through thin iris tissue in alternate bites till the last suture bite, thereby minimizing the corectopia.

Case

A 55-year-old female presented to us with the chief complaints of diminution of vision in the right eye following blunt trauma with firecracker 2 months back. On examination, best-corrected visual acuity in the right eye was hand movements close to face and 20/20 in the left eye. Intraocular pressure (IOP) was 29 (without antiglaucoma medications) and 18 mmHg for the right and left eye, respectively. There was an iridodialysis from 10'0 clock to 1'0 clock with a white traumatic cataract [Figs. 1a, 2a, and 3a]. Ultrasonography revealed an echo-free vitreous cavity with the attached retina. Anterior and posterior segments of the left eye were unremarkable. Starting antiglaucoma medications, right eye iridodialysis repair (Alternate Iris Bypass technique) combined with phacoemulsification, and posterior chamber intraocular lens implantation (PCIOL) were done in the same sitting to achieve a perfectly round pupil. Postoperative best-corrected visual acuity was 20/40 (-0.5 DS/-0.50 DC × 30°) and IOP was 17 mmHg on eye drops brimonidine-timolol and dorzolamide at the last follow-up of 6 months.

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The main surgical steps [Video 1] are the creation of fornix-based localized peritomy with extent corresponding to the site of iridiodialysis; 10'o clock to 1'o clock [Figs. 2b and 3a], making a partial thickness scleral flap 2 mm away from the limbus using a crescent knife along the extent of iridodialysis [Figs. 2b and 3a], paracentesis is done at the limbus with a 15° side port knife opposite to the iridodialysis and sodium hyaluronate 1.4% is injected to maintain the anterior chamber [Figs. 2c and 3b]. One end of the long needle of the 10–0 polypropylene suture is inserted in the sclera at 10'o clock and simultaneously a 26 G long needle (1.5") is introduced into the anterior chamber through the paracentesis and positioned at the 10'o clock edge of the peripheral iris which helps in guiding the location for passing

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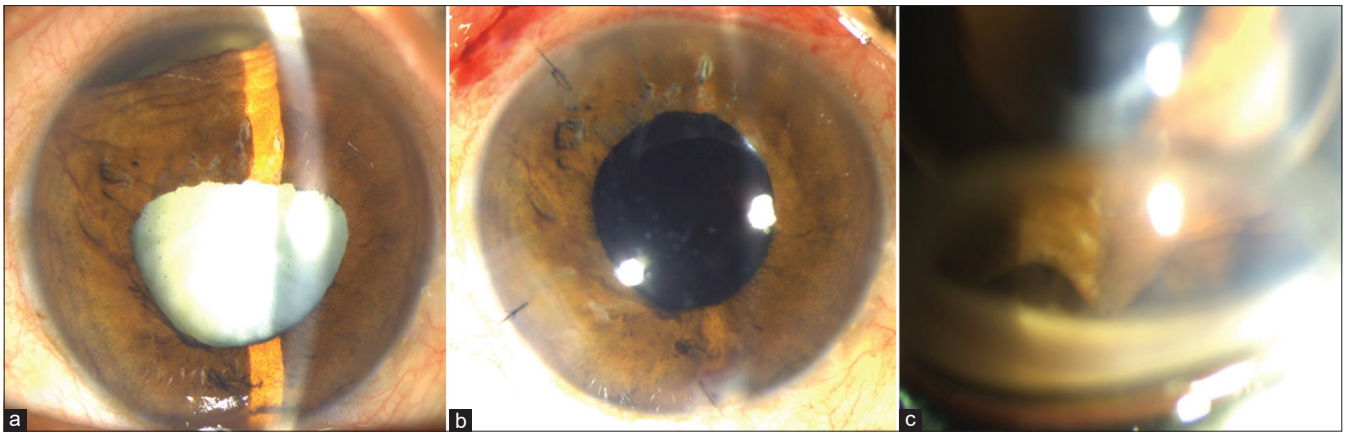

Figure 1: (a) Right eye shows iridodialysis from 10'o clock to 1'o clock with white cataract with D-shaped pupil. (b) Shows post iridodialysis repair with posterior chamber intraocular lens. (c) Gonioscopy shows the focal attachment of the iris at the angle at the suture site without complete angle closure

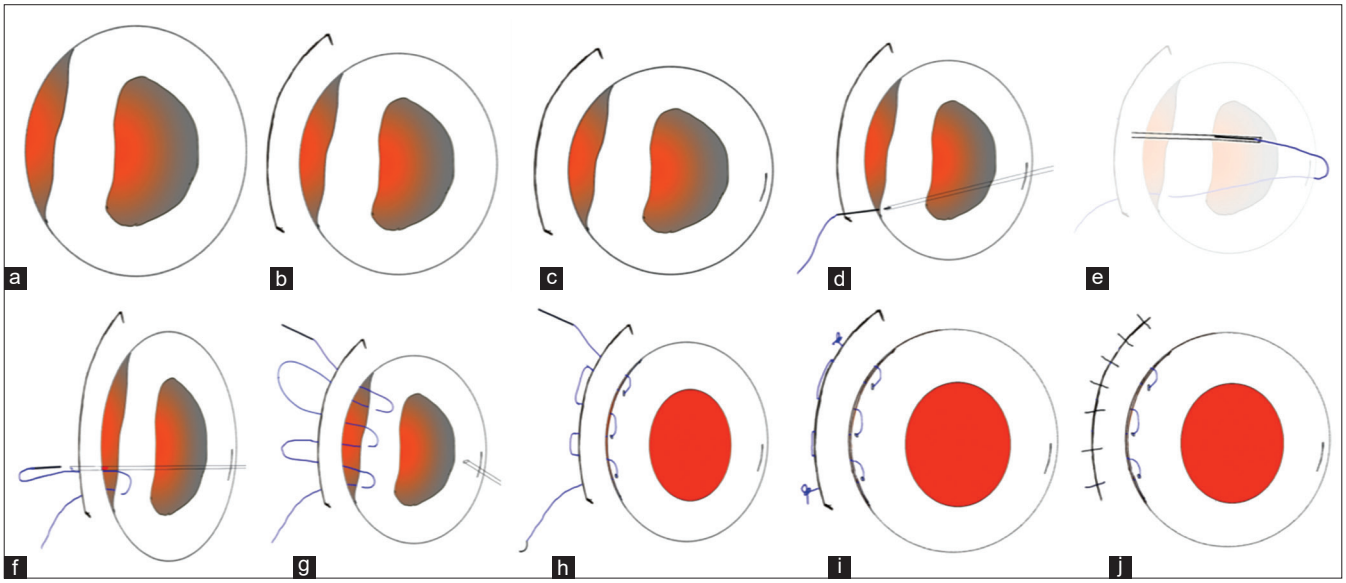

Figure 2: (a-j) Shows diagrammatic representation of the procedure (surgeon's right eye temporal view). (a) shows iridodialysis with D –shaped pupil, (b) shows peritomy and scleral flap made corresponding to the extent of iridodialysis, (c) paracentesis made at the limbus opposite to the iridodialysis. (d) insertion of long needle of 10-0 prolene through sclera (ab externo) with simultaneous insertion of 26 G long needle through the paracentesis and passing 10-0 prolene needle into the edge of the iridodialysis and then through the 26G needle, (e) complete insertion of long needle of prolene into the 26G long needle after taking out from the eye, (f) passing 26G long needle (along with long needle of prolene inside it) again through the paracentesis and inserting into the sclera from inside out *without passing through the iris tissue* which completes one cycle, (g) this cycle is repeated three times till it reaches the other end of the iridodialysis and multiple loops of the suture are made, (h) suture was tightened at both sides till the pupil becomes round, (i) sutures are tied at both ends, (j) scleral flap is sutured followed by peritomy closure

the long needle of the polypropylene suture. Thereafter, long needle of the polypropylene suture is advanced and passed into the peripheral iris edge with simultaneous counter pressure from the 26 G long needle and then further advanced and passed into the 26 G needle [Figs. 2d and 3c]. The counter pressure of 26 G needle at the edge of iridodialysis guides the long needle of the prolene suture to pass through the thin bite of iris tissue so that pupil eccentricity can be avoided. Further, the 26 G long needle is removed out of the paracentesis (with the 10–0 polypropylene long needle inside it) and then 10–0 polypropylene long needle is inserted completely into the 26 G needle (i.e., the swage of the suture needle facing towards the 26 G needle tip) outside the eye as shown in Figs. 2e and 3d. The 26 G long needle (along with 10–0 polypropylene inside it) is introduced again through the paracentesis and inserted into sclera from inside out *without passing through the iris tissue* (alternate iris bypass) [Figs. 2f and 3e]. This time, passing the 26 G needle into the sclera from inside out (approximately 0.5 mm close to the previous suture bite), without passing through the iris tissue, helps in focal attachment of the iris at the angle whereby complete angle coverage by iris tissue can be avoided. A 10-0 polypropylene long needle is then removed using the McPherson forceps which completes one cycle. This cycle is repeated till the other end of the iridodialysis i.e., till 1'o clock position is reached and multiple loops of prolene sutures are obtained [Fig. 2g]. Now both ends of the suture are pulled and tightened till the pupil becomes round

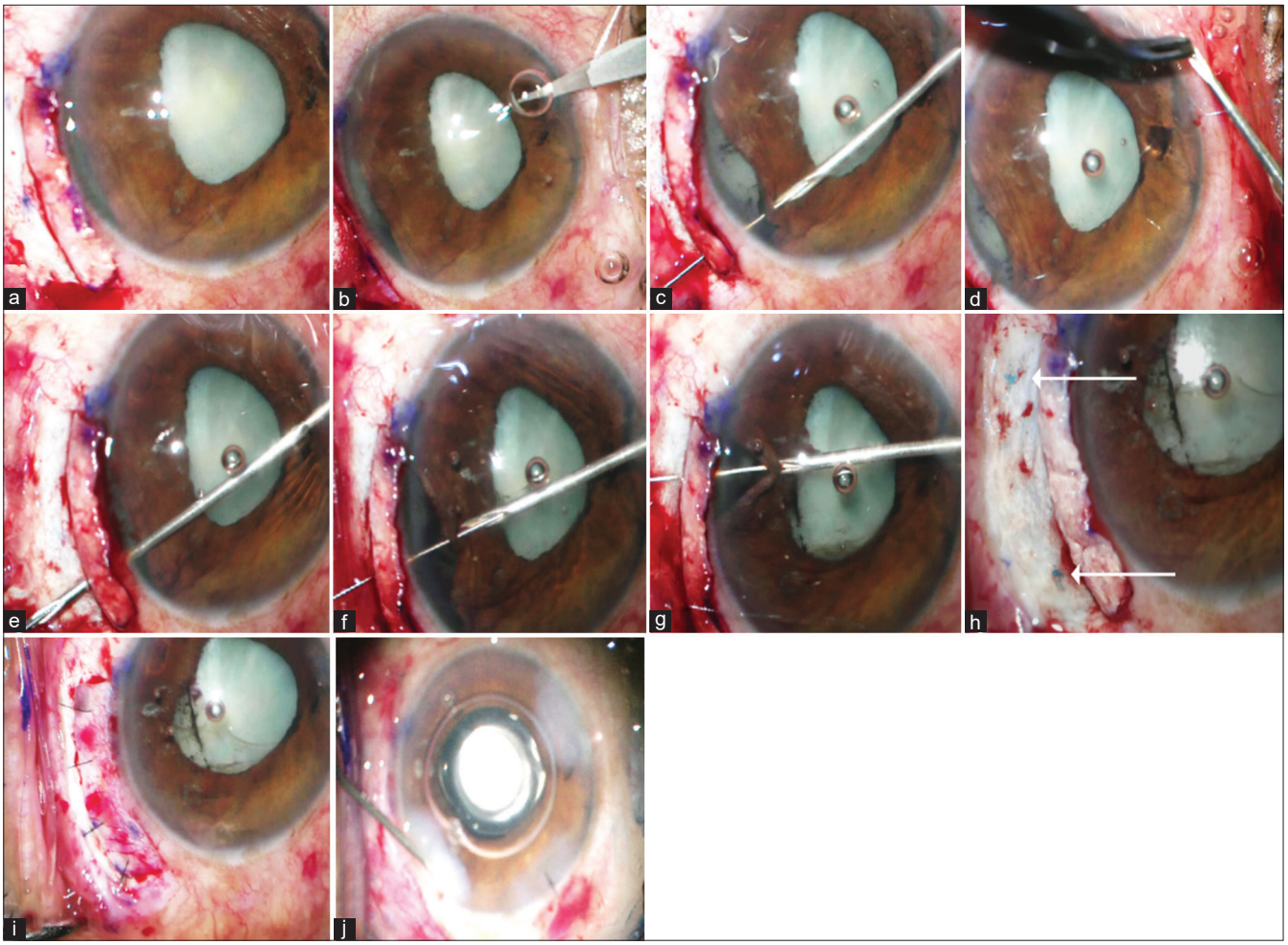

Figure 3: (a-k) shows the important steps of the surgery (surgeon's right eye temporal view). (a) shows peritomy and scleral flap made corresponding to the extent of iridodialysis (10'o clock to 1'o clock). (b) paracentesis made at the limbus opposite to the iridodialysis. (c) insertion of the long needle of 10-0 prolene through sclera (ab externo) with simultaneous insertion of 26 G long needle through the paracentesis and passing 10-0 prolene needle into the edge of the iridodialysis and then through the 26G needle. (d) complete insertion of long needle of prolene into the 26G long needle after taking away from the eye. (e) passing 26G long needle (along with long needle of prolene inside it) again through the paracentesis and inserting into the sclera from inside out *without passing through the iris tissue* which completes one suture cycle. (c, f and g) shows the edges of the iridodialysis which were visible while passing 10-0 prolene needle at all times. (h) suture was tightened on both sides till the pupil became round. (i) scleral flap sutured (j) peritomy was closed and phacoemulsification was completed with insertion of posterior chamber intraocular lens

[Fig. 2h]. Thereafter, both ends are tied into knots on the sclera [Figs. 2i and 3h]. The scleral flap and conjunctival peritomy are closed at the end of the surgery [Figs. 2j and 3i-j]. Table 1 describes the summary of the cases.

Discussion

Management of iridodialysis depends upon its location, extension, and symptoms of the patient. Small and superior iridodialysis are usually covered by the upper eyelid and do not require repair. Small iridodialysis can also be managed conservatively by using cycloplegics. Spontaneous attachment of iridodialysis without the use of atropine has also been reported.[7] Surgical correction of iridodialysis is indicated in cases of diplopia, glare, and flashes of light, confusion between objects, and also for cosmetic purposes.

There are many recent advances for the surgical correction of iridodialysis such as sewing technique and single knot sewing technique which have the advantage of being closed chamber procedures but passing prolene suture through the thin peripheral edge of the iris tissue still remains a challenge. The visibility of the edges of the peripheral iris also becomes poor after passing few sutures, especially during passage of the last suture, which further results in passage of polypropylene suture through the thick peripheral edges which may result in corectopia.[5] Continuous mattress suture technique has the advantage of firm attachment of the detached iris tissue to the sclera but it has the disadvantage of angle closure. In another technique "knotless technique", inside-out passage of needle from iris base into the sclera may lead to poor visibility of the iris base after the passage of few sutures, especially during the last suture bite.[7] However, in our technique "alternate iris bypass technique", inside-out passing of suture is bypassing the iris tissue partially by taking alternate bites through it, thus avoiding clumping of iris into the sclera, thus avoiding angle closure and corectopia.

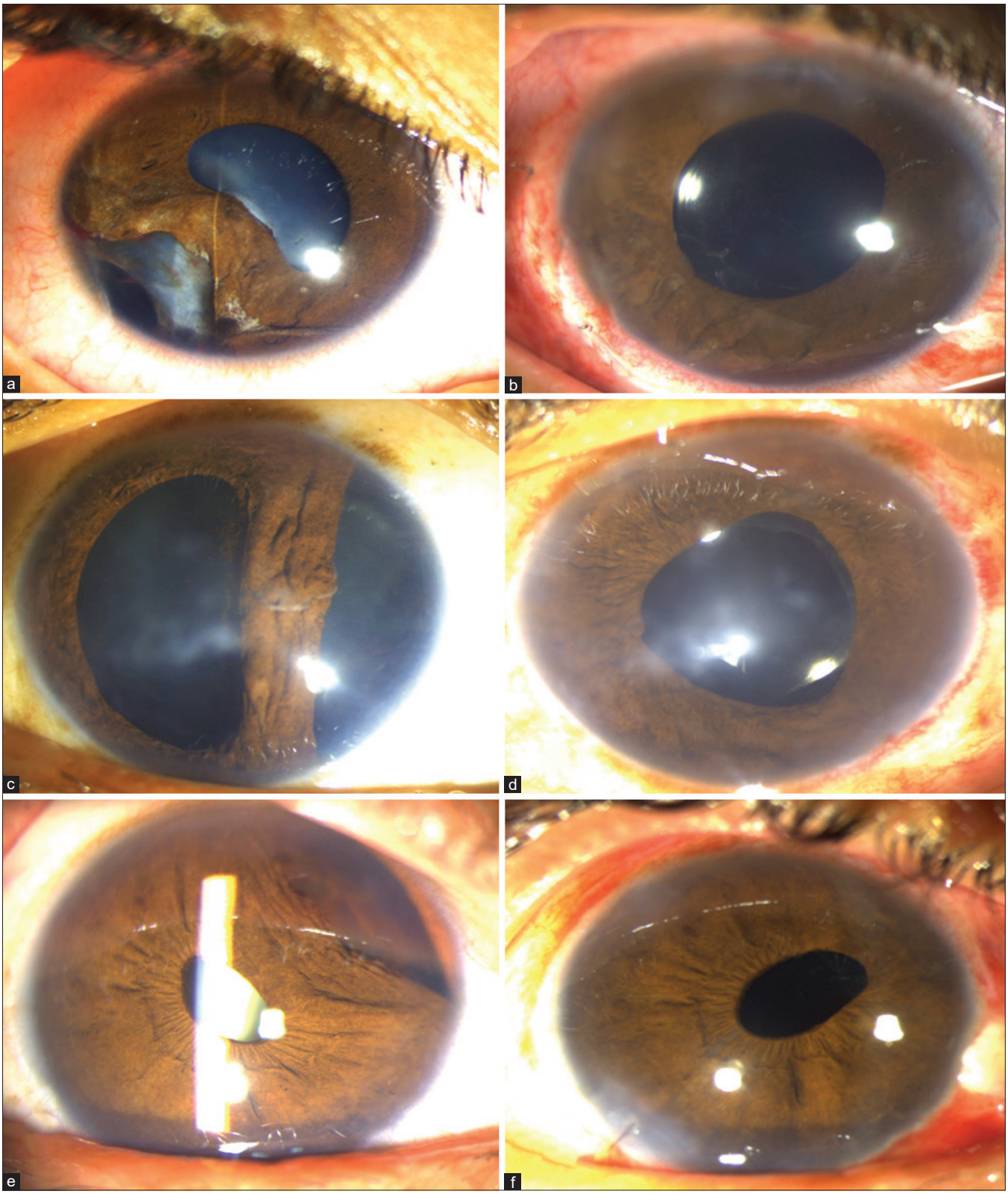

Figure 4: (a-f) (a) shows case 2 with iridodialysis from 6'o clock to 9'o clock hours with traumatic cataract. (b) shows post-operative image of iridodialysis repair with posterior chamber intraocular lens. (c) shows case 3 with iridodialysis from 1'o clock to 5'o clock hours with traumatic cataract. (d) shows postoperative image of iridodialysis repair with good repositioning of iris tissue. (e) shows case 4 with iridodialysis from 12'o clock to 3'o clock with traumatic cataract. 4f shows postoperative image of iridodialysis repair with good anatomical iris tissue repositioning

Table 1: Summary of the cases

	Age and sex	OD/ OS	Cause of iridodialysis	Location and extent of irido-dialysis	Cataract	Cataract grade	Surgical intervention	Pre -operative BCVA	Post -operative BCVA	Follow up duration
Case 1	55 year female	OD	Blunt trauma by firecracker injury	Superotemporally from 10'o clock to 1'o clock [Figure 1a]	Yes	Total white cataract	Iridodialysis repair (Alternate iris Bypass technique) combined with phacoemulsification with PCIOL implantation [Figure 1b]	Hand movement close to face	20/40 (-0.5 DS/-0.50 DC × 30)	6 months
Case 2	13 year male	OD	Blunt trauma by firecracker injury	Inferotemporally from 6'o clock to 9'o clock [Figure 4a]	Yes	Total white cataract	Iridodialysis repair (Alternate iris Bypass technique) combined with phacoemulsification with PCIOL implantation [Figure 4b]	20/400	20/60 (-1.50 DS × 70DC)	3 month
Case 3	32 year female	OD	Blunt trauma by assault	Nasally from 1'o clock to 5'o clock [Figure 4c]	Yes	Total white cataract	Iridodialysis repair (Alternate iris Bypass technique) combined with phacoemulsification with PCIOL implantation [Figure 4d]	Counting fingers close to face	20/80 (-1.25 DS/-0.75 DC × 100)	1 month
Case 4	48 year male	OD	Blunt trauma with bull horn	Superonasally from 12'o clock to 3'o clock [Figure 4e]	Yes	Nuclear opacity grade III	Iridodialysis repair (Alternate iris Bypass technique) combined with phacoemulsification with PCIOL implantation [Figure 4f]	Counting fingers at 1 feet	20/20 (plano)	6 month

In this technique, the peripheral edge of the iridodialysis is visible even while passing the last suture [Fig. 3c, f and g]. Besides, the 26 G long needle with bevel up will guide the location for the passage of polypropylene suture. Thus, the passage of the prolene suture through the thin peripheral tissue of iris is assured, leading to reduced eccentricity of the pupil [Fig. 1b]. The gonioscopic picture of our first patient shows focal attachment of the iris tissue at the angle, only at the suture sites, whereby the complete coverage of angle by iris tissue is avoided as evident in Fig. 1c.

Advantages of alternate iris bypass technique

Firstly, we can clearly see the iridodialysis edges throughout the surgery so that the passage of the polypropylene suture through the thin iris tissue is possible. Therefore, corectopia can be reduced.

Secondly, tightening of the prolene suture can be done from both ends until the pupil becomes round to avoid pupil eccentricity. Only one knot at either end is needed. Thirdly, there is no iris tissue incarceration in the wound due to alternate iris tissue bypass during the ab interno passage of suture. Lastly, edges of the iridodialysis are attached to the sclera focally only at the sutural site and there is no angle closure by the iris tissue (as evident in Fig. 1c) which can prevent risk of glaucoma post-surgery in cases of large iridodialysis.

Disadvantages of alternate iris bypass technique

There may be the risk of suture getting cut while passing 26 G needle into the sclera ab interno. Moreover, the ab interno procedure is blind as there is no external guide to come out exactly at the intended point.

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Conflicts of interest

There are no conflicts of interest.

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