• Letter to the Editor •

Single self-leading suture technique for iridodialysis repairment

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Dear Editor,

We described an innovative "single self-leading suture technique" for repairing iridodialysis. Instead of moving the needle forth and back, our method is easier to manipulate in the narrow surgical space between the cornea and lens, which will decrease the unnecessary complications related to iatrogenic injury. We provide an economical friendly and less time-taking method, which improves the suture accuracy.

Iridodialysis, detachment of the iris root from the ciliary body, has various causes, including surgery, trauma, congenital malformation, and spontaneous detachment[1]. The iris root is fragile and when the iris is exposed to trauma or other tractional force, iris root separation from ciliary body frequently occurs[2]. Symptoms of the iridodialysis include blurred vision, monocular diplopia and photopsia[3].

A wide range of treatment options are available for iridodialysis, depending on the severity of the detachment. Rosenberg *et al*[4] described the use of an external double-flange in a sewing machine-like fashion to perform scleral fixation in iridodialysis repair. Kusaka *et al*[5] reported a method involving the use of a single-pass double-flanged polypropylene suture with rivets, intricate suture techniques, knots, and/or advanced equipment such as anterior chamber maintainers.

Surgical repair is challenging due to the tenderness and flexibility of the iris and the restrictive space in the anterior chamber, as the needle passes over the pupil and lens, which involves a high level of risk[6-7]. The complications of traditional surgery include a decrease in vision, damage to the lens capsule, corectopia, hyphema and increased intraocular pressure[8].

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Here, we describe a novel safer approach of using an external double-flanged, adjustable and repeatable suture technique. This method uses only polypropylene sutures and does not require specialized equipment.

An illustration of the single self-leading suture technique was presented in Figure 1, and intraoperative images were shown in Figure 2, to explain the suture technique. In Figure 2A, iridodialysis is present at approximately 10-13 clock hours. A scleral tunnel was made at the corresponding area. Two side corneal incisions were made at convenient locations, respectively made at 3 and 9 clock hours, and a 10-0 polypropylene suture was prepared in advance and is inserted into the cannula of a 31-gauge needle (Figure 2B). The suture-in-needle was passed through the bottom of the scleral tunnel 2.0-2.5 mm posterior to the limbus at site 1 (Figure 1A) and was then passed through the iris root. A Sinskey hook or an intraocular forceps was introduced into the anterior chamber *via* a corneal paracentesis site, the loop of the suture at the tip of the needle was grasped, and one end of the suture (End a, in Figures 1B, 2C) was pulled out *via* the paracentesis site. The needle was withdrawn from the globe while keeping the suture in the cannula. The suture-in-needle was then passed through the scleral and iris root at site 2 (Figures 1C, 2D), and the suture loop at the tip of the needle was re-grasped and pulled out through the same paracentesis site. End a of the suture was passed through the loop as long as enough (Figures 1D, 2E). Then, the needle and the suture loop were withdrawn from the globe, while pulling End a of the suture out at site 2 (Figures 1E, 2F). After the removal of the needle, the suture passing the dialyzed iris and sclera was knotted (Figure 1F).

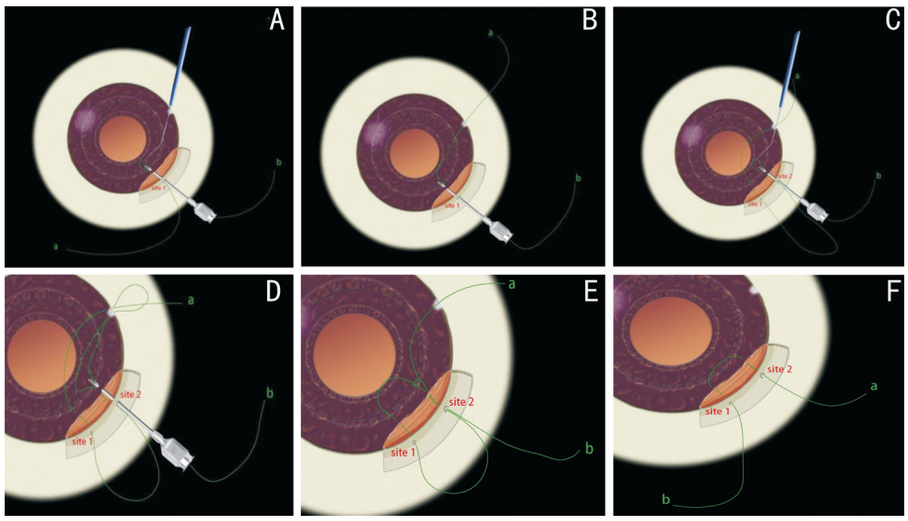

Figure 1 Animated illustration of single self-leading suture for iridodialysis A-F were separated steps of the technique shown by animated illustration. Sites 1-2 were two scleral tunnels 2.0-2.5 mm posterior to the limbus. Ends a-b were both ends of the suture. A: The suture-in-needle was passed through the bottom of scleral tunnel 2.0-2.5 mm posterior to the limbus at site 1. B: The loop of the suture at the tip of needle was grasped by forcep and one end of the suture (End a) was pulled out of paracentesis. C: The needle was withdrawn from the globe while keeping the suture in the cannular. The suture-in-needle was then passed through scleral and iris root at site 2. D: End a of the suture was passed through the loop as long as enough. E: Then the needle and the suture loop was withdrawn for the globe, while pulling End a of the suture out at site 2. F: After the needle was removed, the suture passing the dialyzed iris and sclera was knotted.

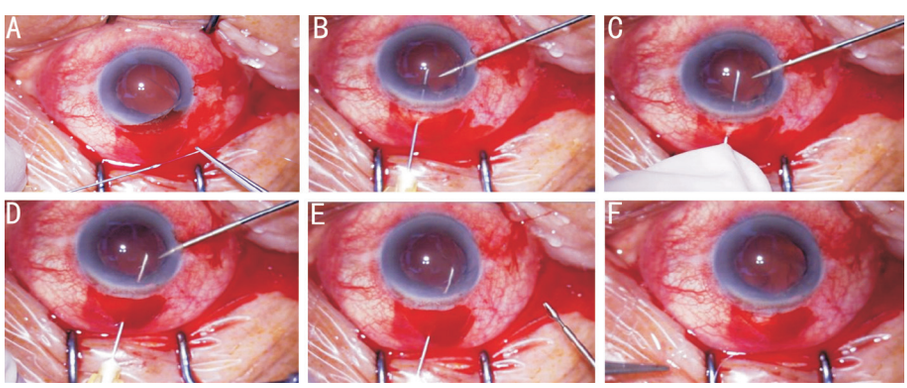

Figure 2 Intraoperative surgery photos of single self-leading suture for iridodialysis A-F were separated steps of the technique captured during the surgery. A: Threading the 10/0 suture into 31-gauge needle. B: Pinching the flange out of the 9 o'clock cornea side incision. C: Making the flange effectively flat the stretched. D: The peripherical iris paralleled to the first paracentesis is penetrated with the needle and loop suture is created. Taking the loop suture out of the 9 o'clock cornea notch. E: Holding initial remained flange into the loop suture completely. F: Initial free end within the loop were already moved out of the second scleral paracentesis and then making two free ends flat the stretched.

When the needle was in the anterior chamber, a tweezer was used to pinch the flange within the needle out of the contralateral corneal side incision, effectively flattening it. Next, the needle was led out of the globe, and the suture remained in the 31-gauge needle without withdrawal. The needle was repassed through the scleral wall, the second site was made at the right side of the first insertion, and then the peripherical iris parallel to the first paracentesis site was penetrated. The loop suture was created after connecting the two iris edges and was taken *via* the 9 o'clock cornea notch. The initial flange was held and pressed into the loop completely. Next, the needle with the loop complex was moved back to the second scleral paracentesis site, passing the dialyzed iris and sclera. Finally, the iris knot was completed, the scleral tunnel was closed, and conjunctival closure was performed.

Four patients with iridodialysis were successfully treated using the single self-leading suture method. In this study, we present the single self-leading suture method for iridodialysis repair based on previously described procedures as well as a verification of a new technique of iridodialysis repair requiring no needle passage through the lens and no specialized sewing equipment. We illustrate the loop formation and the suture procedure. Similar techniques have not been reported previously. Four patients with iridodialysis were followed up closely for three months without complications of reoperations noted.

The repair of iridodialysis is difficult and delicate because of the flexibility and tenderness of the iris tissue, the limited surgical space, and the back-and-forth passage of the needle. This method has a wide range of benefits that may address these difficulties. The leading benefit is the improved the security of the surgery, which is achieved by avoiding the passage of the needle across the lens and pupil, which potentially causes iris tears and secondary lens damagement. Compared with conventional techniques, our method allows easier to manipulation in the narrow surgical space between the cornea and lens, which may decrease complications related to iatrogenic injury. In addition, the method buries the suture in the scleral tunnel to prevent future suture erosion. This technique is not only economical but also less time-consuming. The problems encountered during the procedure are threading the suture into a 31-gauge needle, the formation of the loop suture, and familiarity with all the sutures' orientations. However, these are minor impediments and surmountable with enough practice. Another limitation is that the technique was only performed in a small sample; nevertheless, all four cases treated using the single self-leading suture technique. In the future, randomized comparative studies are required to elucidate the merits of our technique compared with those of conventional techniques and contribute to a better understanding of the method to standardize the procedure.

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