PEARLS FOR THE YAMANE TECHNIQUE

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There has been plenty of buzz in the retina community about the Yamane technique. When the team at Retina Today was strategizing how best to cover the topic, we decided that deferring to our colleagues in the anterior segment was a good starting place. This article, which is a modified version of a cover story from Retina Today’s sister publication Cataract & Refractive Surgery Today, can be viewed in its entirely online at bit.ly/RetinaTodayYamane.

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BY BRANDON D. AYRES, MD

The Yamane technique: Step by step.

Pseudoexfoliation syndrome is one of the most common reasons for lens dislocation during cataract surgery. For such cases, and for eyes in which capsular support is absent, multiple IOL fixation techniques have been used over the years. In my practice, we have transitioned from suture techniques to an elegant sutureless haptic fixation technique, the Yamane technique.

This has been our primary technique for scleral fixation of an IOL for the past 2 years. The procedure has its complexities and involves performing multiple components in a specific order. Now, the technique can be simplified using the Scleral IOL Fixation Solutions Pack (SFP; MicroSurgical Technology), which provides all the tools required to use the Yamane approach for scleral fixation of IOLs.

THE CONCEPT

The idea behind the Yamane technique is to externalize the haptics of a three-piece IOL using thin-walled 30- or 27-gauge needles through two transconjunctival sclerotomies. The haptics of the IOL are carefully laced into the lumen of the needles using intraocular forceps. Then the needles are used to externalize the haptics on the conjunctival surface. Next, low-temperature cautery is used to make a flange at the end of the haptics. This flange or bulb prevents the haptics from prolapsing back into the posterior chamber, and the three-piece IOL is thereby fixated efficiently in the posterior segment in the absence of capsular support.

STEP BY STEP

The Yamane technique involves the following steps:

► Step No. 1

Carefully measure for the exact placement of the haptics at the beginning of the case (Figure 1). This is critical to minimize the risk of decentration or tilt of the IOL.

• Hint: Before inserting the IOL into the anterior chamber it is important to ensure that no vitreous is present.

► Step No. 2

Once the measuring is completed,

Figure 1. Measuring and marking of the needle insertion sites.
place the three-piece IOL in the anterior chamber. My preferred IOL for haptic fixation is the CT Lucia 602 (Carl Zeiss Meditec) due to the durability of its PVDF haptics. Typically at this point, I place the leading haptic in the nasal anterior chamber and leave the trailing haptic hanging out through the main incision.

- **Step No. 3**
  Maintain the anterior chamber. I like to use an anterior chamber maintainer in the eye in order to prevent hypotony.

- **Step No. 4**
  Make the transconjunctival sclerotomy with the thin-walled 30-gauge needle.

- **Step No. 5**
  Make the first sclerotomy 2.5 mm posterior to the limbus. The intrascleral length of the tunnel is about 2 to 2.5 mm as well.

- **Step No. 6**
  Grasp the leading haptic using intraocular 25-gauge microforceps and carefully lace it into the lumen of the needle (Figure 2).

- **Step No. 7**
  Once the first haptic is securely laced into the lumen of the needle, the hub is released from the holding forceps, allowing the IOL to move into the eye.

  - **Hint:** Externalizing the trailing haptic is the point when surgeons can experience problems. To avoid challenges with the trailing haptic, do not externalize the leading haptic first. When the haptic is fixated in the needle, let the needle go. Externalizing the needle with the leading haptic at this point would lead to rotation of the IOL in the eye, moving the trailing haptic into a challenging position for lacing the haptic into the second needle. Placing the main incision slightly to the left will help ease placement of the trailing haptic (Figure 3).

- **Step No. 8**
  Introduce the trailing haptic into the anterior chamber, then grasp the second needle to perform the transconjunctival sclerotomy about 2.5 mm posterior to the limbus with core length of about 2 mm. This second sclerotomy is made exactly 180° across from the first one.

  - **Hint:** Ensure that the eye is pressurized with the anterior chamber maintainer whenever you make a sclerotomy.

- **Step No. 9**
  Once the second sclerotomy is made, visualize the lumen of the needle through the cornea and pupillary space. I always aim to achieve a similar angle of the haptic and the needle for even alignment of the IOL. Using the microforceps, grasp the second haptic and place it in the lumen of the needle.

- **Step No. 10**
  With the second haptic now introduced into the lumen of the needle, externalize the haptic by removing the needle through the transconjunctival sclerotomy, then carefully grasp the haptic (Figure 4).

- **Step No. 11**
  With low-temperature cautery, melt about 1 to 2 mm of the terminal end of the haptic to create a flange or bulb that will prevent the haptic from rotating.
SURGICAL PEARLS

Go to the other side of the eye, 180° across, where the needle is still penetrating the sclera holding the leading haptic of the IOL. Externalize the needle and grasp the haptic on the conjunctival surface. Again, melt the end using low-temperature cautery.

> Step No. 13
Prolapse the haptic through the conjunctiva and force it into the scleral channel.

> Step No. 14
The result should be a well-centered three-piece IOL suspended in the posterior segment with no sutures (Figure 6).

CONCLUSION

The learning curve for this technique to place an IOL without capsular support is steep, but once it is mastered it should take only 15 to 20 minutes to complete. In my experience, the greatest challenges with this technique are measuring for placement of the needle insertion sites and lacing the trailing haptic into the lumen of the needle. The most difficult intraocular maneuver is probably lacing the trailing haptic. This is very challenging, but with the right approach and instrumentation, unnecessary complications can be avoided.

Figure 6. A well-centered three-piece IOL placed using the Yamane technique.

BY ZAINA AL-MOHTASEB, MD

A few pearls for the Yamane technique.

PEARL NO. 1
Technically any three-piece IOL can be used in the Yamane technique; however, we have found that IOLs with PVDF haptics are durable and resistant to kinking and breaking. For this reason, the CT Lucia 602 is our preferred IOL for performing this procedure.

PEARL NO. 2
Loosely attach each 30-gauge needle and do not use a luer-lock syringe. This will avoid the possibility of experiencing difficulty detaching the syringe.

PEARL NO. 3
Fill syringes with a small amount of balanced saline solution and make sure to irrigate the needle before the scleral pass. This can help to avoid air bubbles that can interfere with the view for needle insertion during haptic fixation.

PEARL NO. 4
Use an anterior chamber maintainer to ensure a firm eye during the creation of the sclerotomies.

PEARL NO. 5
If the IOL is poorly centered or tilted, the three most common causes are:
- The needle insertions are not 180° apart;
- The needle insertions are not the same distance from the limbus or;
- The scleral pathways vary in length and/or direction.

If the needle insertion points are different distances from the limbus or are not 180° apart, one of the haptics must be reinserted into the eye and refixed with a new needle pass. If the scleral tunnels are of different lengths, one or both haptics can be trimmed and recauterized to improve centration.


The small-incision, sutureless, transconjunctival scleral fixation technique first described by Yamane et al1 for use in eyes with absence of capsular support involves the creation of small-gauge sclerotomies and a small clear corneal incision, resulting in a fast visual recovery and a low risk of postoperative hypotony. A few pearls can help surgeons overcome the challenges of performing this technique.
MARKING AND NEEDLE TUNNEL CREATION

IOL SELECTION

I use the CT Lucia 602 IOL because this lens has PVDF haptics, which are robust and do not kink or break easily. Additionally, even when the haptics of this IOL have been bent acutely, they return to their original configuration.

MARKING AND NEEDLE TUNNEL CREATION

Controlling the entry point into the eye and the length of the tunnels is vital for this technique. It’s important to mark the patient carefully and to make sure that the marks are exactly 180° apart and exactly the same distance from the limbus, and that the tunnel length and angle of entry are symmetric. If anything is off, the IOL will be decentered. I put both of my marks 2 mm behind the limbus.

Each tunnel should be about 1 to 1.5 mm in length. An infusion line is useful when making the tunnels. If the eye is at a constant and firm IOP, I can control the tunnel length and there will be less bleeding. I enter a little acutely with the needle, then create the tunnel, then enter acutely again. The tunnels should be more or less parallel to the limbus; they can be angled ever so slightly posterior, about 5° away from the limbus, but no more than that. For a myopic patient, I may angle the tunnels a bit more than 5°; and a bit less if the patient is hyperopic. This is because the bigger the eye is, the less haptic there will be to work with.

INSERTING THE HAPTICS

The next step is to feed both haptics into the needles. I feed one haptic into one needle, let go of it, then move to the second needle, feed that haptic in, and then rotate them simultaneously. I pull both needles out of the eye at the same time, and as I do that both haptics come out of the eye at the same time. When I do it this way, the lens has to rotate. If the lens doesn’t rotate, then one haptic will pull out, but the other haptic won’t come out because it hasn’t rotated. But if both haptics are rotated by extracting both at the same time, the lens will rotate and both haptics will come out at the same time. With a 30-gauge needle, the haptics will not slip back into the eye. I can just pull the haptics out, let go, and the haptics won’t go anywhere.

Next I grab both haptics with the forceps and push them so that each side is only a little bit out, to see if the lens is centering the way I want it to. If I’ve done everything symmetrically, the lens should center. If it looks like it’s going to center well, I do a small haptic melt on each side and push it into its tunnel, and I’m done.

The haptic melt should not be too big. If it is too big, it will sit on the surface of the eye and not go into the tunnel. I just make a little mushroom tip, and that can be pushed into the tip of the tunnel.

ADDITIONAL POINTERS

Inject OVD before performing the vitrectomy. A vitrectomized eye will not hold an OVD; it will just drop into the back of the eye. I inject dispersive OVD into the eye using the iris and vitreous as a kind of backboard that allows me to press the OVD up against the cornea and create protection for the cornea. In the vitrectomized eye, the IOL will serve as the backboard.

Use self-sealing incisions. Self-sealing incisions are important for the Yamane technique—and any other technique, for that matter. If the eye is leaking, the surgeon will not have control. I make sure that my incisions—even larger incisions—are fashioned so that when I put the infusion line in, they seal themselves or close off.

A redock is my last resort. After I pull both haptics out, I test the centration and tilt of the optic by manipulating the haptics so that there is an equal amount of externalized haptic—about 1 to 2 mm on each side. If everything has been done symmetrically, the lens should center well at this point, and if it does, I will go ahead and melt the haptic tips and be done. If, on the other hand, there appears to be some tilt or decentration, I pull one haptic out a bit more than the other to see if I can compensate and center the IOL. If that does not fix the problem, I melt the side I consider the most optimal and redock the other side. What I mean by redock is that I will create a flange on one side to secure it and I make another needle path with the 30-gauge needle, designed to correct for whatever centration or tilt issue is present by compensating for the asymmetry causing the positioning...
As a glaucoma and complex anterior segment specialist, I am aware that some IOL fixation techniques can cause real problems. Specifically capsule-independent IOL fixation runs the risk of resulting in uveitis-glaucoma-hyphema (UGH) syndrome, which is purely iatrogenic. When the eye is marked for needle passes, one often measures from the limbus, and it is easy to mischaracterize where vital intraocular structures such as the ciliary body are located. Instead, I advocate measuring posteriorly from the scleral spur, which can often be visualized even without making a conjunctival peritomy as the end of the blue zone. The spur, or the surgical limbus, always correlates to intraocular anatomy. I routinely place my needle tracks at least 2 mm posterior to the spur, and in this way I avoid running into the ciliary body. Additionally, I try to ensure that the needle is perpendicular to the surface of the sclera, which keeps the internal entry at the same distance from the spur as the external entry. If the needle is angled in the iris plane, there is risk of the internal needle entry emerging relatively anterior, again putting the ciliary body and posterior iris at risk for IOL-induced chafe.

Another key pearl for any scleral-fixated IOL procedure is to place a peripheral iridotomy. In eyes lacking capsular and zonular stability, the iris can exhibit a great degree of iridodonesis, increasing the risks of intermittent contact between the IOL and the iris, reverse pupillary block, and even pupil capture of the optic. A simple iridotomy placed at the time of IOL fixation can mitigate that risk greatly. I typically use a vitreous cutter at a 1 cut per minute rate so I can get a single, small, clean opening.